Project Management Processes

THREE

Before we discuss the actions that take place in each of the project management process groups, let's go through the definition of a project life cycle and the project management process.

QUICKTEST

- What is done during each of the project management process groups
  - Initiating
  - Planning
  - Executing
  - Monitoring and controlling
  - Closing
- What you should do during each of the project management process groups
- What is a project life cycle
- What is a development life cycle
- Plan-driven
- Change-driven

Project Life Cycles and the Project Management Process

For the exam, you should understand the difference between the project life cycle and the project management process. Both are necessary to complete a project. The project life cycle is what you need to do to *do* the work, and the project management process is what you need to do to *manage* the work.

Project Life Cycle[1] PAGE 19 A life cycle is a progression of phases through a series of developmental stages. The project life cycle is the performing organization's or department's methodology for managing a project. It is the logical breakdown of what you need to do to produce the deliverables of the project. The project life cycle for a particular project is selected based on factors such as the type of product being developed, the industry, and the organization's preferences.

Project life cycles can be either plan driven or change driven. Within a project life cycle, there are generally one or more phases. These phases are collectively referred to as the development life cycle of a project. The development life cycle[2] is used to ensure that the expected or planned result of each phase is achieved. An example of a development life cycle for a software project might include the following life cycle phases: research, design, code, test, and implement.

Plan-Driven Project Life Cycle Plan-driven projects have predictive development life cycles (sometimes referred to as waterfall or traditional life cycles) that require scope, schedule, and cost to be determined in detail early in the life of a project—before the work begins to produce the project deliverables. For example, a construction project would typically be managed using a predictive life cycle.

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Change-Driven Project Life Cycle Change-driven projects use iterative, incremental, or adaptive (agile) development life cycles, and have varying levels of early planning for scope, schedule, and cost.

Incremental and iterative life cycles involve early planning of high-level scope sufficient enough to allow for preliminary estimates of time and cost; scope is developed a little more with each iteration.

An incremental development life cycle delivers a complete, usable portion of the product for each iteration. For example, a project to build a website using an incremental life cycle would involve prioritizing requirements into iterations that deliver a fully functioning portion of the website at the end of each iteration.

With an iterative development life cycle, the complete concept is built in successive levels of detail to create the end result. To build the website mentioned in the previous paragraph using an iterative life cycle, planning for the first iteration would focus on planning to create a prototype of the entire website. After the basic skeleton of the site is built, each successive iteration would be planned to add more detail until a complete and fully functioning site is achieved.

Note that a project may use a combination of incremental and iterative life cycles throughout the project or for phases of the project.

Adaptive development life cycles involve a fixed schedule as well as fixed costs. Scope is broadly defined with the understanding that it will be refined throughout the life of the project. The customer's requirements are documented and prioritized in a backlog, which can be adjusted as the project progresses. Work is planned in short increments to allow the customer to change and reprioritize requirements within the time and cost constraints. A new software development project may follow an adaptive approach, using phases that might include high-level feasibility, design, and planning followed by short, iterative phases of detailed design, coding, testing, and release.

Hybrid Development Life Cycle A hybrid life cycle is a combination of a predictive and an adaptive development life cycle. With such an approach, a predictive life cycle is used to manage the project requirements that are well defined, while an adaptive life cycle is used to manage the requirements that are less clear.

TRICKS OF THE TRADE® The processes, tools and techniques, and concepts discussed in this book can be modified based on the nature of the project, the characteristics of the organization, and other factors, including the project and development life cycle. As you read through this book and prepare for the exam, think in terms of a plan-driven project life cycle. Just remember that many of the same processes, tools, and techniques can be used on change-driven projects as well. Tailoring project management practices to fit the needs of the project and the organization is your responsibility as a project manager.

Project Management Process

As noted earlier, the project management process is what you need to do to *manage* the work throughout the project life cycle. It includes managing the efforts related to initiating, planning, executing, monitoring and controlling, and closing the project.

Figure 3.1 shows how the project management process groups interact.

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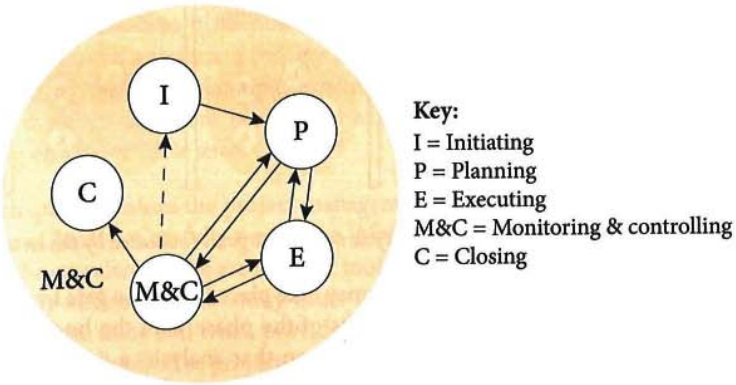

FIGURE 3.1 *Project management process*

The process groups are described in detail later in this chapter, but let's take some time now to discuss the difference between the project management process and the project life cycle—including how the overall project management process interacts with the project life cycle. For small projects following a plan-driven (or predictive) life cycle, you may go through the overall project management process (initiating through closing) once for the entire project, although portions of the process may be iterated or repeated throughout the project life cycle (see fig. 3.2).

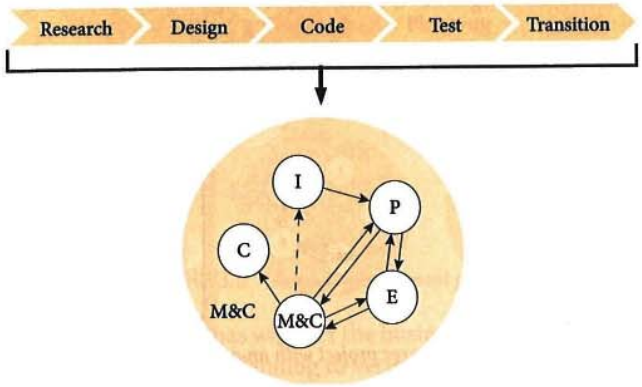

FIGURE 3.2 *Small project with a predictive life cycle*

Large projects often require each life cycle phase to be managed through the project management process groups. The example illustrated in figure 3.3 is for a large construction project. In this project, the development life cycle phases of feasibility, planning, design, production, turnover, and start-up are all extensive, requiring separate planning and management of each phase. This means there would be an overall initiating effort in which the project manager would help create a charter and do high-level planning for the entire project to get charter approval. Then, a separate initiating process for the feasibility phase would take place, followed by a planning effort for the work that will be done in the feasibility phase, the execution and control of that work, and, finally, a closeout of the phase, which typically includes a handoff of deliverables (in this example, the results of the feasibility analysis). This would then be repeated for each of the life cycle phases.

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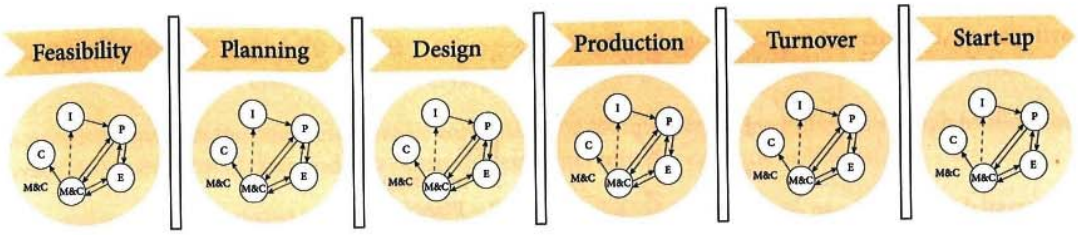

FIGURE 3.3 *Large project with a predictive life cycle with phase gates (indicated by the vertical bars)*

At the end of each phase, an event called a phase gate may take place.[3] A phase gate involves analyzing the results of the completed phase by comparing the results of the phase with the business documents, the project charter, and the project management plan. Based on that analysis, a decision is made. Options include redoing the same phase, moving forward with the next phase, or choosing not to continue with the project. If the decision is made to move forward, the project would begin initiating work on the next phase and progress through the project management process groups for that phase.

Large change-driven projects may also be broken into phases and then into smaller releases and iterations within those phases. The project management processes of initiating, planning, executing, monitoring and controlling, and closing are done for each phase. This process is typically done within each release and iteration as well. The level of detail and the time spent on each of the project management process groups may vary based on the phase of the project you are working on, but the entire project management process is typically followed, as indicated in figure 3.4, which depicts an adaptive life cycle.

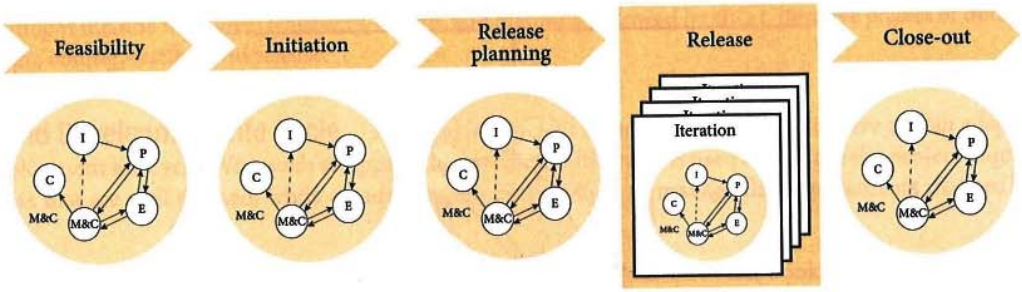

FIGURE 3.4 *Large project with an adaptive life cycle*

This may all seem fairly complicated. Don't worry! For the exam, understand that there is a project life cycle and a project management process. Read exam questions carefully to determine whether the project life cycle or project management process is being discussed.

The project life cycle varies depending on the industry, the organization, and the type of product, service, or result being developed. As the project manager, you work with the project management team and project governance to select the right approach for the project.

Some people think they need to understand a variety of industries to pass this exam. Although some questions may refer to specific types of projects and industries (for example, "You are building a bridge" or "You are creating a new system for your company"), that type of information is mostly background data. The exam will not ask you to select the "correct" project life cycle for a specific type of project, nor will it ask how to do work on a certain type of IT, construction, or engineering project. Instead, the exam will ask you about managing projects. The questions are general and can be answered without an understanding of the industry—if you know project management.

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You may, however, see questions that require you to understand how the project life cycle (plan-driven versus change-driven) influences both how a project is planned and the flow of the work itself. Also remember that the project management process is the same, regardless of the development life cycle used. The process groups of initiating, planning, executing, monitoring and controlling, and closing do not change, although there are variations in the level of attention and formality given to each of the process groups depending on the life cycle used.

The rest of this chapter examines the project management process, both at a high level and in more detail with Rita's Process Chart™. Carefully review the information in the chapter, especially the process chart, and complete all the exercises. These are valuable tools for helping you identify the gaps in your knowledge and will significantly cut down your study time. Understanding the process of managing a project and knowing what should be done and when provides a framework for understanding all the inputs, tools and techniques, and outputs involved in project management. If you understand the process, you can use logic on the exam, rather than having to rely on memorization. So are you ready? Read on!

The illustration that appeared in figure 3.1 is shown again here in figure 3.5 for your reference as you read the following section.

