



# 3

## Adapting the Project Management Processes

### CERTIFICATION OBJECTIVES

- 3.01 Learning the Project Processes
  - ✓ Two-Minute Drill
- Q&A Self Test

**D**id you ever have one of those Junior Scientist Chemistry Kits when you were a kid? These kits had recipes for different reactions, formulas, and experiments. You could make smoke, sparks, smells, and iridescent colors if you followed the step-by-step directions. Of course, if you were a “real scientist” you’d experiment and things could go haywire. One small change, an uncalculated variable, or a mistaken catalyst could cause your whole experiment to literally blow up in your face.

Sounds like project management, doesn’t it?

All of the different elements in project management are integrated. The cost, time, scope, cultural achievability, technical achievability, and more are all related and interdependent. A small change, delay, decision (or lack thereof) can amplify into serious problems further down the project timeline.

The work of project management is full of processes—a whole bunch of ‘em. There are logical groupings of these processes: initiating, planning, executing, monitoring, controlling, and, finally, closing. Of course, for your PMP exam you’ll want to be familiar with all these process groups and all the activities that happen in each group. But more importantly (yes, more important than your PMP exam even) you’ll need to know how to apply these processes to your job out in the real world.

Just because there are loads of processes available doesn’t uniformly mean that a project manager can—or should—complete every project management process in every project. The project manager and the project team should determine which processes are needed in order to successfully complete the project. As a whole, for projects to be successful you’ll need four things:

- The application of the appropriate project management processes to complete the project
- A solid plan and execution of this solid plan to meet project and product requirements
- A method to satisfy stakeholder expectations
- An approach to keep the project’s time, cost, quality, scope, resources, and risk in balance

Project management, unlike those Junior Scientist Chemistry Kits, doesn’t come with exact step-by-step directions. It is a fluid process with general guidelines, stakeholder requirements, and you leading the project to achieve the customer’s requirements. In this chapter, we’ll talk about how all of the different parts of

a project are interrelated. Specifically, we'll discuss the project processes and their interactions, the ability to customize the project processes, and how all of this business works towards your current project of passing the PMP examination.

**CERTIFICATION OBJECTIVE 3.01**

# Learning the Project Processes

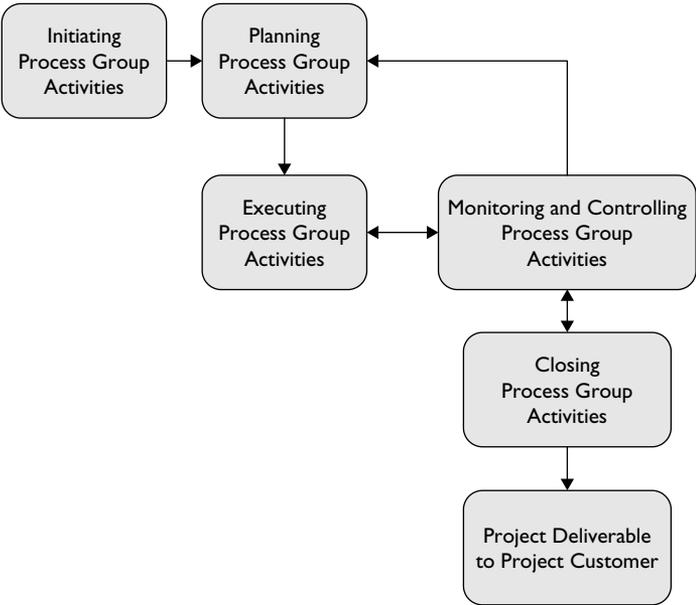
All projects, from technology to architecture, are composed of processes. Recall that phases are unique to each project and that the goal of the phase is to conclude with a specific, desired result. The completion of phases is the end of the project, culminating in the creation of a unique product, service, or result. Processes are a series of actions with a common, parent goal to create a result, such as the one Figure 3-1 reflects. Processes within project management monitor and move the phases along.



***In your organization, you may treat equipment as a true resource. For example, manufacturing equipment, printing equipment, or even transactions may be treated as resources whose time is billable to project customers.***

**FIGURE 3-1**

Projects are completed through project processes.



People perform processes. It may be tempting to say that a piece of equipment, such as a manufacturing device, a computer, or a bulldozer, completes the process, but it is, technically for your exam, a person, or group of people that complete the process. Think of the processes within a project you've worked on. Know that the processes are not the individual activities, but the control of individual activities to complete a project phase.

## Identifying the Project Management Process Groups

The following are the five project management process groups and what occurs under each:

- **Initiating** The project is authorized.
- **Planning** Project objectives are determined, as well as how to reach those objectives with the given constraints.
- **Executing** The project is executed utilizing acquired resources.
- **Monitoring and controlling** Project performance is monitored and measured to ensure the project plan is being implemented to design specifications and requirements.
- **Closing** The project, its phases, and contracts are brought to a formal end.

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#### Watch

**Project management processes are the processes you'll want to study. Product-oriented processes, on the other hand, are unique to the organization creating the product.**

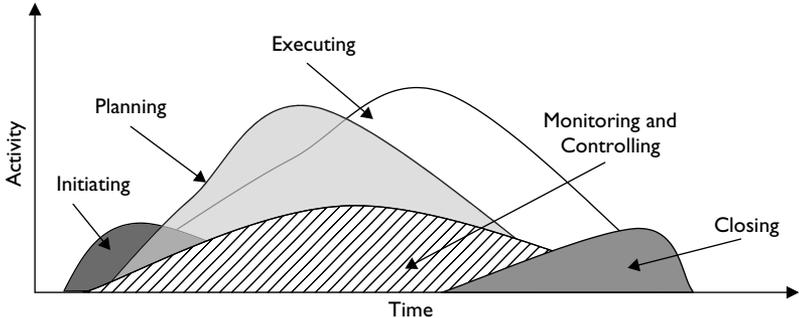
These process groups are not solo activities. The groups are a collection of activities that contribute to the control and implementation of the project management life cycle. The output of one process group will act as input for another process group. For example, one of the outputs of the initiating process is the project charter. The charter is thus input for the planning processes, being that it authorizes and sanctions

the project, the project manager, and the resources required to complete the project work. While there is a logical succession and order to the flow of the processes, process groups will overlap other groups (as shown in Figure 3-2).

Not only will process groups overlap, but some process groups may be repeated based on the activities within the project. Specifically, planning, monitoring and controlling, and executing processes are revisited throughout the project, as Figure 3-3 demonstrates.

**FIGURE 3-2**

Process groups may overlap other process groups.



For example, within a project designed to create a new piece of software, there will be logical project phases: design, build, test, implement, and so on. Within each of the phases, project processes can also exist. Each phase of the project has processes unique to the logical activities within that phase. The closing processes happen at the end of each project phase and at the end of the project. With that thought, know that the closing process of a project phase can serve as input for the next phase within the project.

There's more than one correct way to manage a project. It's a project manager's role to follow the predisposed method to project management that their organization subscribes to—or, in many instances, it's the project manager's role to find the best approach to reach a successful project conclusion. Regardless of the project management approach, the processes within the project management practices are the same: integrative and interdependent.

**FIGURE 3-3**

Processes may be iterative throughout the project.