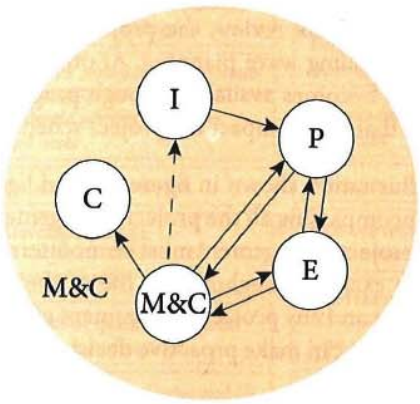

FIGURE 3.5 *Project management process*

In initiating, the project manager determines whether the business case and the benefits management plan can be achieved and does some high-level planning to verify that it is likely the project can be completed within the given constraints of scope, schedule, cost, etc. Stakeholders are identified, and stakeholder analysis is performed to assess each stakeholder's potential involvement and influence on the project.

The project is formally authorized in project initiating when the sponsor signs the project charter. After the project charter has been approved, the project moves from initiating into detailed planning, where a project management plan (including plans for how to plan, execute, monitor and control, and close the project) is developed. When the project management plan includes the appropriate amount of detail for the project life cycle and development approach, it is approved by the sponsor.

The project then moves into executing, where the team completes the work according to the processes and procedures detailed in the project management plan.

While the work is being done, the work results (or work performance data) are fed into monitoring and controlling, to make sure the project is progressing according to the baselines established in the project management plan.

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If variances from the plan require changes, the change requests are evaluated in the Perform Integrated Change Control process (part of monitoring and controlling) to determine their impact on the project, identify the best options for dealing with them, and decide whether they should be approved, rejected, or deferred.

For approved changes that require adjustments to the baselines and project management plan, a replanning effort must be completed before the team can start working from the updated version of the plan and baselines in executing. This replanning effort is done as part of the Perform Integrated Change Control process in monitoring and controlling. After the plan and baselines are modified, the revised plan is provided to the team in executing, and the project is executed according to the updated plan, and monitored and controlled to the revised baselines. If the project gets so far off the baselines that it requires an analysis of whether the project should continue at all, or if significant changes are suggested that are outside the project charter, it may move back into initiating while that decision is made (since the charter, which is created in initiating, would have to change in such a situation). Ultimately, when the work is done (or the project is terminated), the project moves into closing.

Throughout the project, it may be necessary to revisit project planning. For example, if a stakeholder is identified and their requirements need to be analyzed after work has begun or if a new risk that needs to be analyzed using qualitative risk analysis is identified in a risk review, the project will need to return to planning. The project also returns to planning to do rolling wave planning. Another instance when the project returns to planning is when new information becomes available through progressive elaboration (for example, more accurate estimates are generated that could impact the project schedule and budget).

There's one last point to keep in mind about the illustration shown in figure 3.1 and figure 3.5. Did you notice the large monitoring and controlling circle encompassing all the project management processes? It's there to illustrate that all the work of the project and project management must be monitored and controlled. This is an important concept to remember for the exam: throughout the life of the project, you'll be monitoring and measuring the outcomes of the project and any project management efforts, and analyzing them to help identify variances from the plan so that you can make proactive decisions to keep the project on track.

This process might be exactly what you need to use to manage small projects. For large projects that are broken into phases, this process may be repeated multiple times. For example, on a project with a research phase, you complete initiating through closing for that phase, and then repeat the process from initiating to closing for the next phase. When answering situational questions on the exam, remember that the level of detail to which the project management processes are performed will be adjusted or tailored to the type and strategic importance of the project and the chosen life cycle.

Now let's look at the project management process in more detail, using Rita's Process Chart™.

Rita's Process Chart™ In the past, there have been more than 70 exam questions that require knowledge of the project management process. Therefore, to pass the exam, you must understand this process. It can seem like a lot to learn. This chapter, and the remaining chapters in this book, will help you understand it with little or no memorization.

Since the first edition of this book, people all over the world have used the following chart as a trick to learn the project management process quickly and effectively. It helps you understand what should be done when. This chart was created by Rita Mulcahy and is unique to RMC's books and products.

It is not intended to map to other project management resources; instead, its function is to state, simply and directly, the efforts that are involved in managing a project. Understanding these efforts will provide the context you need to clearly understand the project management process for the exam.

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Project Management Processes

INITIATING

- Select project manager
- Determine company culture and existing systems
- Collect processes, procedures, and historical information
- Divide large projects into phases or smaller projects
- Understand business case and benefits management plan
- Uncover initial requirements, assumptions, risks, constraints, and existing agreements
- Assess project and product feasibility within the given constraints
- Create measurable objectives and success criteria
- Develop project charter
- Identify stakeholders and determine their expectations, interest, influence, and impact
- Request changes
- Develop assumption log
- Develop stakeholder register

PLANNING

(This is the only process group with a set order.)

- Determine development approach, life cycle, and how you will plan for each knowledge area
- Define and prioritize requirements
- Create project scope statement
- Assess what to purchase and create procurement documents
- Determine planning team
- Create WBS and WBS dictionary
- Create activity list
- Create network diagram
- Estimate resource requirements
- Estimate activity durations and costs
- Determine critical path
- Develop schedule
- Develop budget
- Determine quality standards, processes, and metrics
- Determine team charter and all roles and responsibilities
- Plan communications and stakeholder engagement
- Perform risk identification, qualitative and quantitative risk analysis, and risk response planning
- Go back—iterations
- Finalize procurement strategy and documents
- Create change and configuration management plans
- Finalize all management plans
- Develop realistic and sufficient project management plan and baselines
- Gain formal approval of the plan
- Hold kickoff meeting
- Request changes

EXECUTING

- Execute work according to the project management plan
- Produce product deliverables (product scope)
- Gather work performance data
- Request changes
- Implement only approved changes
- Continuously improve; perform progressive elaboration
- Follow processes
- Determine whether quality plan and processes are correct and effective
- Perform quality audits and issue quality report
- Acquire final team and physical resources
- Manage people
- Evaluate team and individual performance; provide training
- Hold team-building activities
- Give recognition and rewards
- Use issue logs
- Facilitate conflict resolution
- Release resources as work is completed
- Send and receive information, and solicit feedback
- Report on project performance
- Facilitate stakeholder engagement and manage expectations
- Hold meetings
- Evaluate sellers; negotiate and contract with sellers
- Use and share project knowledge
- Execute contingency plans
- Update project management plan and project documents

MONITORING & CONTROLLING

- Take action to monitor and control the project
- Measure performance against performance measurement baseline
- Measure performance against other metrics in the project management plan
- Analyze and evaluate data and performance
- Determine if variances warrant a corrective action or other change request(s)
- Influence factors that cause change
- Request changes
- Perform integrated change control
- Approve or reject changes
- Update project management plan and project documents
- Inform stakeholders of all change request results
- Monitor stakeholder engagement
- Confirm configuration compliance
- Create forecasts
- Gain customer's acceptance of interim deliverables
- Perform quality control
- Perform risk reviews, reassessments, and audits
- Manage reserves
- Manage, evaluate, and close procurements
- Evaluate use of physical resources

CLOSING

- Confirm work is done to requirements
- Complete final procurement closure
- Gain final acceptance of 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 knowledge bases

Rita's Process Chart™
Where are we in the project management process?

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How to Use Rita's Process Chart™

As you review Rita's Process Chart™, make sure you:

- Understand the overall project management process (a PMI-ism).
- Find terms you do not know, and learn what they are by looking them up in this book.
- Understand why each item is in the column (process group) it falls into.
- Are able to replicate the specific order of the planning process by understanding what happens when, how previous work supports what comes next, and why; knowing the Planning column in this order can help you get a large number of questions right on the exam because the exam often asks what should be done next. The work in the other process groups does not have a set order.
- Understand the project management process groups of initiating through closing, including when each effort should be done on projects. The exam asks questions that present a situation and require you to know which process group the project is in.
- Understand that project planning is an iterative process. Consider how you might go back and redo (iterate) some of the items in the Planning column to refine the plan for a large project. Or think about how rolling wave planning would be used on a large project to refine and detail plans for each phase as you move through the life cycle of a project.
- Complete Rita's Process Game™ (which follows the chart) at least three times. Going through the game will solidify your understanding of the overall project management process and help you find gaps in your knowledge. Focus your study on those gap areas so you understand the processes before taking the exam.

Notes on the Chart

- Notice the phrase "Understand business case and benefits management plan" in the Initiating column. This could be read as, "Understand the reason the project is being done and what benefits the organization expects to gain as a result of the project." These business documents will guide all project management activities to ensure the project is worth the required investment and that it will return the anticipated or expected benefits to the organization. This is a major concept on the exam that many project managers miss.

  A project is initiated for specific reasons, and the project results must support those reasons. It seems easy, but many projects do not satisfy the business need or deliver the benefits for which they were intended. Project managers may create the project they want, rather than what was asked of them, or they may complete the project to the technical requirements and forget the reasons (stated or otherwise) the project was initiated. The problem is that many project managers do not appreciate the importance of the effort that takes place before the project has a charter and is therefore authorized.

  Here is what should be happening in your organization: the company should know what its strategic objectives are, and all projects should help meet those objectives. This is not what happens in many real-world organizations, however—to the detriment of those organizations. A company that manages itself well has strategic objectives, and it evaluates various options for achieving those objectives. Many project ideas are proposed, and the company performs analysis to see which proposed projects meet the objectives for the least cost, time, resources, and, if it is a well-run company, risk. The organization then authorizes one or more projects by issuing project charters. This is the project selection process you need to understand for the exam, and you need to know how that process affects project management activities.

- As the project manager, you should understand why the project you are assigned to was selected and what benefits the project is expected to deliver. Is the project being done so the organization can enter a new market? Is it intended to meet a regulatory requirement? Is it the result of a customer request?

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Is it just a priority project for a company executive? Is it expected to dramatically improve the future of the company? If you lose sight of the objectives, the project may finish on schedule and on budget but still fail because it does not achieve those objectives or does not deliver the benefits expected.

- Team building, risk identification, stakeholder identification, risk response planning, and many other activities primarily occur in the process groups in which they are placed on the chart, but these activities can start in initiating and continue until closing.

- In the Planning column, note the first box: "Determine development approach, life cycle, and how you will plan for each knowledge area." Each knowledge area (scope, schedule, cost, etc.) requires management plans as well as additional plans for configuration, change, and requirements management. The first thing you need to do as you start planning is figure out how you are going to plan, execute, and control for each knowledge area. This will help guide the rest of your planning efforts.

- Notice the phrase "Determine team charter and all roles and responsibilities" in the Planning column. You should be aware that determining roles and responsibilities involves more than determining who is going to do which product-related work activities. It also includes who will be required to provide reports, who will attend meetings, who will help with risk identification, who will work with the quality department, etc. All roles and responsibilities on a project should be defined. They may be documented as part of the resource management plan, in project job descriptions, and in the management plans for each knowledge area. This item also includes developing a responsibility assignment matrix and a rewards and recognition system. If all this effort seems unnecessary to you, you may be thinking about it in the context of a small project that uses the same handful of team members as the last project. Remember to think in terms of large projects that have hundreds of team members.

- Look at the phrase "Go back—iterations" in the Planning column. This is an important concept. When planning a project, the project manager and the team complete each item listed in the Planning column above this point to the best of their ability. But a project will evolve as each item is planned, and much of the earlier planning work will need to be modified or added to. For example, it is only after completing the risk management planning efforts that the WBS and the other items can be finalized. A risk response strategy (see the Risk Management chapter) may be used to avoid a portion or all of a threat by planning to perform additional testing as part of the project. This testing will require adjusting the WBS for added scope, the network diagram to determine the order of the work, the budget for added cost, etc. The project manager might also work with discretionary dependencies (see the Schedule Management chapter) to decrease some risk and thereby change the network diagram. The important thing to remember is that planning should lead to a realistic, bought-into, approved, and formal project management plan that is updated throughout the project to reflect approved changes. Iterations help you create and maintain such a plan.

- On a related note, the Planning column includes a reminder that planning is the only process group with a set order. Occasionally, however, a planning process will require an input that, according to this column, won't be available yet. The risk register, for example, is an input to several processes leading to the creation of the schedule. The schedule is developed before we get to risk management activities in the Planning column, so how can the risk register be an input? In such situations, you'll start off using a preliminary version of the input. Initial risks are uncovered during initiating, so although the risk register will by no means be complete by the time you're creating the schedule, the known risks can be factored into your planning. Then, after performing risk management activities, you'll have a more complete risk register that you can use to refine your schedule through iterations.

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- Notice the term "procurement strategy and documents" in the Planning column. This phrase refers to documents such as the procurement statement of work (a description of the work to be done), contract provisions, source selection criteria, and bid documents such as the request for proposal (RFP), request for quotation (RFQ), and request for information (RFI). It encompasses the breadth of preparation required in planning for procurements. Note also the placement of "Finalize procurement strategy and documents" after "Go back—iterations." It's likely the risk management process will generate risk response strategies involving contracts; through iterations the procurement documents can be created, refined, and finalized.

- Team members can be released at any time during the project, once their work is approved and accepted and they have completed any documentation or other activities that pertain to their work. For example, the electricians on a project to build a house may test their work, get acceptance of their work, document lessons learned, suggest process improvements, and turn the work over. They can then be released from the project while other team members doing drywall are still working (executing their part of the plan). Keep in mind that some team members remain on the project to its end to assist the project manager in creating the final lessons learned, archiving final records, and producing the final report.

- As project executing progresses, the project manager may determine that a change to the project is needed. The same could happen while the project manager is monitoring and controlling the work. That is why changes can be requested in both the executing and monitoring and controlling process groups. Change requests may also be generated in planning as a result of rolling wave planning that occurs after the plan has been approved and work has started. Change requests are evaluated and approved or rejected as part of the Perform Integrated Change Control process (see the Integration Management chapter).

- Do the project management process groups occur sequentially? No; they all overlap. For example, you could be using monitoring and controlling processes to control the identification of stakeholders, the adherence to organizational requirements for project planning, or the creation of baselines and project documents. Defects could be identified in executing that will require work in executing to fix them, as well as work in monitoring and controlling to decide if the defects require a change to the plan to prevent future rework and delays. Controlling procurements and the final closure of procurements can occur simultaneously on projects because some sellers will complete their contractual obligations to the project while others are still producing deliverables. Look again at Rita's Process Chart™, and think about the overall focus of each process group.

- Make sure you understand the difference between executing and monitoring and controlling actions, because they continually overlap while the work of the project is going on. The focus of executing is to managing people, physical resources, and work to accomplish the project as planned. The focus of monitoring and controlling is ensuring the project is progressing according to plan, and approving necessary changes to the plan to meet the organization's strategic objectives and deliver the expected benefits.

TRICKS OF THE TRADE **Rita's Process Game™** The following pages contain the pieces for Rita's Process Game™. Cut them out, and practice putting each item into the correct process group, on your own or in a group. When you think the cards are sorted into the correct process groups, put the planning efforts in order. Check your answers using Rita's Process Chart™. Play this game at least three times to ensure you understand the efforts involved in the project management process that are discussed throughout this chapter.

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INITIATING	PLANNING	EXECUTING
MONITORING & CONTROLLING	CLOSING	Evaluate sellers; negotiate and contract with sellers
Release resources as work is completed	Evaluate team and individual performance; provide training	Create measurable objectives and success criteria
Gather work performance data	Manage reserves	Manage, evaluate, and close procurements
Analyze and evaluate data and performance	Develop stakeholder register	Finalize all management plans

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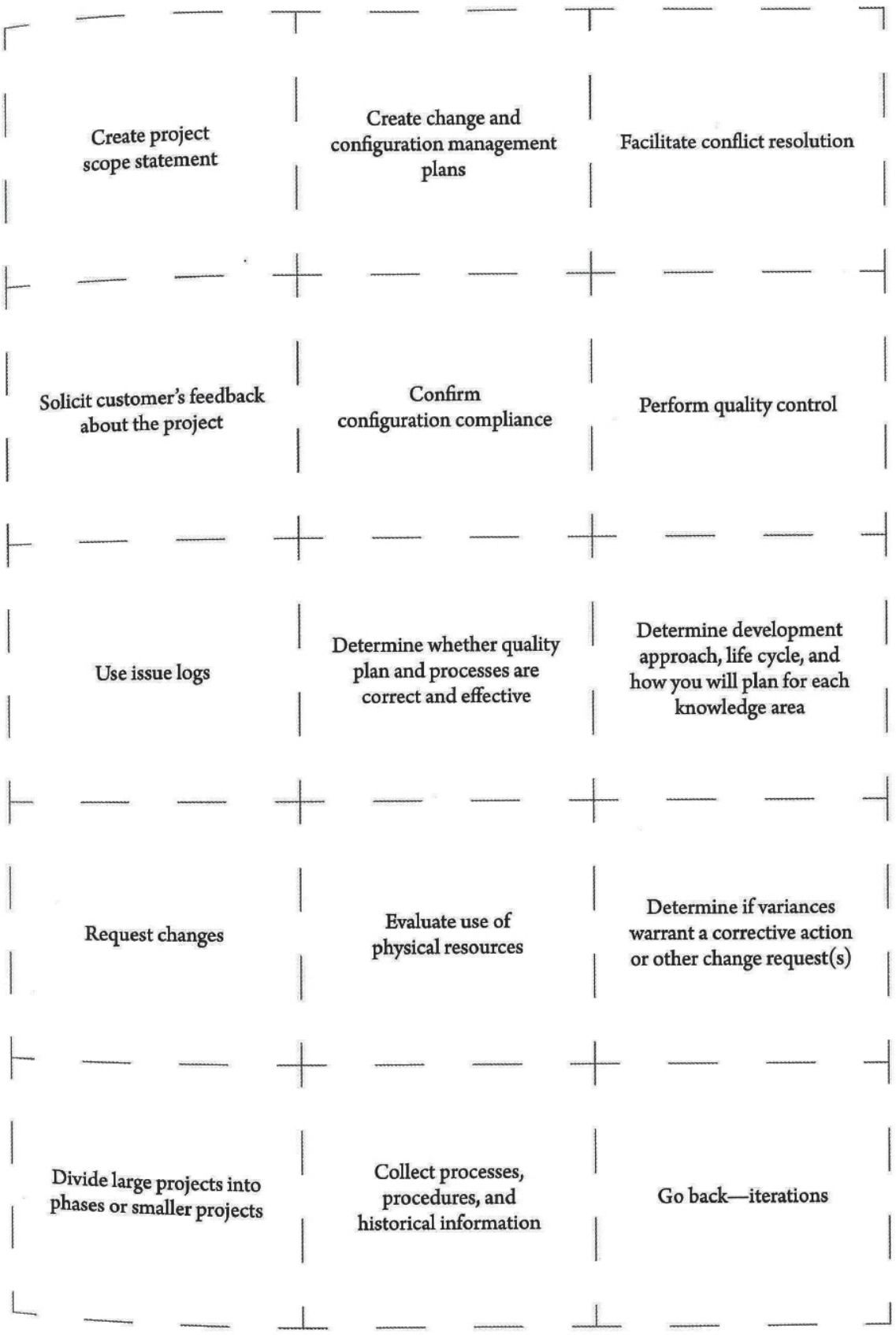

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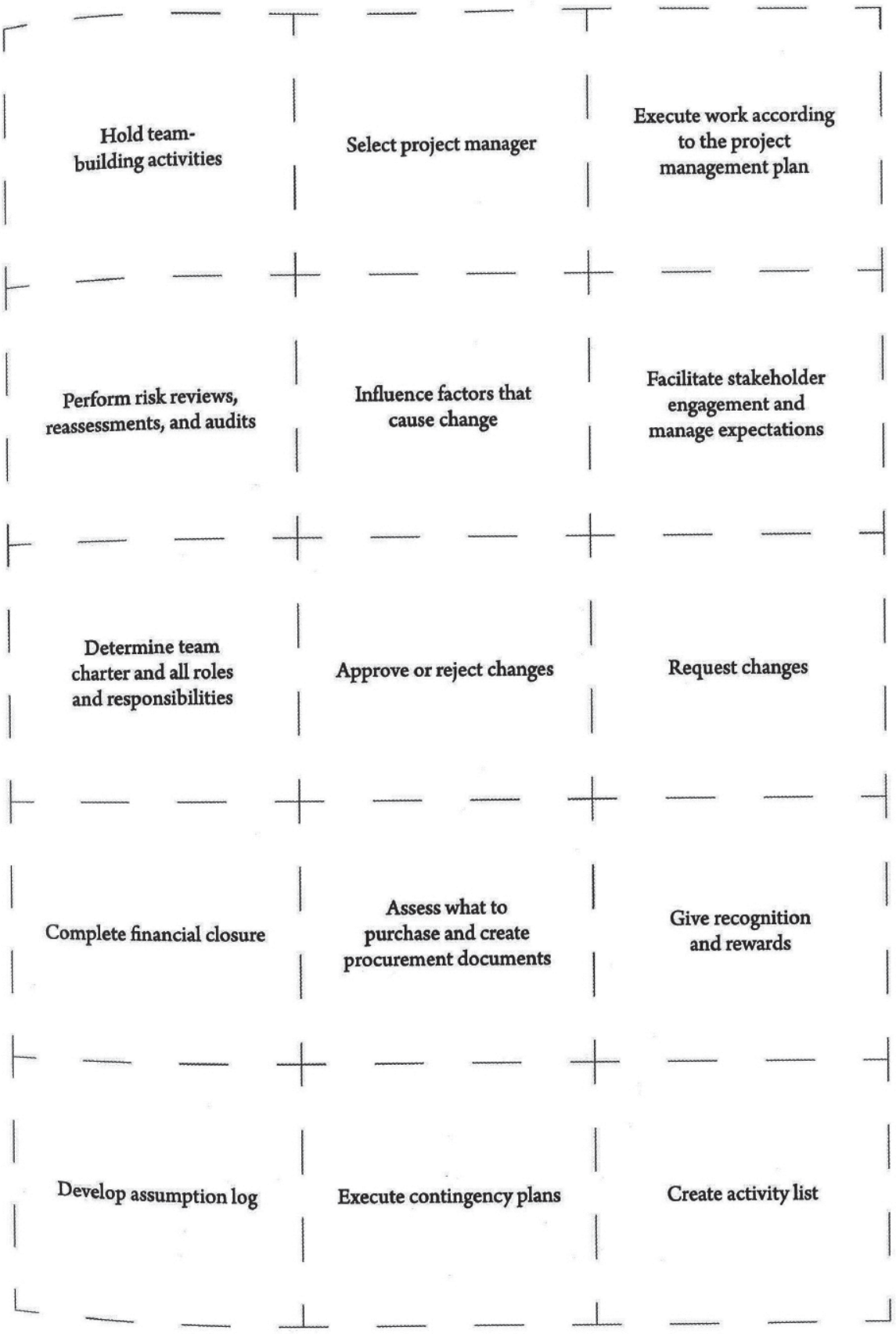