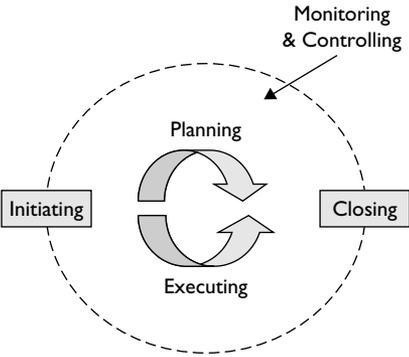
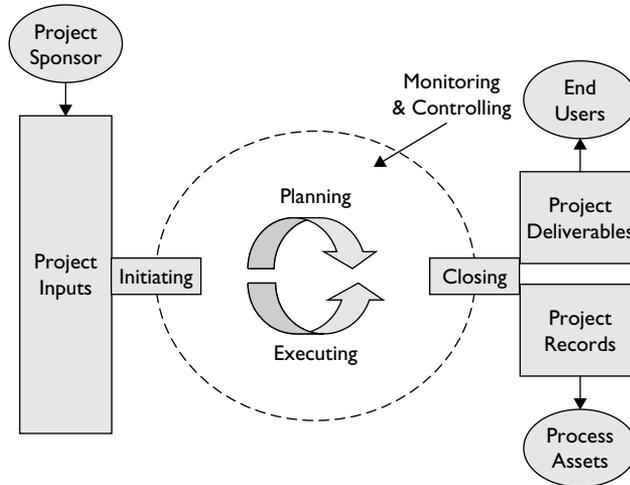


FIGURE 3-4

Project's management flows through project boundaries and iterations of processes.



Project management does, to some extent, follow W. Edwards Deming quality approach of “Plan-Do-Check-Act,” as shown in Figure 3-4. Project management is full of iterations, repetitive work, and constant controlling and monitoring. The primary difference between Deming’s model and PMI’s model is that a project will end with the closing process group.

## Identifying the Initiating Process Group

This process group launches the project process and allows the project manager to have the authority to begin the project. Project initiation, while simple on the surface, admits that there is some problem that a solution should solve. As a solution is considered, a level of authority is transferred from senior management to the project manager to lead the organization to the desired future state.

In most organizations, much of the work of the initiation process group happens outside of the project manager’s control and sometimes doesn’t even involve them. This is one of those “chicken-or-the-egg” scenarios. Many PMP candidates ask, “If a project manager isn’t identified until the charter is formed, what’s initiation got to do with the project manager?” Let’s be realistic for a moment: the project manager is involved with the initiation process group because their input, guidance, and participation is needed. Sure, sure, the project isn’t official until the charter is signed, but everyone usually knows who the project manager is going to be.

## Identifying Needs

A project is generally called upon to provide a solution to a problem or to take advantage of an opportunity. The needs of the current state are then answered by the deliverables of the proposed project. These needs might have to do with:

- Reducing costs
- Increasing revenues
- Eliminating waste
- Increasing productivity and efficiency
- Solving a business or functional problem
- Taking advantage of market opportunities

This is just a short list. There are countless other needs that can be addressed through project plans.

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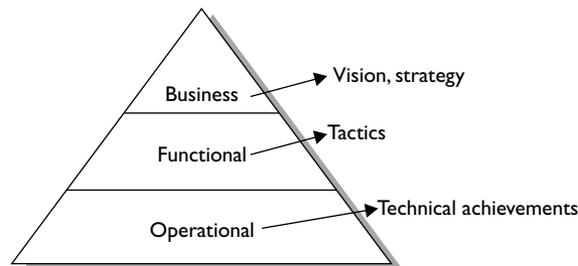
***Business reasons for why a project is created depend on your business objectives. If you're pitching a project to management, address the most prevalent business needs first. So first, from a business perspective, answer the following question: "Why is this important to my organization?"***

## Creating a Feasibility Study

A feasibility study is conducted to prove a problem actually exists, document the opportunities at hand, and then determine if a project can be created to resolve the problem or take advantage of the opportunity cited. A feasibility study may also look at the cost of the solution in relation to the possible rewards gained by its implementation.

## Identifying the Business Needs

The business needs will examine the problem, opportunity, and solution to see how the potential project and its expected outcome fits within the realm of the business vision and goals. Recall the organizational pyramid in the following illustration? The business level of an organization asks, "Why is this important?" The focus of the business level is vision and strategy, so the results of the project must support that level. Projects must align with the strategy of the organization.



### Creating a Product Description

The initial product description will describe what the expected outcome of the project is to be. This may be a service, a product, or even a description of the desired future state. The initial product description does not have to be an exact specification document of what the project will create, though in some instances it may. Typically, the product description describes the high-level solution or realized opportunity that the project will accomplish.

### Creating a Project Charter

The project charter authorizes the project, officially naming the project manager and authorizing the project work. Yes, it's true that the project manager and the project management team may write the project charter, but the charter's approval and funding are above the project's boundaries. In other words, the project charter should be approved and funded by an individual within the organization that has the proper authority to authorize the project manager, the needed funds, and the resources that will be utilized within the project work.



***Project charters authorize. When you think of the project charter, think authority for the project manager.***

The project manager is officially named in the project charter, but the involvement of the project manager in the project will likely come early on in this process group. The project manager will need to know the expectations of his role in the type of organizational structure he is participating in (functional, matrix, projectized, or composite). The organizational structure recognition is important since it will determine the level of authority and power that the project manager can expect within a project.

The project charter should also reflect the initial scope description, the needed resources to complete the project, and any identified assumptions and constraints. Constraints, such as a preset budget or mandatory project deadline must be identified in the project charter as this sets the tempo and immediate expectations for the project's success.

In order to create a project charter the project management team requires the following:

- A contract if the project is being completed for another entity
- A project statement identifying the project purpose
- Enterprise environmental factors such as the organization's structure, culture, and relevant regulations and standards
- Organizational process assets, including policies, standard project management forms, templates, and organizational procedures that affect the project work

### **Creating a Preliminary Scope Statement**

Before the project can cruise officially into the planning process group, the project manager and the soon-to-be named project team need some idea of the direction and requirements of the project. This is called the preliminary scope statement. This document identifies what the project is supposed to accomplish and the general expectations of the project team and the project manager. The preliminary scope statement must identify the following:

- The project vision
- Deliverable requirements
- Product requirements
- Project boundaries
- Acceptance criteria
- The high-level scope control

### **Identifying the Planning Process Group**

The planning processes are iterative in nature; a project manager does not complete the planning processes and then move on to other activities within the project, never to return. Throughout the project, the project manager and the project team

will be returning to the planning processes as often as needed. Changes to the project scope, love ‘em or hate ‘em, will bring the project team back to planning—and sometimes even back to the initiating process groups.

## exam

### Watch

**Perhaps the most important reason to include stakeholders is that they can contribute to the project management plan. Stakeholders know things that the project team doesn't, thus you should use the stakeholders to help the project succeed.**

In particularly large projects, the project manager should include the stakeholders to obtain buy-in of the project deliverables. Including the project stakeholders not only accomplishes buy-in, but provides shared ownership of the project. This is important because shared ownership allows the customer to recognize the value and intensity of the project work and process. In addition, the project manager should include stakeholders to ensure the project deliverables are in alignment with what the stakeholders and the project team are expecting to receive.

As part of planning, the stakeholders' expectations and requirements must be analyzed. The stakeholders' expectations must be documented, prioritized, and balanced between competing objectives. Managing stakeholders' expectations is crucial to a project's success, so having a complete understanding of their expectations is mandatory.

Stakeholder analysis allows the project manager and the project team to determine the expectations of the customer. If the customer doesn't know what their expectations are, the project manager cannot decide for them. The project manager and the customer must be in agreement with what the project should create before the creation begins.

Within large or highly technical projects, planning can also be known as rolling wave planning. Rolling wave planning focuses detailed planning on the immediate activities of the project rather than on remote, future activities that may be affected by the outcome of the direct project results. The issues further downstream are addressed in rolling wave planning, but in high-level detail, rather than the specifics the pressing focus is on. This is an example of progressive elaboration.