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Perform quality audits and issue quality report	Gain formal approval of the plan	Understand business case and benefits management plan
Perform risk identification, qualitative and quantitative risk analysis, and risk response planning	Confirm work is done to requirements	Update project management plan and project documents
Use and share project knowledge	Follow processes	Hold kickoff meeting
Complete final procurement closure	Identify stakeholders and determine their expectations, interest, influence, and impact	Update project management plan and project documents
Uncover initial requirements, assumptions, risks, constraints, and existing agreements	Report on project performance	Measure performance against other metrics in the project management plan

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Hold meetings	Hand off completed product	Estimate activity durations and costs
Measure performance against performance measurement baseline	Estimate resource requirements	Manage people
Develop schedule	Determine critical path	Gain final acceptance of product
Determine company culture and existing systems	Acquire final team and physical resources	Finalize procurement strategy and documents
Monitor stakeholder engagement	Take action to monitor and control the project	Develop realistic and sufficient project management plan and baselines

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Define and prioritize requirements	Assess project and product feasibility within the given constraints	Inform stakeholders of all change request results
Continuously improve; perform progressive elaboration	Complete final performance reporting	Determine quality standards, processes, and metrics
Index and archive records	Develop budget	Gather final lessons learned and update knowledge bases
Develop project charter	Request changes	Plan communications and stakeholder engagement
Create WBS and WBS dictionary	Gain customer's acceptance of interim deliverables	Produce product deliverables (product scope)

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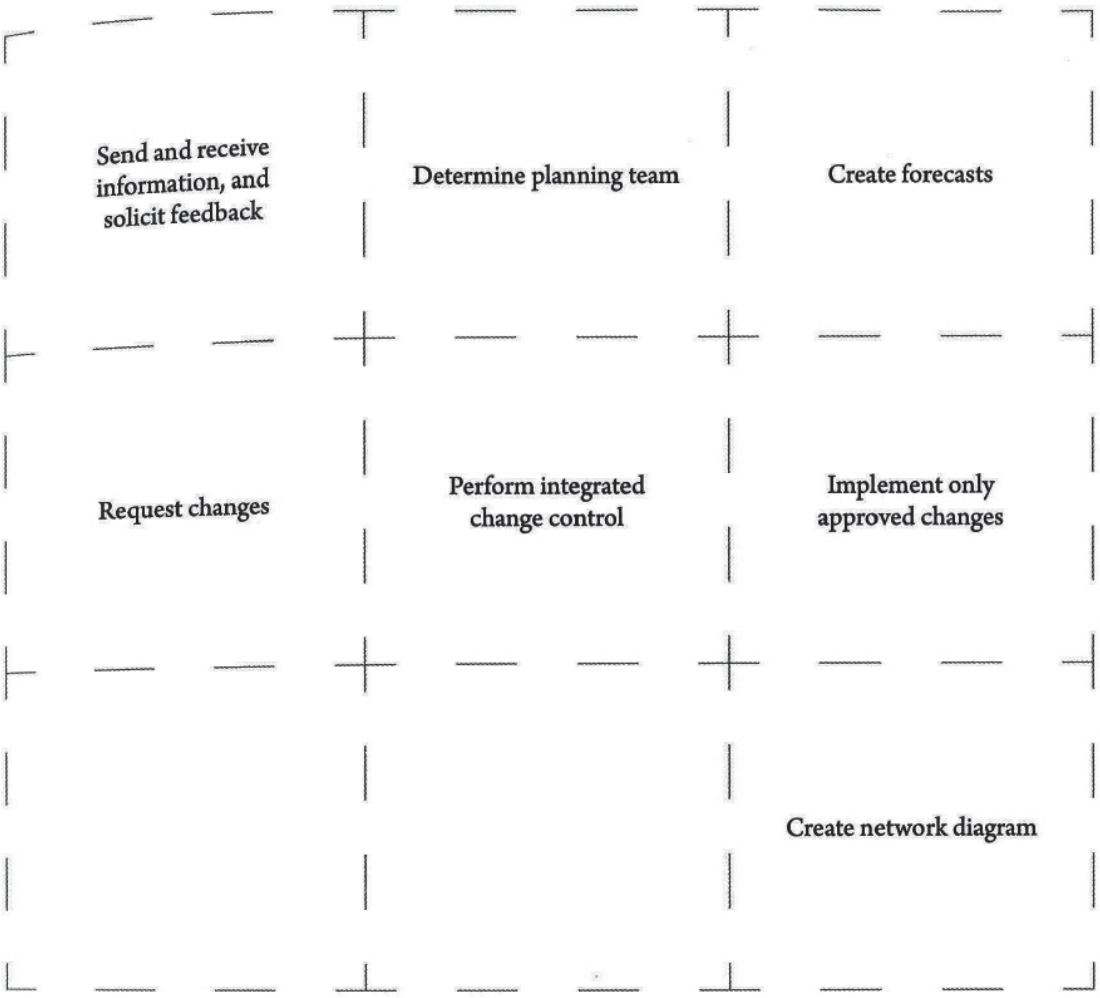

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TRICKS OF THE TRADE

The What-Comes-Before Game

Here is another game to help you understand the overall project management process. Playing this game after you have completed Rita's Process Game™ at least three times will really help solidify your understanding of these concepts.

Name the project planning effort that comes before each of the following items on Rita's Process Chart™.

Planning	What Comes Before?
1 Create network diagram	
2 Finalize procurement strategy and documents	
3 Create project scope statement	
4 Create WBS and WBS dictionary	
5 Determine critical path	
6 Develop budget	
7 Estimate activity durations and costs	
8 Gain formal approval of the plan	
9 Hold kickoff meeting	
10 Determine quality standards, processes, and metrics	
11 Assess what to purchase and create procurement documents	
12 Plan communications and stakeholder engagement	
13 Go back—iterations	
14 Determine team charter and all roles and responsibilities	
15 Develop realistic and sufficient project management plan and baselines	
16 Perform risk identification, qualitative and quantitative risk analysis, and risk response planning	
17 Estimate resource requirements	
18 Create activity list	

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Answer The What-Comes-Before Game

	Planning	What Comes Before?
1	Create network diagram	Create activity list
2	Finalize procurement strategy and documents	Go back—iterations
3	Create project scope statement	Define and prioritize requirements
4	Create WBS and WBS dictionary	Determine planning team
5	Determine critical path	Estimate activity durations and costs
6	Develop budget	Develop schedule
7	Estimate activity durations and costs	Estimate resource requirements
8	Gain formal approval of the plan	Develop realistic and sufficient project management plan and baselines
9	Hold kickoff meeting	Gain formal approval of the plan
10	Determine quality standards, processes, and metrics	Develop budget
11	Assess what to purchase and create procurement documents	Create project scope statement
12	Plan communications and stakeholder engagement	Determine team charter and all roles and responsibilities
13	Go back—iterations	Perform risk identification, qualitative and quantitative risk analysis, and risk response planning
14	Determine team charter and all roles and responsibilities	Determine quality standards, processes, and metrics
15	Develop realistic and sufficient project management plan and baselines	Finalize all management plans
16	Perform risk identification, qualitative and quantitative risk analysis, and risk response planning	Plan communications and stakeholder management
17	Estimate resource requirements	Create network diagram
18	Create activity list	Create WBS and WBS dictionary

How to Use the Rest of This Chapter

For many people, this is the hardest chapter in this book, and it uncovers the most gaps in their knowledge. If this chapter is difficult for you, trust us to help you; carefully follow along and try to complete each exercise. Then look for gaps in your knowledge. Do not simply skip to the answers.

The exercises in this chapter are extensive and are designed to help you explore what a project manager needs to do during each of the project management process groups. Take your time completing each exercise and reviewing the answers. Note your gaps on a separate sheet. Then spend some time making sure you research each knowledge gap as you read the rest of the book and clear it from your list.

Again, we encourage you to complete all exercises as they are intended to be completed. The exam includes common project management errors as choices and will focus on things most people do not know they should be doing. RMC has helped people all over the world find their knowledge gaps, and we have determined which gaps are most common. We then created exercises to fill those gaps. So, approach these

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exercises with the intent of discovering your personal gaps, and make sure you are thinking of a large, plan-driven project when you complete each exercise.

Also remember that you should read each chapter in this book more than once. When you go through this chapter the second time, focus on filling the gaps you discovered in the first pass through the chapter, rather than recreating the complete list for each exercise.

Initiating Process Group

The processes in the initiating process group formally start a new project or project phase. The initiating process group involves identifying and analyzing stakeholders to align their expectations about the project. It also provides a guiding vision for the project in terms of the organization's strategic objectives, the benefits the project will help achieve, the project's high-level scope, and any known constraints. The project is officially authorized through project initiating, and this process group provides the project manager with the authority and information necessary to begin the project. The project charter and the stakeholder register are the outputs of this process group.

Inputs to Project Initiating You do not have to memorize inputs to pass this exam. It is much better to use logic and rely on your understanding of the project management process. Try this exercise.

Exercise What does a project manager need to know or have before initiating a project?

Answer If you know what efforts are involved in project initiating (such as drafting the project charter and identifying and analyzing stakeholders), the inputs are easier to logically identify. To initiate a project, you need to know or have the following:

- The business case and the benefits management plan for the project
- The product description and requirements as they are known up to this point; in other words, what is the project supposed to do?

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- How the project fits into or supports the company's strategic plan
- A list of likely stakeholders
- Any known constraints (such as imposed schedule, budget, or resources), risks, and assumptions
- Any relevant agreements, including contracts, if any of the work will be done under contract
- Industry standards
- Marketplace trends and legal, regulatory, or compliance factors
- The company's change control system
- Defined processes and procedures for how the company operates
- Relationships with the sponsor of the project, likely stakeholders, and possible team members
- Templates from past projects
- Historical WBSs
- Historical estimates
- Lessons learned from previous projects
- What is going on in the company today, including major projects and the potential impact that current and planned initiatives could have on this project
- An understanding of the company's culture
- A list of people who may be good team members
- Information on organizational and project governance

Make sure you identify anything from the previous list that you did not think of, and add it to your gaps list.

TRICKS OF THE TRADE Remember, many questions on the exam will include common errors in project management. You will be required to know the activities that should be done during each part of the project management process. The only way to check your knowledge is to first determine what your knowledge is and then compare it to what it should be. The following exercises are designed to help you do just that.

Exercise Let's go beyond inputs. What are the specific actions required to complete project initiating?

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Answer If you are thinking only in terms of high-level processes, you probably came up with the following:

- Develop Project Charter (Integration Management chapter)
- Identify Stakeholders (Stakeholder Management chapter)

Knowing the names of these two processes will not be enough to pass the exam, however. You need to have a more detailed understanding of what really should be done (the actions) in project initiating.

The following table provides a list of the actions involved in project initiating—from the time the project manager is assigned. Remember that what needs to be done on a project varies based on the specific project, it's life cycle, development approach, and the industry, so it may not be practical to do all these actions on every project.