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**Rolling wave planning is an acceptable planning solution for long projects whose late activities in the project schedule are unknown or will be determined based on the results of early project phases.**

## Creating a Scope Statement

Project managers must have a scope management plan that defines how the project scope will be defined, what changes will be allowed, and how the scope can be controlled. The scope management plan also defines the approach to create the work breakdown structure.

The scope statement is a document that describes the work, and only the required work, necessary to meet the project objectives. The scope statement establishes a common vision among the project stakeholders to establish the point and purpose of the project work. It is used as a baseline against which all future project decisions are made in order to determine if proposed changes or work results are aligned with expectations. The scope statement may, with adequate reason, be updated to reflect changes in the project work.

The project manager and the project team should create a change control plan that specifies how the project scope may be changed, what the procedure to change the scope is, and what the requirements are to make a change. On large or high-profile projects, the project manager may be working with a Change Control Board (CCB) to determine if changes should be approved and factored into a project scope.

## Creating the Work Breakdown Structure

The work breakdown structure (WBS) is an organized collection of the project-deliverable components to be created by project work. The project manager cannot complete this activity alone. The input and guidance of the project team is required as they are the individuals closest to the work and will be completing the actual activities within the project phases. The WBS is not a list of activities—it's a deliverables-oriented decomposition of the project. The activity list comes from the WBS.

## Creating the Network Diagram

Once the activity list has been created, the project team can sequence the activities in the order in which the work should be completed. The network diagram, also called the Project Network Diagram (PND), illustrates the flow of activities to complete the project and/or the project phase. It identifies the sequencing of activities identified within the WBS and determines which activities may be scheduled sequentially versus in tandem.

## Completing Estimates

Time and cost estimates are completed within the planning process. Time estimates reflect the amount of time to complete each activity within the WBS. Once the estimates are mapped to the PND, an accurate estimate of how long the project will take to complete may be created.

Cost estimates can be calculated a number of different ways, such as through top-down estimates, bottom-up estimates, or the dreaded informal “hallway estimates.” All estimates should identify a range of variance reflective of the degree of confidence of the estimate, the assumption the estimate is based on, and how long the estimate is valid.

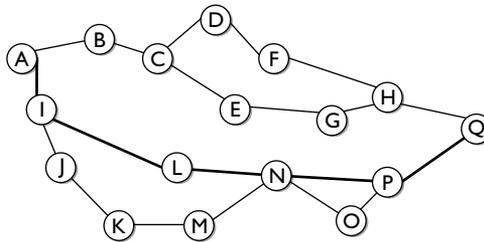
## Developing the Project Schedule

The project schedule is dependent on the creation of the WBS, the PND, and the availability of the resources. Based on when the resources, the project team, and other required resources, such as equipment and facilities, are available, the schedule can be determined. In many instances, the project must be scheduled according to time constraints. Using the constraint of a deadline on the project, all activities must be scheduled, from the project’s start to its completion, to ensure the project can finish on time.

The critical path is the chain of activities within the PND that cannot be delayed without delaying the project end date. There can be more than one critical path and it is possible for the critical path to change. The other paths within the PND have float or slack. Float or slack means these paths may be delayed, to a point, without delaying the end result of the project. Figure 3-5 shows a typical PND with the critical path in bold.

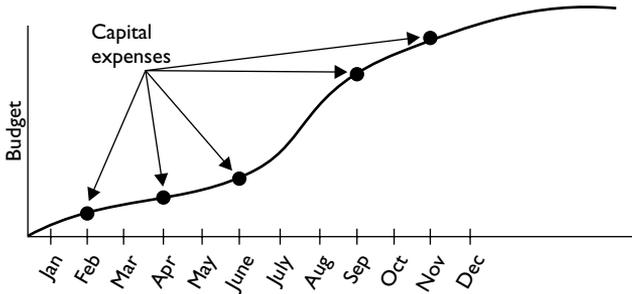
**FIGURE 3-5**

Project network diagrams illustrate a project’s workflow.



**FIGURE 3-6**

Cash flow projections allow an organization to plan for project expenses.



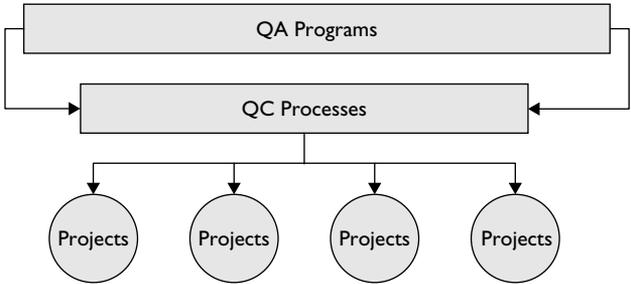
### Planning for Project Financials

The project manager and the project team need to create a cost estimate for the project work. Cost estimates should include a qualifier, such as +/- 10 percent and the reasoning behind the qualifier.

The project budget is the cost of the project, cash flow projections, and how the monies will be spent. The project budget should cover the cost of the team’s time, facilities, and all foreseeable expenses. Cash flow projections are needed to alert management as to when monies must be available for the project to continue. Figure 3-6 demonstrates a project with expected cash flow expenses.

### Creating a Quality Management Plan

The quality management plan details how the project will map to the organizational quality policy—for example, ISO 9000 or Six Sigma specifics. The plan will provide specifics on how the project team will meet the quality expectations of the organizational quality assurance program. The quality management plan also sets the guidelines for how the project will adhere to quality control mechanisms and ongoing quality improvement. The following illustration demonstrates how QC fits within QA.



### Planning for Human Resource Needs

The project team completes the project work, while the project manager relies on the project team to do several tasks, including the following:

- Completion of the project work
- Providing information on the work needed to complete the project scope
- Providing the necessary accuracy in project estimating
- Reporting on project progress

The project manager must use human resource and leadership skills to guide and lead the project team to project completion. In some organizations, the project team may be assigned to the project, while in other organizations the project manager may have the luxury of handpicking the project team members.

### Creating a Communications Plan

The communications plan determines who needs what information, how they need it, and when it will be delivered. The plan specifies team meetings, reports, expectations for reports, and expectations of communication among team members. The communications plan must account for all needed communications within the project.

Consider a project manager of a high-profile project called Project XYZ. The project manager requires that the project team members report their progress on Project XYZ every Tuesday at the project status meeting. In addition to team members reporting their status, they will also need to update their work electronically through the Project Management Information System (PMIS). These communication requirements are defined in the communications management plan.



***It has been said that 90 percent of a project manager's time is spent communicating. Communicating equates to project management.***

### Completing Risk Management Planning

Risk can be both good and bad. Generally, risk is a perceived threat (or opportunity) to the completion of the project. Every organization has a different approach and attitude towards risk. Risk management planning defines the project manager's obligations to acknowledge, document, research, and plan for risks within the project.

Many organizations use a predefined risk management plan that all project managers must adhere to.

### **Identifying Project Risks**

The initial risk assessment allows the project manager and the project team to determine what high-level risks may influence the feasibility, resources, and requirements to complete the project. The initial risk assessment may also steer the project toward a different solution. Risk assessment is an ongoing, active project management process.

### **Completing Qualitative and Quantitative Risk Analysis**

Risk assessment is an in-depth analysis of the project risks through qualitative and quantitative analysis. Qualitative risk analysis calls for a probability and impact matrix. Risks are typically categorized as high, medium, and low. Quantitative risk analysis is a more in-depth study of the identified risks. This technique calls for a risk matrix based on probability and impact. Quantitative analysis also uses simulations and decision tree models.

### **Completing Risk Response Planning**

The risks are analyzed for both positive and negative impacts, entered through a risk matrix and then planned accordingly. Risks may be accepted, avoided, mitigated, countered, or planned for through contingency. Risks are also assigned to risk owners who will monitor thresholds and triggers.

### **Planning for Project Contracting**

Chances are that a project team will need to buy something in order to complete their project work. The purchase of a thing or service requires the project manager to follow the organizational policies and procedures for procurement. This can include finding qualified vendors, requesting quotes or proposals, and reviewing those proposals for the best vendor.

### **Officially Launching the Project Work**

Planning is an iterative process. The result of planning is to allow the project work to begin. Once the project has reached a collective state of agreement between the project manager, management, the project team, and the customer, the project is officially allowed to begin.

## Executing Processes

The executing processes allow the project team to perform the project work. It is the execution of the project plan, the execution of the vendor management, and the management of the project implementation. The project manager works closely with the project team in this process to ensure that the work is being completed and that the work results are of quality. The project manager also works with vendors to ensure that their procured work is complete, of quality, and meets the obligations of the agreed contracts.

Realistically, when projects go awry it's time to revisit planning. Variances are the difference between what was planned and what was experienced. Common variances are time and cost estimates, risk impacts, risks that were not identified but came into planning, and the availability of project resources. Some variances can spur change requests that will cause the project management plan to be changed, the scope broadened or reduced, and in some situations cause the project to be rebaselined.

### INSIDE THE EXAM

What, in this chapter, must you focus on for your PMP exam? Hmm... could it be processes? Processes are activities that are completed by people, not things. On the exam you won't need to know facts like which process is the most important, but rather which activity should the project manager complete next? Just substitute "activity" for the appropriate process and you're on your way.

Focus on the project management processes. Know the five process groups and how the processes among those groups are inter-related. Recall that the core processes follow a hard logic in their sequencing and that the facilitating processes are more flexible and supportive to the core processes.

It will behoove you to know, if not memorize, Table 3-1 (shown later in this chapter). This table covers all of the processes and how

they map to the knowledge areas. If you want to pass your exam, and I know you do, know which processes happen in which knowledge area. Create some witty acrostic to memorize the knowledge areas and the processes within each process group. Here are a few other key exam tips to take from this chapter:

- Larger projects require more detail than smaller projects.
- Projects fail at the beginning, not at the end.
- The processes may be customized to meet the demands or conditions of the project.
- Planning is iterative.
- Planning, executing, and controlling are tightly integrated.

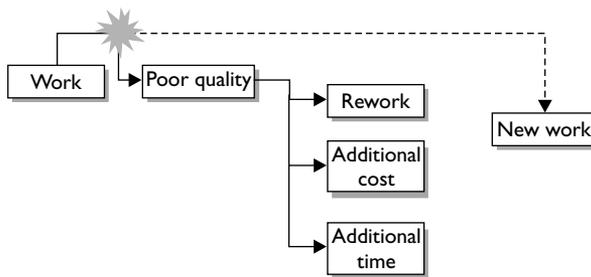
## Directing and Managing Project Execution

This is the business of getting the project done. The project team executes the work as defined in the project management plan and the project manager manages the work. This also includes the management of the organizational and technical interfaces the project manager must interact with to ensure that project work flows smoothly and as planned. The bulk of the project time and budget are consumed during project execution.

A work authorization system is a method that allows work to begin according to schedule and circumstance. It provides for the verification of predecessor activities and the permission to begin successor activities.

## Mapping to Quality Assurance

As the project work continues, the project team and the project manager will need to verify that the project work results are mapping to the organization's quality assurance program as described in the quality management plan. Failure to adhere to the quality assurance program may result in penalties, project delays, and work that needs to be redone, as shown in the following illustration.



## Developing the Project Team

There needs to be a project team in order for the project to be completed. Based on the organizational structure, the project manager will recruit the project team or the project team will be assigned to the project manager. In some organizations, such as with a functional structure, the project team will already be assembled. The project plan will dictate what roles and responsibilities are needed for the project while the staffing management plan will guide how human resources, the project manager, and the project team members interact.

The project team members will be assigned work to complete while the project manager oversees and manages the work the project team members do. One challenge for all project managers is the availability of project team members. It's not much fun for project managers or project team members when multiple projects create various demands simultaneously. This happens far too much in matrix structures where project team members are likely to work on multiple projects.

The project manager must work with the project team members to ensure that their level of proficiency is in agreement with their obligations on the project. This may involve classroom learning, shadowing among project team members, or on-the-job training. The success of the project work is dependent on the project team's ability. Should the team or team members be lagging in required knowledge to complete the project work, additional education and development are necessary.

As project team members complete their work, the staffing management plan will be referenced by the project manager on how to complete project team member assessments. In particular, reward and recognition systems should be documented and followed. Project team members, just like project managers, like to be rewarded for a job well done.

### **Dispersing Project Information**

Information must be disseminated according to the communications plan. Stakeholders will need to be kept abreast of the project status. Management may want milestone reports, variance reports, and status reports, and customers will have specific communications requirements. All of these demands, from any stakeholder, should be documented within the communications plan—and then followed through in the execution process.

### **Managing Procurement Activities**

In most projects, vendors are involved at some point. Part of the executing process is to find the best vendors to be involved with the project. Adequate timing is required for the procurement process to allow the vendors to provide adequate, appropriate information for the project—and to allow the project manager to make an educated decision on which should be selected. Procurement includes obtaining quotations, bids, and proposals for the services or goods to be purchased for the project's completion.

This part of procurement involves making a decision as to which identified vendor will be the source of the service or good being procured. Source selection is based upon the selection criterion determined by the performing organization.

Once a vendor has been selected, procurement involves administering the contracts between the buyer and the seller. The contract must be fair and legal. The contract typically is a document that represents the offer and acceptance of both parties. Some organizations may utilize centralized contracting or a contracting office to manage all project contracts.

## **Monitoring and Controlling the Project**

The monitoring and controlling processes are the activities that ensure the project goes according to plan and the actions that need to be implemented when evidence proves the project isn't going according to plan. Specifically, the controlling processes verify project work and the response to that work. In addition, the project manager must work to control the predicted cost and schedule of the project. Variances to the cost and schedule will affect the project's success.

At the heart of this process group is simply controlling and monitoring the project work. This means the project manager and the project team actively collect and measure the project's performance, risk, time, cost, and scope. Then, based on the collection of project performance, the project manager can react to performance to improve the project and to forecast project performance based on trend analysis.

### **Managing Integrated Change Control**

Integration management is the control of the project's components and how each part of a project may affect its other parts. For example, a proposed change to the project scope may affect the project schedule, time, cost, quality, risk, communications, human resources, and even procurement issues.

Integrated change control is the process of examining change requests, changes, preventive action, corrective action, and defect repair to see how these issues affect the remaining portions of the project. The outcome of integrated change control includes updates to the project plan and project scope, but also approved or declined change requests, approved corrective and preventative actions, and validated defect repair. The ultimate result of integrated change control is the project deliverable.

### **Providing Scope Verification**

Scope verification is the process of verifying that the work results are within the expectations of the scope. It is typically done at project phase completion where the customer formally accepts the product of the project work. Should scope verification fail, the project scope must be compared against the work results. If the scope has

not been met, the project may be halted, reworked, or delayed during a decision making process by the customer.