As you review the list, place a check mark next to the actions you have done on your real-world projects and leave any actions you do not know or have never done unchecked. Then make sure you study the areas that are unchecked. The items in the list are not in any particular order.

	Actions Involved in Project Initiating	Place ✓ Here If You Do It; Study Areas Unchecked
1	Sponsor(s) selects the project manager.	
2	Sponsor(s) determines the authority of the project manager.	
3	Collect historical information.	
4	Divide large projects into phases. Use project governance rules and apply them to the project.	
5	Identify stakeholders, and determine their influence, expectations, and impact. Document that information in a stakeholder register.	
6	Determine high-level requirements, constraints, assumptions, and risks.	
7	Turn high-level stakeholder needs, wants, and expectations into requirements.	
8	Make sure the business case and the analysis supporting the need for the project are documented and understood.	
9	Use the benefits management plan to understand the benefits that the project is expected to deliver to the business.	
10	Ensure the high-level product scope is documented with as much detail as is practical.	
11	Understand how the project supports the organization's strategic objectives.	
12	Collect and use any relevant, existing agreements (including contracts) that might be generating the project or that will be required during the project.	
13	Determine success criteria and measurable project and product objectives.	
14	Facilitate the resolution of conflicting objectives.	

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	Actions Involved in Project Initiating	Place ✓ Here If You Do It; Study Areas Unchecked
15	Become familiar with the company culture and structure as they relate to the project.	
16	Find existing processes, standards, and compliance requirements that affect the project.	
17	Understand how the organization does business (business knowledge) and what governance, procedures, and policies are already in place to use on the project.	
18	Do planning on a high-level basis.	
19	Perform high-level estimating for the project schedule and budget.	
20	Use the high-level planning and estimating data to determine whether the project objectives can be achieved within the given constraints and whether the expected benefits can be realized.	
21	Determine what form the project charter will take, including its level of detail.	
22	Coordinate project initiating efforts with stakeholders, including the customer.	
23	Work with the customer and others to determine high-level acceptance criteria and clarify what is and is not in the project.	
24	Determine the initial project organization.	
25	Identify any inherent or required milestones on the project.	
26	Finalize the project charter.	
27	Obtain formal approval of the project charter.	
28	Define the exit criteria for the project (when and why the project or phase should be closed).	
29	Involve subject matter experts in developing the project charter and identifying stakeholders.	
30	Develop project documents such as the risk register, the stakeholder register and the assumption log, including data on identified risks and stakeholders.	
31	Use stakeholder mapping to analyze data on identified stakeholders to understand their power, interest, and influence.	

The following are some points from the previous list of actions that could use further clarification.

Progressive Elaboration[4] You may notice that many of the items in the previous list (including estimates, product scope description, etc.) start in the initiating process group and then are iterated or refined into plans that can be used to manage the project. Although the project management plan is finalized in planning, items such as detailed estimates and project scope and product scope descriptions may be clarified as the work is being done during the executing and monitoring and controlling processes. The process of continually refining estimates and scope definition is called progressive elaboration.

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Rolling Wave Planning[5] The technique of rolling wave planning is a form of progressive elaboration. The earliest parts of the project are planned in sufficient detail for work to begin. Later phases of project work are planned at a high level. As the project progresses, and more information impacting the work becomes available, plans are elaborated in sufficient detail to accomplish the work.

Project Manager Assigned You should notice in the previous list that the project manager is assigned early in the process. This means the project manager is involved in project initiating. Is this true on your projects? For the exam, assume you are involved this early in the project, and make sure you understand what is going on during initiating.

Business Documents Do you know why your project was selected? Does it matter? As noted in the discussion of Rita's Process Chart™, the project manager needs to keep in mind throughout the project the reason the project was started. It will influence how the project is planned, what changes are allowed, and how the project scope is defined. The business case and the benefits management plan are inputs to developing the charter. (See the Develop Project Charter discussion in the Integration Management chapter for more about the importance of project business documents.)

High-Level Planning Is Done during Project Initiating The other important thing to notice in the previous exercise is that high-level planning is done during project initiating. Such planning may include creating a high-level WBS, performing order of magnitude estimating, and doing high-level risk identification. You use this information to determine whether the product of the project can be delivered by the end date and within the organization's established budget for the project. In other words, you need to assess whether the project has a chance of being successful before the organization commits money and resources to it. This high-level planning effort is part of creating the project charter, which documents measurable project objectives, success criteria, milestone schedules, and an initial budget for the project.

Figure 3.6 shows the reasons why project initiating is begun.

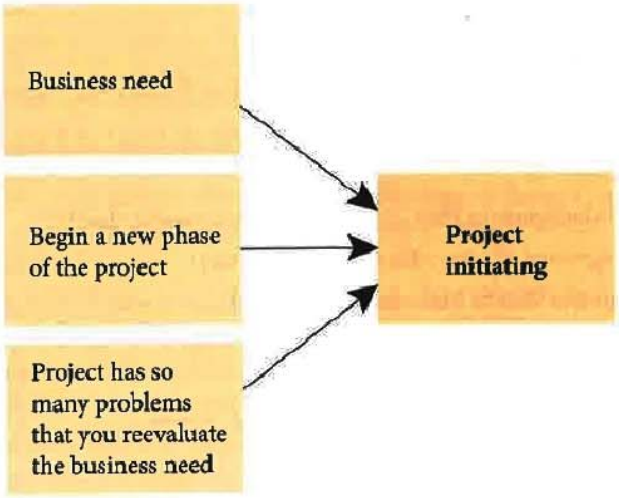

FIGURE 3.6 *Reasons for entering project initiating*

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Planning Process Group

If you could magically do your last project over again, how much better would it be? This is the power of planning. Project planning entails walking through the project using a consistent process, iterating your plans, and getting the project organized in sufficient detail before actually doing the work to produce the product of the project. Planning efforts save resources, time, and money, and encourage increased stakeholder buy-in and commitment to the project.

In project planning, the project manager and the team perform a detailed analysis of whether the objectives in the project charter and the expected business benefits can be achieved. They then decide how the project objectives will be accomplished, addressing all appropriate project management processes and knowledge areas. This means determining what processes are appropriate for the needs of the project and tailoring them to the needs of the project.

Exercise What are the specific actions required to complete project planning?

Answer If you are thinking only in terms of high-level processes, you may have come up with the following:

- Develop Project Management Plan (Integration Management chapter)
- Plan Scope Management (Scope Management chapter)
- Collect Requirements (Scope Management chapter)
- Define Scope (Scope Management chapter)
- Create WBS (Scope Management chapter)
- Plan Schedule Management (Schedule Management chapter)
- Define Activities (Schedule Management chapter)
- Sequence Activities (Schedule Management chapter)
- Estimate Activity Durations (Schedule Management chapter)
- Develop Schedule (Schedule Management chapter)
- Plan Cost Management (Cost Management chapter)
- Estimate Costs (Cost Management chapter)

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- Determine Budget (Cost Management chapter)
- Plan Quality Management (Quality Management chapter)
- Plan Resource Management (Resource Management chapter)
- Estimate Activity Resources (Resource Management chapter)
- Plan Communications Management (Communications Management chapter)
- Plan Risk Management (Risk Management chapter)
- Identify Risks (Risk Management chapter)
- Perform Qualitative Risk Analysis (Risk Management chapter)
- Perform Quantitative Risk Analysis (Risk Management chapter)
- Plan Risk Responses (Risk Management chapter)
- Plan Procurement Management (Procurement Management chapter)
- Plan Stakeholder Management (Stakeholder Management chapter)

Again, simply knowing the names of processes will not be enough to pass the exam. You need to have a detailed understanding of what really should be done (the actions) during each part of the project. To be well prepared for the exam, you need to identify and understand any required actions you do not know or have never done.

Complete the following checklist, noting which actions you currently perform when planning your projects. Although all the following actions are done during project planning, the level of detail to which each action is performed will vary based on the particular project.

NOTE: Avoid losing focus when working through these long lists as they contain a lot of information that will help you understand the actions you need to be familiar with when answering exam questions. Spend about 15 minutes thinking through the following list.

	Actions Involved in Project Planning	Place ✓ Here If You Do It; Study Areas Unchecked
1	Determine how you will plan the planning, executing, and monitoring and controlling efforts for stakeholders, requirements, scope, schedule, cost, quality, resources, communications, risk, procurement, changes, and configuration, and put that information into the beginnings of management plans.	
2	Refine the high-level requirements from project initiating so they are more specific and detailed, and look for additional requirements, being sure to consider any internal or external analysis, reports, or regulations; analyze and prioritize requirements.	
3	Expand on the assumptions identified in project initiating, looking for new assumptions and documenting the details of the assumptions.	
4	Refine the high-level constraints (such as resources, schedule, and cost) from project initiating so they are more specific and detailed.	
5	Create a description of the project deliverables, the work required to complete those deliverables, and their acceptance criteria (project scope statement).	

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	Actions Involved in Project Planning	Place ✓ Here If You Do It; Study Areas Unchecked
6	Use the project scope statement to gain approval of the "final" scope from stakeholders before further planning is done.	
7	Assess what may need to be purchased on the project. Identify any pieces of work that may be outside the organization's abilities to complete, and determine if new equipment or technology is needed to perform the project work.	
8	Select the procurement strategy for each contract. Create a draft of the procurement documents for necessary contracts, including bid documents, procurement statements of work, source selection criteria, and contract provisions.	
9	Determine what subject matter experts you will need on the project team to help with project planning.	
10	Break down the deliverables into smaller, more manageable pieces (WBS).	
11	Create descriptions of each work package in a WBS dictionary so that the work can be understood and produced without gold plating.	
12	Break down the work packages from the WBS into lists of activities to produce them.	
13	Sequence activities and determine predecessors and successors in the network diagram.	
14	Estimate resource requirements (such as staff, facilities, equipment, and materials).	
15	Meet with managers to gain resource commitments.	
16	Decide what level of accuracy is needed for estimates.	
17	Use historical data to support estimating time and cost.	
18	Involve experts or those who will work on activities to estimate time and cost.	
19	Determine how long the project will take without compressing the schedule (determine critical path).	
20	Develop a schedule model, evaluate it against the schedule constraint in the project charter, and use schedule compression techniques to reconcile the two to come up with a final schedule for the project management plan.	
21	Develop a preliminary budget and compare it to the budget constraint in the project charter. Then, develop options to reconcile the two to come up with the final budget for the project management plan.	
22	Determine quality policies, practices, and standards, and then determine metrics to measure quality performance.	
23	Determine processes to fulfill quality requirements and conform to organizational standards and policies.	
24	Determine how you will improve the processes in use on the project.	

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	Actions Involved in Project Planning	Place ✓ Here If You Do It; Study Areas Unchecked
25	Create a system for recognizing and rewarding the efforts of project team members to help keep them motivated and engaged in project efforts.	
26	Plan for acquisition, team building, training, assessment, and release of team members. Plan for physical resources requirements, including acquisition and logistics.	
27	Clearly determine all roles and responsibilities so team members and stakeholders know their roles on the project and what work they will need to do.	
28	Work with the project team to develop a team charter defining their commitments and interactions with each other, including ground rules for meetings, conflict resolution processes, etc.	
29	Determine what information you need from other projects and what information you will share with the organization and other projects.	
30	Plan what will be communicated on the project, to whom, by whom, when, and how.	
31	Plan how to involve stakeholders and manage their expectations during the project.	
32	Complete detailed risk identification, subjectively analyze risks (qualitative risk analysis), perform quantitative risk analysis as necessary, and do risk response planning.	
33	Iterations—go back and update project plans and documents as necessary to work toward a project management plan that is bought into, approved, realistic, and formal.	
34	Finalize the procurement statement of work and other bid documents for each contract.	
35	Look for potential positive and negative interactions with other projects that could affect the project.	
36	Determine the processes that will be used to request, approve, and manage changes on the project.	
37	Develop the configuration management plan, outlining naming conventions and processes for document versioning, storage, and retrieval.	
38	Plan ways to measure project performance, including determining the measurements to be used, when they will be taken, and how the results will be evaluated.	
39	Determine what meetings, reports, and other activities you will use to control the project to the project management plan.	
40	Finalize the "execute" and "monitor and control" aspects of all management plans. Document closing requirements and actions.	

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	Actions Involved in Project Planning	Place ✓ Here If You Do It; Study Areas Unchecked
41	Develop the final project management plan, project documents, and performance measurement baseline by performing schedule network analysis, looking for options, and confirming that project objectives can be met.	
42	Gain formal approval of the project management plan from the sponsor, team, and managers of resources.	
43	Hold a kickoff meeting with key stakeholders, team members, managers of team members, and the customer to make sure everyone is on the same page and to gain buy-in.	
44	Throughout the project, return to the planning processes to do rolling wave planning (progressive elaboration or iteration) as more information becomes available. Results will likely require change requests and updates to the project management plan and project documents.	

Project planning is iterative. Each planning process may use the results of the previous processes, and each process may affect or cause changes to the previous processes. The idea, in the real world, is to attempt to complete each planning process as completely as possible. Then, after risk identification, qualitative and quantitative risk analysis, and risk response planning, you go back to finalize all the components of the project management plan and project documents. This approach to planning saves time and is efficient. It is only after risk management planning is completed that the final cost and schedule can be determined. Risk management could also result in iterations to the scope, the deliverables, the project resources (including when they are used), the sequence in which activities are performed, and almost all other parts of the project. The results of the planning effort are the project management plan and project documents that will guide the execution and control of the project.

Notice the references to management plans in the previous table. As described in chapter 1, management plans are a PMI-ism. Too often, project managers jump right into whatever they are doing without analyzing or planning. Such actions lead to inefficiencies, rework, mistakes, conflict, and needless overtime. Project managers are supposed to think about things before they do them. The exam assumes you take a more formal approach that includes considering how you will do the work and documenting that information in a management plan.

There are many components to management plans, but generally they answer the questions such as: "How will we go about planning scope, schedule, cost, etc.?" "How will we manage and monitor and control scope, schedule, cost, etc. now that we have planned what needs to be done?" "How will we perform the closing of project phases and the overall project?" The answers to these questions are determined as part of project planning. For clarity, the previous table groups management plans together instead of listing each management plan separately. It also accounts for the iterations of the management plans by separating them into the planning, executing, and monitoring and controlling parts of each plan. The individual management plans are combined into the overall project management plan. We will further discuss the project management plan and its components in the Integration Management chapter.

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Another important concept to understand about planning is that the amount of time the team spends in project planning and the level of detail achieved in the plan should be appropriate to the needs of the project. The appropriate level of detail is dictated by the selected development approach and project governance. If a high-priority project has a tight schedule that does not allow much room for variance, the project will require more planning than a low-priority project with a fairly flexible schedule.

Some projects cannot be fully planned to a detailed degree prior to starting work. Often, such projects are organized by phases (such as test phase, install phase, etc.), or they use an adaptive life cycle approach. Using an adaptive life cycle, only the first part of the project may be fully planned, while the later pieces are planned at a higher level and then progressively elaborated when more is known about the project. Detailed planning for the next phase is done as the previous phase nears completion.

Everyone is involved in the planning processes. The project manager compiles the project management plan and project documents with input from stakeholders. The project manager may also use information gathered from resources such as historical records from previous projects, company policies, governance, regulatory and compliance policies and procedures, and other such sources to plan the project.

Figure 3.7 shows the reasons for entering project planning.

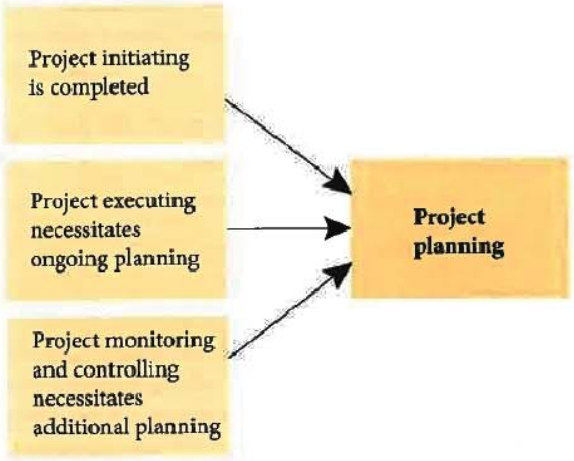

FIGURE 3.7 *Reasons for entering project planning*

For descriptions of each of the individual planning processes, see the rest of this book—particularly the Integration Management chapter, which discusses the development of the project management plan.

Executing Process Group

The purpose of project executing is to complete the project work as defined in the project management plan to meet the project objectives and achieve the expected business value. In other words, the goal is to produce the project deliverables within the project's planned budget and schedule to deliver the agreed-upon benefits. The focus is on leading and managing the project; that includes engaging stakeholders, working with the team to complete work, following processes, and communicating according to the plan. During executing, the project manager essentially has a guiding, proactive role, and uses the project management plan and project documents as reference points in managing the work.

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Many project managers do not create management plans that include specific plans (for scope, schedule, cost, etc.), and that are realistic and have the support of management. Without experience in using such a plan, they do not realize the value a project management plan can provide in properly managing and executing a project. They may find exam questions about executing with this type of project management plan to be extremely difficult because it is so different from their daily work practices. For the exam, get your mind around the critical difference planning makes, and assume the project was properly planned before work began, unless the question indicates otherwise.

Exercise Imagine you are about to begin project executing. What type of actions must be taken?

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Answer If you are thinking only in terms of high-level processes, you may have come up with the following:

- Direct and Manage Project Work (Integration Management chapter)
- Manage Project Knowledge (Integration Management chapter)
- Manage Quality (Quality Management chapter)
- Acquire Resources (Resource Management chapter)
- Develop Team (Resource Management chapter)
- Manage Team (Resource Management chapter)
- Manage Communications (Communications Management chapter)
- Implement Risk Responses (Risk Management chapter)
- Conduct Procurements (Procurement Management chapter)
- Manage Stakeholder Engagement (Stakeholder Management chapter)

Again, you need to know more than the names of processes. Let's look at the actions involved in executing a project. As you check your answers against the following table, note which actions you do on your projects, which actions were not on your list, and which actions that you wrote down are not included here. Note that some of these items, such as "Complete work packages," will be largely undertaken by the project team.

NOTE: This is another long list. Keep focused, and spend 15 minutes thinking through these actions. Remember that the list is not sequential.

	Actions Involved in Project Executing	Place ✓ Here If You Do It; Study Areas Unchecked
1	Communicate your expectations for stakeholders and the project, and manage the involvement and needs of all stakeholders throughout the project to ensure everyone has a common understanding of the work.	
2	Implement the most up-to-date version of the project management plan, including revisions made as a result of control activities.	
3	Complete work packages.	
4	Collect, document, and share lessons learned.	
5	Establish and manage communication channels.	
6	Evaluate how effectively the team members function as a team.	
7	Implement approved changes, including corrective actions, preventive actions, and defect repair.	
8	Confirm that practices and procedures are being followed and are still appropriate for the project.	
9	Produce and distribute reports on project performance.	
10	Hold team-building activities.	
11	Use the team charter for guidance on team interactions. Follow ground rules at team meetings.	
12	Obtain needed training for team members.	

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	Actions Involved in Project Executing	Place ✓ Here If You Do It; Study Areas Unchecked
13	Exchange information about the project according to the plan, and solicit feedback to ensure communication needs are being met.	
14	Remove roadblocks.	
15	Achieve work results that meet requirements.	
16	Meet with managers to reconfirm resource commitments.	
17	Keep managers apprised of when their resources will be needed on the project.	
18	Commit, manage, and release physical and team resources in accordance with the project management plan.	
19	Guide, assist, communicate, lead, negotiate, facilitate, and coach.	
20	Use your technical knowledge.	
21	Hold meetings to identify and address issues, assess risks, and keep the project work moving forward.	
22	Manage stakeholder engagement and expectations, increase project support, and prevent possible problems.	
23	Focus on preventing problems rather than just dealing with them as they arise.	
24	Make sure all team members have the skills, information, and equipment needed to complete their work.	
25	Look for exceptions to the approved project management plan in team members' performance, rather than checking up on every person's work.	
26	Recommend changes to be evaluated in the Perform Integrated Change Control process.	
27	Follow organizational policies, processes, and procedures.	
28	Increase the effectiveness of processes.	
29	Make updates to the project management plan and project documents to reflect current information about the project.	
30	Create recommendations for the performing organization to increase its effectiveness.	
31	Ensure continued agreement from the stakeholders to the project management plan.	
32	Keep everyone focused on completing the project to the project charter and project management plan.	
33	Keep the project's business case and benefits management plan in mind while managing the project, especially when problems occur.	
34	Solve problems.	
35	Determine where project changes are coming from and what you can do to eliminate the root cause of the need for change.	
36	Determine final team members and other resources, and bring them on to the project as needed.	

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	Actions Involved in Project Executing	Place ✓ Here If You Do It; Study Areas Unchecked
37	Recognize and reward the team and individuals for their work and performance on the project.	
38	Gather initial measurements and details about activities of project work (work performance data).	
39	Implement approved process improvements.	
40	Use an issue log to record project issues and details about their resolution, including who is responsible for resolving each issue and the expected timeline.	
41	Obtain seller responses to bid documents.	
42	Review proposals, bids, and quotes; negotiate contract terms with prospective sellers; and manage the evaluation and selection of sellers.	
43	Manage the integration of sellers' work and deliverables into the overall work and deliverables of the project; manage any seller-related conflicts or challenges.	
44	Expend and manage project funds.	
45	Facilitate conflict resolution using conflict resolution techniques.	
46	Assess individual team member performance.	
47	Update human resource records of team members to reflect new skills acquired while working on the project.	
48	Carry out contingency plans in response to risk triggers.	

Did your list include items that were not in the previous table? If so, make sure those items should actually be part of executing a properly managed project. Did you include such things as getting the team to cooperate, discovering added scope, or coordinating unplanned overtime work? Although these things could (and often do) occur on a project, they result from a lack of proper project management.

How about dealing with problems? Notice that "solves problems" is only one of 48 items on the list of actions to be done during project executing. As a project manager, you should be focused on preventing problems so you do not have to deal with them. With proper project management, problems occur less often, and should not have a major impact on the project. Assume risk management efforts have identified and evaluated risks, and that contingency plans are in place to deal with risks that have high probability or impact ratings. Instead of handling risk events, you can spend your time engaging stakeholders and encouraging team members. Again, for the exam, assume proper project management was done unless the questions say otherwise.