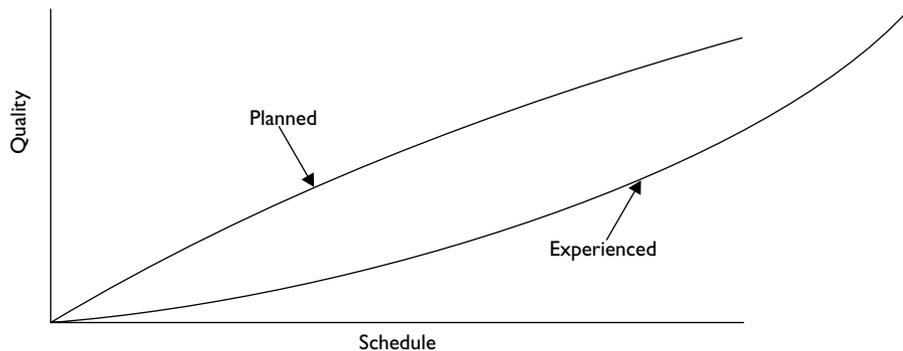
Scope verification is a control process. However, at the end of the project the scope must be verified for final acceptance. This process is completed with the project manager and the key stakeholders. Scope verification is the process of inspecting, touring, and “taking a walk-through” of the project deliverables to confirm that the requirements of the project have been met. Scope verification may happen at different intervals throughout the project, such as at key milestones or phase completions. Scope verification at the end of a project may require a formal sign-off from the customer that the project is complete and to their satisfaction.

### **Implementing Scope Change Control**

The project manager must follow the change management plan to ensure unneeded changes to the project scope do not occur. This includes scope creep that the project team may be completing on its own accord—for example, the project team members may be making additional adjustments to the equipment they are installing in a project, even through the project scope does not call for the additional adjustments. Scope change control ensures that the documented procedures to permit changes to the scope are followed.

### **Enforcing Schedule Control**

Schedule control requires constant monitoring of the project’s progress, approval of phase deliverables, and task completion. Slippage must be analyzed early in the project to determine the root cause of the problem. Activities that slip may indicate inaccurate estimates, hidden work, or a poor WBS. Quality issues can also throw the project schedule when the time to redo project activities is taken into consideration, as shown in the following illustration. Finally, the project manager must also consider outside influences and their affect on the project—for example, weather, market conditions, cultural issues, and so on.



## **Managing Cost Control**

Controlling the project's cost requires accurate estimates and then a check and balance against those estimates. Procurement management, cash flow, and fundamental accounting practices are required. Though cost control is dependent on project expenses, it also hinges on hidden and fluctuating expenses such as shipping, exchange rates for international projects, travel, and incidentals. Thus, accurate and thorough record keeping is imperative.

## **Ensuring Quality Control**

Quality control (QC) measures work results to determine if they are in alignment with quality standards. If the work results are not of quality, QC uses methods to determine why the results are inadequate and how to eliminate the causes of the quality deficiencies. QC is inspection driven and strives to keep mistakes away from the project customer.

## **Managing the Project Team**

The project team completed the work and the project manager ensures that they do so according to the plan. Team management is limited to the authority the project manager has over the project team. In any organizational structure, however, the project manager should evaluate the project team performance and seek methods to improve all team performance to improve the project deliverables. The outcome of managing the project team includes the following:

- Change requests
- Corrective actions
- Preventive actions
- Project management plan updates

At some point in the project, based on the organizational structure, team members will be reassigned to new projects. Reassigning project team members is of utmost importance in a projectized organization where project team members are with a project full-time through completion. As the project in a projectized organization nears completion, the project team may be anxious about their next assignment. In a functional matrix environment, the project team may fluctuate at phases or milestones as they complete their assignments and then move on to other activities within the organization.

### **Ensuring Performance Reporting**

The project manager and the project team must work together to report and record accurate completions of work. Performance reporting stems from accurate measurement by the project team, proof of work completion, and factual estimates. The project manager then churns the reported projects through earned value management, schedule baselines, cost baselines, and milestone targets. The status reports to management are reflective of where the project has been, where it stands now, and where it's heading.

### **Completing Performance Reporting**

It's been said that if an organization doesn't measure itself it cannot improve. As the project moves towards completion, the project manager and the project team must measure the project performance. Performance reporting includes the following:

- Status reports
- Progress measurement
- Forecasting
- Performance reports
- Recommended corrective actions

### **Managing the Project Stakeholders**

Stakeholders will look to the project manager for updates, guidance, and leadership on the project. They'll also look to the project manager to ensure that they get the things out of the project they want. This means the project manager must actively manage the stakeholders, their competing objectives, and change requests. This process brings about the following:

- Resolved project issues
- Approved change requests
- Approved corrective actions
- Project management plan updates

### **Monitoring and Controlling Project Risks**

Risk management requires risk ownership and monitoring by the project team members. As activities in the PND are completed, the project manager and the

risk owners must pay special attention to the possible risks and the mitigation plans that may come into play. Risk responses, should they be acted on, may cause secondary risks, cost increases, and schedule delays. Risk response must be rapid and thorough—and their outcomes well-documented for historical reference for downstream activities and other projects.



***Risk response may also include risk impact statements that detail project risk, its possible impact on the project, and its probability. The project manager and management sign the risk impact statement for each identified risk beyond a predetermined score.***

## Closing the Project

Closing a project is a wonderful feeling. Project closure has many requirements for it to be successful, however. Project closure requires a final, complete effort by the project manager, the project team, the project stakeholders, and management to officially close the project and move on to other opportunities. The activities in this process are typically associated with the end of a project, but most may also be completed within project phases.

### Auditing Procurement Documents

The project manager has spent the money, but on what? The procurement audit process requires accountability for the monies that have been invested in the project. In some instances, the financial audit is more formal, and an accountant or finance professional reviews the project's accounting. In other instances, the process is considered a debriefing and is completed with the project manager and management. In practically all instances, the intensity of the procurement audit is relevant to the autonomy of the project manager: the more power and responsibility the project manager has in an organization, the more accountable he is for the project budget.

### Closing Vendor Contracts

At the completion of a project or project phase, the vendor contracts must be closed out. Confirmation that vendor invoices and purchase orders have been fulfilled, met, and paid is needed to complete the vendor closeout process. Closing out vendor contracts may also require proof of delivery of the goods or services purchased, and vendor contracts may be audited to confirm that vendor responsibilities have been met.

### Closing Administrative Duties

When the project is completed, the project manager must finalize all reports, document the project experience, and provide evidence of customer acceptance. The project manager will create a final report reflecting the project's success, or its failure. The project manager will also provide information reflective of the project product and how it met the project requirements, and then will complete the lessons learned documentation.

### Celebrating!

At project completion, a celebration to thank and reward the project team for their hard work and dedication to the project is needed. Celebrations are also a good time to reflect on the work completed, the challenges of the project, and to come back together as a team before moving on to other projects and opportunities within the organization.

## How Process Groups Interact

Imagine any project: building a new house, creating a new service, deploying a technology solution. Within any of these projects there will be a logical approach from start to finish. Within project management, and in particular for your PMP exam, the flow of activities must be documented from initiation to closure. The five process groups don't necessarily allow the work to progress—they serve more as a control mechanism to identify and oversee the flow of actions within the project.

Each process has unique activities, as we've seen already in this chapter, but each of these activities contributes and coincides with the project work. The activities guide the project work from concept to completion. Specifically, the parts of the processes are the gears to the "project machine." The processes allow for a specific, manageable, and expected outcome of the project. Within each process, there are three common components:

### exam

#### Watch

***If the scope has been completed, the project is finished. Beware of exam questions that tell you the scope is completed but that the customer isn't satisfied. This is because if the scope is complete, the project is complete.***

- **Inputs** Documented conditions, values, and expectations that start the given process
- **Tools and techniques** The actions to evaluate and act upon the inputs to create the outputs
- **Outputs** The documented results of a process that may serve as an input to another process

These three components are fundamental through all five process groups. Typically, plans, documented evidence of problems, or documented outcomes of activities are inputs to a project process—for example, resource planning requires the WBS. The WBS is an input to resource planning, but it’s also an output of the planning process group. The tools and techniques used to plan for resources include expert judgment, alternative identification, and your nifty project management software.