Did you list meetings? Meetings are certainly part of executing a project, but many people do not realize that proper planning can decrease the number of meetings they need. If you were thinking about "go around the room and report what you have done" types of meetings, realize that status can also be collected through other means. Effective agile teams have focused daily stand-up meetings to keep the team on track to complete their commitments for the iteration. The occasions when the team gets together are too important to just focus on collecting status. How about reviewing risk triggers and upcoming contingency plans during meetings? Having too many meetings can cause you to lose buy-in from your team if they feel you are wasting their time.

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TRICKS OF THE TRADE® Keep the following in mind as a way to summarize executing activities: work according to the project management plan, be proactive, lead and engage, and guide.

The processes of project management are not always performed in the same sequence. Executing means working with the latest revision of the project management plan. In other words, you are always executing according to the project management plan, but the plan might change over time. Figure 3.8 illustrates the reasons for entering project executing.

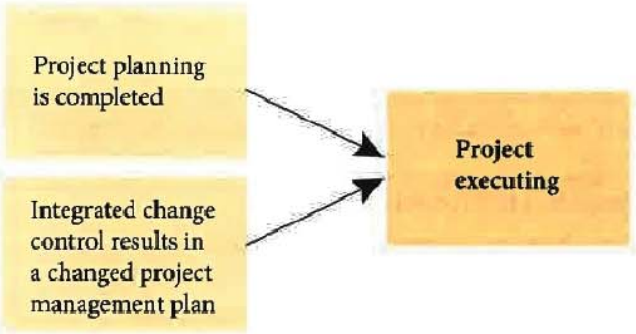

FIGURE 3.8 *Reasons for entering project executing*

Monitoring and Controlling Process Group

Monitoring and controlling are combined into one process group, but each has a different focus. Monitoring requires the project manager to focus their attention on how the project is progressing. The project manager will need to assess how stakeholders are participating, communicating, and feeling about the project, the work, and the uncertainties that have been identified. Controlling requires evaluating hard data on how the project is conforming to the plan and taking action to address variances that are outside of acceptable limits—by recommending changes to the way the work is being done, or possibly adjusting baselines to reflect more achievable outcomes. In this context, the term "changes" encompasses corrective and preventive actions and defect repair.

Test takers often find project monitoring and controlling to be one of the most challenging process groups on the exam. One reason for this is that you are expected to know how to observe, measure, evaluate, and analyze a project in a more planned and complete way than most project managers do on their real-world projects. The project management plan includes monitoring activities, such as observing, communicating, and evaluating. It also specifies control activities to be used on the project, along with a plan for how variations will be addressed.

Without organizational support for monitoring and controlling the project to the plan, a project manager could spend most of their time asking for percent complete, being unsure if the project will meet its performance measurement baseline.

We saw earlier in this chapter that monitoring and controlling applies to change-driven projects as well as plan-driven ones, but it can be useful to think in terms of plan-driven projects to understand the work of this process group and to answer questions on the exam (unless, of course, a question specifies a change-driven project).

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For the exam, assume:

- You have a formal project management plan that is realistic and complete to the level appropriate for the project.
- You have plans already in place for how and when you will measure schedule, cost, and scope performance against the performance measurement baseline.
- You are accountable for meeting the performance measurement baseline.
- You also measure against the other metrics included in the project management plan to see how the project is performing.
- You take action to correct any variances that warrant action.
- Any deviations from the plan should be made up, rather than requesting a change to the project to accommodate them. Submitting a change request should be the very last resort and only used if there is no other way to make up the deviation.

The following exercise should help you get your mind around what a project manager should do to monitor and control a project. Again, we encourage you to work through this exercise. Find the gaps in your knowledge and experience, and fill those gaps, rather than relying on memorization for the exam. As a result, you will pass the exam—and be a better project manager!

Exercise What are the specific actions required as part of project monitoring and controlling?

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Answer If you are thinking only in terms of high-level processes, you may have come up with the following:

- Monitor and Control Project Work (Integration Management chapter)
- Perform Integrated Change Control (Integration Management chapter)
- Validate Scope (Scope Management chapter)
- Control Scope (Scope Management chapter)
- Control Schedule (Schedule Management chapter)
- Control Costs (Cost Management chapter)
- Control Quality (Quality Management chapter)
- Control Resources (Resource Management chapter)
- Monitor Communications (Communications Management chapter)
- Monitor Risks (Risk Management chapter)
- Control Procurements (Procurement Management chapter)
- Monitor Stakeholder Engagement (Stakeholder Management chapter)

The previously listed processes are described in the chapters of this book as referenced. Now let's look at what actions should be done in monitoring and controlling a project. Review the following list, and identify any you do not know or have never done. If you included actions that are not listed here, make sure those actions are part of monitoring and controlling.

NOTE: Because this is one of the most challenging process groups on the exam, you should spend considerable time here. Do not lose focus as you read. Take a break in the middle of the list if you need to, and remember the list is not sequential.

	Actions Involved in Project Monitoring and Controlling	Place ✓ Here If You Do It; Study Areas Unchecked
1	Measure project performance according to the planned measures in the management plans.	
2	Measure against the performance measurement baseline.	
3	Analyze and evaluate work performance data.	
4	Determine variances.	
5	Use your judgment to determine what variances are important and if they warrant recommending a change or corrective action.	
6	Recommend changes, including defect repair and preventive and corrective actions. Do not just wait for others to recommend them.	

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	Actions Involved in Project Monitoring and Controlling	Place ✓ Here If You Do It; Study Areas Unchecked
7	Make or obtain a decision in integrated change control about whether changes should be approved, rejected, or deferred.	
8	Track and evaluate naming conventions, version control processes, the storage and retrieval system (configuration management), and the use of the PMIS. This ensures everyone knows which version of the project or product documentation is the latest version.	
9	Control scope, schedule, and cost to their baselines.	
10	Perform procurement inspections and reviews of seller performance to the contract.	
11	Refine control limits as needed.	
12	Identify the root causes of problems with the help of techniques such as process analysis (for example, Lean, Kanban, and Six Sigma).	
13	Obtain formal acceptance of interim deliverables from the customer.	
14	Identify the need for replanning.	
15	Replan and make updates to the project management plan and project documents to reflect approved changes and updates to the project.	
16	Evaluate stakeholder relationships and involvement to determine if they require improvement.	
17	Manage the schedule and cost reserves.	
18	Recalculate how much the project will cost and how long it will take, and create forecasts.	
19	Obtain additional funding if needed.	
20	Prepare work performance reports from the analyzed data and measurements.	
21	Hold periodic quality inspections.	
22	Make decisions to accept or reject completed deliverables.	
23	Evaluate the effectiveness of implemented corrective actions.	
24	Assess the effectiveness of project control systems.	
25	Spend time trying to improve quality.	
26	Determine if project controls need to be updated.	
27	Identify and analyze trends.	
28	Evaluate the effectiveness of risk responses in a risk review.	
29	Look for newly arising risks.	
30	Reanalyze identified risks.	
31	Use milestones as a project control tool.	
32	Observe and analyze.	
33	Use variance reports to help correct small problems before they become serious.	
34	Calculate estimate to complete.	

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	Actions Involved in Project Monitoring and Controlling	Place ✓ Here If You Do It; Study Areas Unchecked
35	Use and interpret earned value calculations.	
36	Use quality control tools such as inspections, histograms, performance reviews, and cause-and-effect diagrams.	
37	Influence any factors that could result in the project's change control and configuration management measures being bypassed.	
38	Control changes.	
39	Control to make sure that only approved changes are implemented.	
40	Work with the change control board.	
41	Evaluate stakeholder satisfaction.	
42	Control procurements through actions such as reviewing, approving, and paying invoices, administering claims, and performing inspections and audits.	
43	Validate defect repair.	
44	Determine where project changes are coming from and what you can do to eliminate the root cause of the need for change.	
45	Consider the project's business case and the organization's strategic objectives when analyzing change requests.	
46	Use active listening, inquiry, and data gathering to confirm that communications and stakeholder engagement efforts are effective and working as planned. Make or recommend needed adjustments.	
47	Evaluate the use, cost, and other aspects of physical resources. Make appropriate changes and adjustments.	
48	Close procurements after final deliverables are accepted.	
49	Update risk report to keep key stakeholders informed about the status of overall project risk and the highest-ranked individual risks.	

Not all monitoring and controlling efforts result in the discovery of variances that warrant preventive or corrective action, defect repair, or changes to the baselines or plan. When a project has been planned appropriately, most control efforts result in information that proves work is being done according to the plan and that scope is being produced to the agreed-upon standards and metrics. Results of measurements (whether positive or negative) and outcomes of other monitoring and controlling efforts are added to the project management plan and project documents as updates. In fact, project management plan and project documents updates are outputs of every monitoring and controlling process. Records of the work, measurements, and lessons learned are used for reference and comparison throughout the life of the project. In addition to identifying variances, measurements can be useful in trend analysis, forecasting, and estimating the remaining work.

We have included the following information about the processes to help you develop a better overall understanding of project monitoring and controlling. Read the following carefully to expand your understanding of what "monitoring and controlling" is.

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Control Scope

- Follow the change management plan.
- Measure scope performance against the performance measurement baseline.
- Influence the factors that cause changes.
- Control scope changes and the impacts of those changes.
- Analyze work performance data and variances.
- Request changes.
- Update the scope baseline, other parts of the project management plan, and requirements documentation with approved changes.
- Validate changes to make sure they do not over- or undercorrect problems.
- Document lessons learned.

Control Schedule

- Follow the change management plan.
- Measure schedule performance against the performance measurement baseline.
- Influence the factors that cause changes.
- Control schedule changes and the impacts of those changes.
- Analyze work performance data and variances.
- Request changes.
- Update the schedule baseline, other parts of the project management plan, and schedule-related documentation with approved changes.
- Document lessons learned.
- Manage the schedule reserve.
- Use earned value analysis to create schedule forecasts.
- Validate changes to make sure they do not over- or undercorrect problems.

Control Costs

- Follow the change management plan.
- Measure cost performance against the performance measurement baseline.
- Influence the factors that cause changes.
- Control cost changes and the impacts of those changes.
- Analyze work performance data and variances.
- Request changes.
- Update the cost baseline, other parts of the project management plan, and cost estimates.
- Document lessons learned.
- Manage the cost reserve.
- Use earned value analysis to recalculate the estimate at completion and other cost forecasts.
- Obtain additional funding when needed.
- Validate changes to make sure they do not over- or undercorrect problems.

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Control Quality

- Hold periodic inspections.
- Ensure the deliverables are meeting the standards.
- Influence the factors that cause changes.
- Request changes or improvements to work and processes.
- Make decisions to accept or reject work.
- Assess the effectiveness of project quality control systems.
- Analyze work performance data and variances.
- Update the quality management plan, as well as quality- and process-related documentation.
- Validate changes to make sure they do not over- or undercorrect problems.
- Document lessons learned.

Control Resources

- Confirm the type and quantity of resources used are consistent with what was planned.
- Evaluate the effectiveness of the physical resources.
- Analyze work performance data and variances.
- Request changes.
- Validate changes to make sure they do not over- or undercorrect problems.
- Update the resource management plan, as well as resource-related documentation.
- Document lessons learned.

Monitor Communications

- Ensure information is being communicated to the appropriate people in the right way and at the right time.
- Analyze work performance data and variances.
- Request changes.
- Analyze information about communications to make sure they are meeting stakeholder needs.
- Validate changes to make sure they do not over- or undercorrect problems.
- Document lessons learned.