## Customizing Process Interactions

The processes discussed in the previous section are the mainstream, generally accepted order of operations. You can count on these processes existing and progressing in the preceding order. However, having said that, you can also count on these processes to be flexible, pliable, and customized to work in any order that the project demands. Project processes are not made of stone, but flexible steel.

The following are some general guidelines about customizing project processes:

- Projects that are resource-dependent may define roles and responsibilities prior to scope creation. This is because the scope of the project may be limited by the availability of the resources to complete the scope.
- The processes may be governed by a project constraint. Consider a predetermined deadline, budget, or project scope. The project constraint, such as a deadline, will determine the activity sequencing, the need for resources, risk management, and other processes.
- Larger projects require more detail. Remember that projects fail at the beginning, not at the end.
- Subprojects and smaller projects have more flexibility with the processes based on the usefulness of the process. For example, a project with a relatively small team may not benefit from an in-depth communications plan the same way that a large project with 35 project team members might.

## Plotting the Processes

The first three chapters of this book have focused on the project management endeavor, the project management context, and the project management processes. Chapters 4 through 12 will focus on the project management knowledge areas. In those chapters, we’ll zoom in on the processes we’ve identified and break down the topics into exam-specific information.

While the information we've covered in this chapter is important, it is more of an umbrella of the nine knowledge areas that you'll want to focus on for your PMP exam. Table 3-1 maps out the project management processes showing where they fall within the nine knowledge areas and which chapter in this book covers the associated process.

**TABLE 3-1** Projects are Comprised of Process Groups Which Span Nine Knowledge Areas.

	<b>Initiating</b>	<b>Planning</b>	<b>Executing</b>	<b>Monitoring and Controlling</b>	<b>Closing</b>	<b>Chapter</b>
Project Management Integration	Developing the project charter; develop preliminary project scope statement	Developing the project management plan	Directing and managing the project plan execution	Monitoring and controlling the project work. Managing Integrated Change Control.	Closing the project.	4
Project Scope Management		Planning and defining the project scope; creating the WBS		Completing scope verification and scope control		5
Project Time Management		Defining activities, their sequence, their estimated duration, and estimating the required resources; developing the project schedule		Controlling the project schedule		6
Project Cost Management		Completing cost estimating and cost budgeting		Enforcing cost control		7
Project Quality Management		Planning for quality	Adhering to quality assurance requirements	Performing quality control on the project		8
Project Human Resource Management		Completing human resource planning	Acquiring and developing the project team	Managing the project team		9
Project Communications Management		Creating the communications management plan	Distributing the required information to the appropriate parties	Reporting on project performance and managing project stakeholders		10

**TABLE 3-1** Projects are Comprised of Process Groups Which Span Nine Knowledge Areas. (cont.)

	<b>Initiating</b>	<b>Planning</b>	<b>Executing</b>	<b>Monitoring and Controlling</b>	<b>Closing</b>	<b>Chapter</b>
Project Risk Management		Completing risk management planning, risk identification, qualitative and quantitative risk analysis, and risk responses		Monitoring and controlling risk		11
Project Procurement Management		Planning project acquisitions and plan contracting	Requesting seller responses and selecting sellers	Managing contract administration	Closing the project's contracts	12

## CERTIFICATION SUMMARY

There are five process groups within a project. You'll want to know what activity happens within each of these groups. Projects start in the initiating process group, where projects get authorized. From here, the project moves into the planning process group. Planning is an iterative process and allows the project objectives to be determined, as well as how the project will achieve those objectives. The project plan is executed in the executing process group. The monitoring and controlling process group is where project performance is monitored, measured, and controlled. Finally, the project is completed and the contracts are completed in the closing process group.

You should know that a project can move between planning, monitoring and controlling, and executing as conditions change—for example, a new risk may be identified. This risk is analyzed and then a risk response is created in the planning processes group. The project work moves on but the risk management is implemented during the executing processes. The response to the risk is monitored in controlling. Should the risk change, the project can revisit the planning processes. Don't subscribe to the theory that the project work stops as the project moves back into planning. Other project activities may continue to operate as the project planning processes group is revisited.

The project moves along according to the project schedule and the project network diagram. Activities on the critical path are actively monitored for slippage while noncritical path activities are periodically checked for slippage. This is important

as activities on the critical path have no tolerance for delays, while noncritical path activities can be delayed as long as they do not delay the project's completion.

As the project progresses, the project manager must monitor and communicate the project performance. Work results that are below an accepted level of performance must be adjusted with corrective actions to bring the project back into alignment with the cost, schedule, and scope baselines. Communication of the project performance is one of the key elements for successful project management—and for passing the PMP exam.

## KEY TERMS

To pass the PMP exam, you will need to memorize these terms and their definitions. For maximum value, create your own flashcards based on these definitions and review them daily. These definitions can be found within this chapter and in the glossary.

closing	controlling	executing
facilitating processes	initiating	knowledge areas
planning	process groups	project charter
project communications management	project cost management	project human resources management
project management integration	project management processes	project procurement management
project quality management	project risk management	project scope management
project time management	scope statement	



## TWO-MINUTE DRILL

### Project Management Processes

- ❑ Projects are comprised of processes. People, not things, complete processes; processes move the project or phase to completion.
- ❑ The five process groups
  - ❑ initiating
  - ❑ planning
  - ❑ executing
  - ❑ monitoring and controlling
  - ❑ closing

comprise projects and project phases. These five process groups have sets of actions that move the project forward towards completion.

- ❑ Just because a process was not completed does not mean it was not needed. A project manager, however, doesn't always have to complete every process within each process group—just those processes that are needed for the project to be successful.

### Determining the Need for Projects

- ❑ Projects are created to provide a solution for a problem or to take advantage of an opportunity. They can be created to reduce costs, reduce waste, increase revenue, increase productivity and efficiency, or produce other results. The project manager should know why the project is created in order to aim towards the project purpose.
- ❑ Some projects require a feasibility study to prove that the problem exists or to conduct root cause analysis to find the root of a given problem. Feasibility studies also determine the possibility of the project to solve the identified problem for a reasonable cost and within a reasonable amount of time.
- ❑ The product description describes the expected outcome of the project. The product description should define what the project is creating. If the project is solving a problem, the product description should describe how the organization will perform without the problem in existence. If the project is seizing a market opportunity, it should describe the organization once the opportunity is seized. Basically, product descriptions describe life after a successful project.

## The Project Management Framework

- ❑ The three components of processes—inputs, tools and techniques, and outputs—spurn decisions, conditions, plans, and reactions to conditions and progress. The output of one process serves as the input to another. Within each process, the tools and techniques—such as expert judgment—guide and influence the output of a process. A faulty output will likely influence downstream processes negatively.
- ❑ Project processes can be customized to meet the needs and demands of the project. Some processes may be moved to better meet the conditions and requirements of a given project. In some instances, a process may be removed from a project. Use caution, however: a process that is not completed does not necessarily mean it wasn't needed.
- ❑ The nine knowledge areas are comprised of the project management processes we've discussed in detail in this chapter. The process groups discussed in this chapter map to the following nine knowledge areas:
  1. Project integration management
  2. Project scope management
  3. Project time management
  4. Project cost management
  5. Project quality management
  6. Project human resource management
  7. Project communications management
  8. Project risk management
  9. Project procurement management

## SELF TEST

1. What is a project process?
  - A. The creation of a product or service
  - B. The progressive elaboration resulting in a product
  - C. A series of actions that bring about a result
  - D. A series of actions that allow the project to move from concept to deliverable
2. Within a project, there are two distinct types of processes. Which of the following processes is unique to the project?
  - A. EVM processes
  - B. Project management planning
  - C. IPECC
  - D. A product-oriented process
3. There are five project management processes that allow projects to move from start to completion. Which one of the following is not one of the project management process groups?
  - A. Initiating
  - B. Planning
  - C. Communicating
  - D. Closing
4. Of the following, which is the logical order of the project management processes?
  - A. Initiating, planning, monitoring and controlling, executing
  - B. Planning, initiating, monitoring and controlling, executing, closing
  - C. Initiating, planning, executing, monitoring and controlling, closing
  - D. Planning, initiating, executing, closing
5. Which of the project management processes is progressively elaborated?
  - A. Planning
  - B. Communicating
  - C. Contract administration
  - D. Closing
6. The ongoing process of project planning is also known as \_\_\_\_\_.
  - A. Constant integration planning
  - B. Rolling wave planning

- C. Continuous planning
  - D. Phase gates
7. You are the project manager for the AQA Project. You would like to include several of the customers in the project planning sessions, but your project leader would like to know why the stakeholders should be involved since your project team will be determining the best method to reach the project objectives. You explain to the project leader that the stakeholders should be included because \_\_\_\_\_.
- A. It generates goodwill between the project team and the stakeholders
  - B. It allows the stakeholders to see the project manager as the authority of the project
  - C. It allows the project team to meet the stakeholders and express their concerns regarding project constraints
  - D. It allows the stakeholders to realize the shared ownership of the project
8. You have requested that several of the stakeholders participate in the different phases of the project. Why is this important?
- A. It prevents scope creep
  - B. It allows for scope constraints
  - C. It improves the probability of satisfying the customer requirements
  - D. It allows for effective communications
9. The information from the planning phase is input into which of the following processes?
- A. Initiating
  - B. Monitoring and controlling
  - C. Executing
  - D. Closing
10. The information from the initiating phase is input into which of the following processes?
- A. Planning
  - B. Executing
  - C. Controlling
  - D. All of the project phases
11. Which process represents an ongoing effort throughout the project?
- A. Lessons learned
  - B. Planning
  - C. Closing
  - D. EVM

- 12.** Which of the following processes happen in the correct order?
- A. Activity definition, scope planning, activity duration estimating, cost budgeting
  - B. Scope planning, resource planning, activity duration estimating, activity sequencing
  - C. Scope definition, scope planning, activity definition, activity sequencing
  - D. Scope planning, scope definition, activity definition, activity sequencing
- 13.** Which of the following processes happens in the closing process?
- A. Activity definition
  - B. Cost budgeting
  - C. Quality planning
  - D. Contract closeout
- 14.** Which of the following planning processes is concerned with reporting relationships?
- A. Organizational planning
  - B. Human resource planning
  - C. Scope planning
  - D. Activity definition
- 15.** Of the following, which process is most concerned with mitigation?
- A. Quality planning
  - B. Risk response planning
  - C. Procurement planning
  - D. Risk identification
- 16.** You are the project manager for the FTG Project. This project will affect several lines of business, and controversy on the project deliverables already abounds. You have 45 key stakeholders on this project representing internal customers from all areas of your organization. With this many stakeholders, what challenge will be the most difficult for the project's success?
- A. Communication
  - B. Managing stakeholder expectations
  - C. Managing scope creep
  - D. Coordinating communications between the project manager, project team, and the project stakeholders
- 17.** Which of the following is representative of a project constraint?
- A. A project that must be finished by year's end
  - B. That 45 stakeholders exist on a long-term project
  - C. The requirement to complete EVM
  - D. The requirement to produce a new product

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- 18.** You are a project manager of a large construction project. There are many different stakeholders involved in the project and each has their own opinion as to what the project should create. To maintain communication, set objectives, and document all decisions, you can say that larger projects generally require \_\_\_\_\_.
- A. A larger budget
  - B. More detail
  - C. Phase gate estimating
  - D. A large project team
- 19.** In order to create a network diagram, the project manager needs which of the following?
- A. Activity sequencing
  - B. Project sponsor approval of the WBS
  - C. The WBS dictionary
  - D. A cost baseline
- 20.** Which of the following is considered an output of the cost budgeting process?
- A. Cost estimating
  - B. Resource requirements
  - C. The risk management plan
  - D. The cost baseline
- 21.** Which of the following is considered an output of risk management planning?
- A. Activity lists
  - B. WBS
  - C. The risk management plan
  - D. The scope management plan
- 22.** Which of the following is not an input to schedule development?
- A. The cost baseline
  - B. Resource requirements
  - C. The risk management plan
  - D. The network diagram
- 23.** Frances is the project manager of the JHG Project. This project is very similar to a recent project she completed for another customer. Which planning process will Frances need to finish first to ensure the project is completed successfully?
- A. Contract planning
  - B. Scope definition

- C. Activity sequencing
  - D. Quality planning
- 24.** You are the project manager for the BKL Project. This type of project has never been attempted before by your organization. The stakeholders already have high requirements for the project deliverables and you need to create a change control system. This system should be controlled by which of the following?
- A. A formal change control form
  - B. It should be completed by the team
  - C. The Change Control Board
  - D. It is specific to the organizational structure
- 25.** Complete this statement: Projects fail \_\_\_\_\_.
- A. At the beginning, not at the end
  - B. During initiating, not closing
  - C. Because of inadequate project managers
  - D. Because of the project manager

## SELF TEST ANSWERS

1.  **C.** A process is a series of actions that bring about a result. Recall that processes exist in projects and in project phases.  
 **A** is incorrect since this describes the project as a whole. **B** is incorrect since it also somewhat describes a phase or project as a whole. **D** is incorrect as it describes the series of processes moving through the project. For more information, see the introduction to Chapter 3 and section 3.1 in the PMBOK.
2.  **D.** Product-orientated processes are unique to the product the project is creating.  
 EVM processes, choice **A**, are part of project performance measurement. **B**, project management planning, is universal to project management. **C**, IPECC, is the acronym for the five process groups: initiation, planning, executing, controlling, and closing. For more information, see the introduction to Chapter 3 and section 3.1 in the PMBOK.
3.  **C.** Communications is an activity that will consume much of the project manager's time, but it is not one of the five process groups.  
 **A**, **B**, and **D** are incorrect choices as initiating, planning, and closing are three of the five process groups. For more information, see section 3.1 in the PMBOK.
4.  **C**, Initiating, planning, controlling, executing, and closing is the correct order of the processes presented.  
 **A** is incorrect since it is not the correct order of the processes. While **A** does list all five of the process groups, it does not list them in the correct order. **B** and **D** are incorrect since they do not list the processes in the proper order (nor, with **D**, in their entirety). Remember, on the PMP exam you will need to choose the answer that is most correct according to the question presented. For more information, see section 3.1 in the PMBOK.
5.  **A.** Planning is an iterative process, which is also progressively elaborated. Throughout the project, the project team and the project manager will revisit the planning processes to consider, update, and react to conditions and circumstances within the project.  
 **B** is incorrect since communicating is not one of the process groups. **C** is incorrect as contract administration is not a process group. **D** is incorrect since closing is not an iterative process, but a concluding process. For more information, see section 3.2.2 in the PMBOK.
6.  **B.** Rolling wave planning is a description of the planning process in most large projects. It requires the project manager and the project team to revisit the planning process to address the next phase, implementation, or piece of the project.  
 **A** is incorrect since the planning process is not constant but iterative. **C** is incorrect since there is some pause to the planning processes. **D** is incorrect because phase gates are conditions that allow the projects to move from phase to phase. For more information, see section 3.2.2 and Figure 3-7 in the PMBOK.

7.  **D.** Involving the stakeholders in the planning processes allows for shared ownership of the project.
- A** is incorrect because, although it may generate goodwill between the project team and the stakeholders, this is not the prominent goal of stakeholder involvement. **B** is incorrect because the project charter and the project manager reputation will establish authority more than stakeholder involvement. **C** is incorrect because, though the stakeholders may express their concerns regarding the project constraints, such concerns should be addressed as part of the planning processes, not in addition to them. For more information, see section 3.2.1 in the PMBOK.
8.  **C.** By involving the stakeholders at different aspects of the project, their requirements are more likely to be met. Specifically, scope verification ensures that the stakeholders are seeing that phase deliverables, project progress, quality, and expectations are being met.
- A** is incorrect because the untimely introduction of stakeholders can actually increase scope creep. **B** is incorrect because scope constraints will be evident early in the project rather than during the implementation of the project work. **D** is incorrect since stakeholder presence does not ensure effective communications. Effective communications will stem from the project manager and the requirements identified and documented in the communications management plan. For more information, see section 3.2.1 in the PMBOK.
9.  **C.** The outputs of the planning phase are a direct input to the executing processes.
- A** is incorrect since initiating processes precede planning processes. **B** is incorrect since conditions in the controlling processes are inputs to the planning processes, not the reverse. **D** is incorrect because planning processes do not serve as a direct input to the closing processes. For more information, see section 3.2.3 in the PMBOK.
10.  **A.** The initiating processes serve as a direct input to the planning processes.
- B, C, and D** are incorrect because initiating processes do not directly serve as an input to the executing, controlling, and closing processes. For more information, see sections 3.2.1 and Figure 3-7 in the PMBOK.
11.  **B.** Planning is the iterative process evident throughout the project.
- A** is incorrect since lessons learned is not a process group. Closing may be evident at the end of project phases and at the end of the project, but it is not an ongoing effort like the planning process. **D, EVM,** is not an ongoing process. For more information, see section 3.2.2 in the PMBOK.
12.  **D.** The correct order is scope planning, scope definition, activity definition, and activity sequencing.
- Choices **A, B,** and **C** do not show the processes in the correct order. For more information, see section 3.2. in the PMBOK.

- 13.**  **D.** Contract closeout is the only process that happens during the closing process group.  
 **A** is incorrect since activity definition happens during planning. **B** is incorrect since cost budgeting is also a planning process. **C**, resource planning, is also a planning process, so it too is not a correct answer. For more information, see section 3.2.5.2 in the PMBOK.
- 14.**  **B.** Human resource planning is the facilitating planning process which defines roles and responsibilities—and the reporting structure within the project.  
 **A** is incorrect because organizational planning is not a valid term for this question. **C** is incorrect since it is the determination of what the project will and will not do. **D** is incorrect since activity definition is the definition of the required activities to complete the project work. For more information, see section 3.2.2.13 in the PMBOK.
- 15.**  **B.** Mitigation is a response to risk.  
 **A**, quality planning, is incorrect since it focuses on QA and the enforcement of QC. **C** is concerned with procurement management. **D** is incorrect because the identification of risk does not guarantee, or in some instances warrant, mitigation. For more information, see section 3.2.2.19 in the PMBOK.
- 16.**  **B.** On a project with 45 key stakeholders, the project manager must work to manage stakeholder expectations. Given the impact of the project and the identified controversy, the project manager will need to proceed with caution to ensure the project deliverables meet the required expectations of the stakeholders.  
 **A** is incorrect because, though communications may be the most time-consuming activity for the project, it is not the most difficult to manage. **C** is incorrect because managing scope creep can be controlled through an effective change control system. Scope creep may be an issue, but it is likely not the largest issue with this number of key stakeholders. **D** is incorrect since the communication between the project manager, the project team, and the stakeholders will be governed by the communications management plan. For more information, see sections 3.2, 10.4, and 5.5 in the PMBOK.
- 17.**  **A** is the best choice since it is a time constraint.  
 Choice **B** is not a constraint, but a project attribute. **C** is incorrect since it describes a project requirement, not a project constraint. **D** is incorrect since the requirement to produce a new product may be the project itself, not the constraint. For more information, see section 3.2.1 in the PMBOK.
- 18.**  **B.** Larger projects require more detail.  
 **A** is incorrect since larger projects don't always require a larger budget—consider an Add/Move/Change project to replace a piece of equipment. The project work is shallow, but the piece of equipment may be very expensive. **C** is incorrect because not all large projects will implement phase gate estimating. **D** is incorrect because a large project does not always mandate a large project team—consider a large project with very few resources available to complete the project work. For more information, see section 3.2 in the PMBOK.

19.  **A**. The network diagram illustrates the sequence of events within the project.  
 **B** is incorrect as the project sponsor may not approve, or need to approve, the WBS in all projects. **C** is incorrect because the WBS dictionary is not needed to create a network diagram. **D** is also incorrect since the cost baseline is not necessary to create a network diagram. For more information, see sections 3.2.26 and 6.2 in the PMBOK.
20.  **D**. The cost budgeting process creates the cost baseline.  
 **A** is incorrect since the cost estimates are an input to the cost budgeting process. **B** is incorrect because resource requirements serve as an input to cost estimating. **C** is incorrect because the risk management plan serves as an input to the cost budgeting process. For more information, see sections 3.2.2.11 and 7.2 in the PMBOK.
21.  **C**. The risk management plan is the output of the risk management planning process.  
 Answers **A** and **B**, activity lists and the WBS, are incorrect because they are neither inputs nor outputs of the risk management planning process. Choice **D**, the scope management plan, is incorrect since it is not an output of the risk management planning process. For more information, see sections 3.2.2.15 and 11.1 in the PMBOK.
22.  **A**. The cost baseline is an output of the cost budgeting process. It is not an input to schedule development.  
 **B**. Resource requirements are not an output of schedule development. Choice **C** is incorrect since the risk management plan is an output of the risk management planning process. **D** is incorrect because the network diagram is not an output of schedule development, but is instead an input into schedule development. For more information, see sections 3.2.2.9 and 3.2.2.11 in the PMBOK.
23.  **B**. Even though the projects are similar, Frances must still define the project scope.  
 **A** is incorrect since not all projects will need procurement. **C** and **D** are incorrect because scope definition must precede activity sequencing and quality planning. For more information, see sections 3.2.2.2 and 5.1 in the PMBOK.
24.  **C**. A Change Control Board (CCB) will review and approve changes to the project scope. Due to the high requirements of the stakeholders, a CCB can help fend off unneeded changes, and allow the project manager to focus on the project management activities rather than the potential flood of change requests.  
 **A** and **D**, while correct in theory, are incorrect since they do not answer the question as fully as choice **C** does. Choice **B** is incorrect because the project team should not review and approve changes in this scenario. For more information, see sections 3.2.4.3 and 5.4 in the PMBOK.
25.  **A**. Projects fail at the beginning, not at the end. A poor requirements document, inadequate needs assessments, unfulfilled planning, and more early processes can contribute to project failure.  
 **B**, **C**, and **D** are not correct choices. Choice **A** is the best answer. For more information, see section 3.2.1.2 and 4.2 in the PMBOK.