Monitor Risks

- Reassess risks, planned risk responses, and risk reserves.
- Identify new risks.
- Watch for the occurrence of risk triggers.
- Create and implement workarounds.
- Perform risk audits to evaluate the effectiveness of risk management processes. Analyze work performance data, work performance reports, and variances.
- Request changes.
- Evaluate the effectiveness of implemented risk response plans.
- Document lessons learned.

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Control Procurements

- Monitor performance to make sure both parties to the contract meet contractual obligations.
- Inspect and verify the contract deliverables.
- Protect your legal rights.
- Follow the defined procurement management procedures, including the contract change control system.
- Analyze work performance data, seller work performance reports, and variances.
- Request and manage changes.
- Authorize contract-related work.
- Issue and review claims.
- Maintain comprehensive records.
- Report on seller performance compared to contract.
- Review invoices and make payments.
- Update the project management plan and procurement documentation.
- Validate contract changes, control contracts to updated versions, and evaluate effectiveness of changes.
- Document lessons learned.
- Close out contracts as final deliverables are completed and accepted.

Monitor Stakeholder Engagement

- Analyze work performance data and variances.
- Evaluate stakeholder engagement and stakeholder relationships, and look for opportunities for improvement.
- Assess whether stakeholders' expectations are aligned with the project.
- Resolve conflicts.
- Maintain an issue log.
- Request changes.
- Update the stakeholder management plan and the stakeholder register.
- Document lessons learned.
- Validate success of changes to stakeholder engagement strategy.

Project management does not progress sequentially from initiating to planning to executing to monitoring and controlling to closing; the processes overlap. In fact, you are doing some level of monitoring and controlling throughout the project—from initiating to closing. Figure 3.9 illustrates key project outputs that trigger a focus on monitoring and controlling. It also shows that you might go from monitoring and controlling to other process groups depending on the needs of the project.

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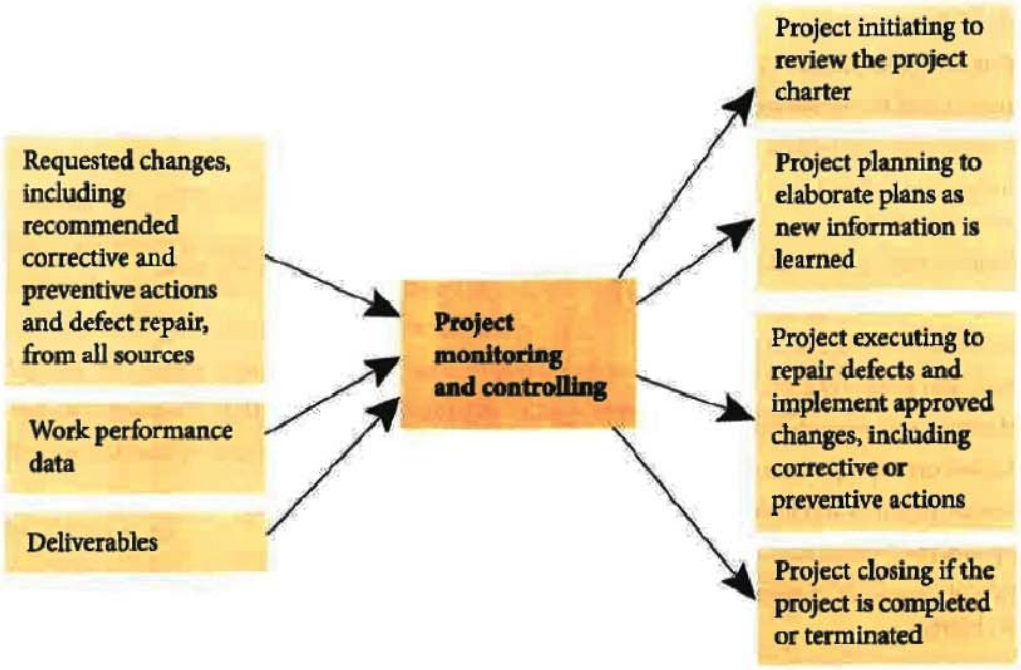

FIGURE 3.9 *Key outputs that trigger project monitoring and controlling, and potential next steps*

Closing Process Group

The project or phase is not over when the product scope is completed; there is one more process to be done. Project closing, where the project is finished, is one of the most ignored parts of the project management process. However, if you take time now to understand the concepts that we'll discuss in this section, the 12 or so questions about closing on the exam should be easy.

The closing effort includes administrative activities such as collecting and finalizing all the paperwork needed to complete the project, and technical work to confirm that the final product of the project is acceptable. It will also include any work needed to transfer the completed project to those who will use it and to solicit feedback from the customer about the product and the project.

In many real-world situations, projects never seem to officially finish. Sometimes the project manager gets pulled off a project to do other things. Sometimes work on the project just stops. Sometimes the project priority decreases. Because all projects are unique, there is no universal way in which a project officially ends; however, all projects must follow the closing process and complete the required closing activities.

The work done during closure is extremely important to the performing organization and to the customer. The exam asks questions in this area to see if you know what those valuable activities are and when a project is really finished. Try this next exercise to test your knowledge.

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Exercise What are the specific actions required to complete the Close Project or Phase process?

Answer Compare the list of closing actions in the following table to what you wrote in the exercise above, and identify any that you do not know or have never done. Look for gaps in your knowledge.

	Actions Involved in Project Closing	Place ✓ Here If You Do It; Study Areas Unchecked
1	Confirm that all project requirements have been met.	
2	Verify and document that the project, or project phase, meets completion or exit criteria set in place during project planning.	
3	Obtain formal (legal) sign-off and final acceptance of the product of the project from the customer.	
4	If any issues prevent final acceptance by the customer, negotiate a settlement or other resolution.	
5	If the project was terminated before completion, document the reasons for termination and the status of the project and deliverables.	
6	Make final payments, and complete cost records.	
7	Gather final lessons learned and share with the organization.	
8	Update project records.	
9	Ensure all the project management processes are complete.	
10	Update corporate processes, procedures, and templates based on lessons learned.	
11	Complete project (or phase) closure.	
12	Analyze and document the success and effectiveness of the project.	

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	Actions Involved in Project Closing	Place ✓ Here If You Do It; Study Areas Unchecked
13	Create and distribute a final report of project (or phase) performance.	
14	Index and archive project records.	
15	Evaluate customer satisfaction regarding the project and the deliverables.	
16	Hand off the completed project deliverables to the appropriate stakeholders (the customer, operations and maintenance, etc.).	
17	Confirm all contracts have been formally closed; update and archive records.	
18	Celebrate!	

Does this list of actions make sense? Take a moment to go back and look again at the previous table. Make sure you understand why each item is important and valuable. Spending some time on the lists of actions in each process group will help you prepare for the exam and give you a solid understanding of the overall project management process.

Because many organizations do not require formal closure procedures, let's take a moment to discuss some of the key actions listed in the previous table that many people miss.

Confirming that all the requirements have been met may seem unimportant; however, most studies show that many requirements are not met on projects, especially on projects with numerous pages of requirements. This confirmation needs to take place and can be done by reviewing the project management plan and accepted deliverables.

What about handing off the completed project deliverables to operations and maintenance? Work involved in completing such a transfer is considered part of the project. The work could include meetings to explain the project nuances, training, documentation for maintenance, and other activities as needed.

Now let's think about formal sign-off and acceptance. These are important because they confirm that the customer considers the project completed and accepts the whole project. Without that acceptance, you cannot be sure the project was finished. Imagine the team never gains formal acceptance on a project for an external customer, but moves on to other projects. Then the customer calls for additional scope to be added to the project. How difficult would it be to regroup the team to perform the work? Gaining formal acceptance helps ensure this won't be necessary.

Measuring customer satisfaction is another important part of project closing. Have you ever had a customer accept your work although they were not happy with the project? It's highly beneficial for the project manager to solicit feedback from the customer about both the project and the product, and to evaluate the customer's satisfaction level during project closing. Just like lessons learned, measuring customer satisfaction should be ongoing throughout the project, but it must occur during project closing. The satisfaction level of stakeholders should also be assessed, and they should be asked for input to improve processes and procedures on future projects.

In the first chapter of this book, we noted that historical records are a PMI-ism. For the exam, make sure you understand the value of these records and the project manager's and team's responsibility for creating them. Historical information is collected throughout the project, but it is during project closing that the final versions of the lessons learned are compiled and archived in the lessons learned repository. In addition,

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project closing involves a concerted effort to index all files, letters, correspondence, and other records of the project into an organized archive that is stored for use on future projects.

Some project managers consider completing the final project performance report and holding an end-of-the-project celebration to be unimportant. But there is good reason for these activities—both of which recognize the team's efforts. The final report communicates to all stakeholders and the entire organization benefits achieved by the team members' efforts on the project.

After the administrative pieces of project closure are completed and the customer, sponsor, and other stakeholders provide formal sign-off that the product of the project is acceptable, the project is closed. At that point, any team members utilized to close the project or project phase are released.

Figure 3.10 illustrates the reasons a project might enter the closing process group.

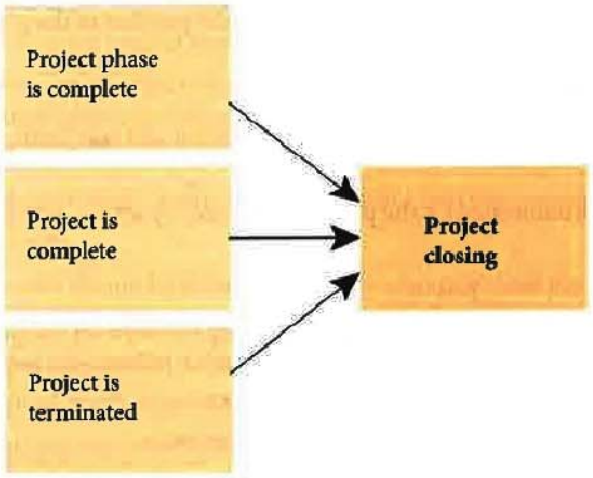

FIGURE 3.10 *Reasons for entering project closing*

TRICKS OF THE TRADE **The Project Management Scramble Game** The following exercise is an extension of Rita's Process Game™ and should help you assess how well you've understood what you've read. This exercise will look at more specific actions, rather than the generalized ones stated in Rita's Process Chart™. For each item listed in the following table, simply determine if it is done in initiating, planning, executing, monitoring and controlling, or closing.

Actions	During Which Process Group Is This Done?
1 Use the project scope statement to gain approval of the "final" scope from the stakeholders before further planning is done.	
2 Determine high-level requirements, constraints, assumptions, and risks.	
3 Measure against the performance measurement baseline.	
4 Implement approved changes, including corrective actions, preventive actions, and defect repair.	
5 Reanalyze identified risks.	
6 Use high-level planning and estimating data to determine whether the product can be achieved within the given constraints.	

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	Actions	During Which Process Group Is This Done?
7	Verify and document that the project or project phase meets completion or exit criteria set in place during project planning.	
8	Conduct team-building activities.	
9	Evaluate the effectiveness of risk responses in a risk review.	
10	Determine how you will plan the planning, executing, and monitoring and controlling efforts for stakeholders, requirements, scope, schedule, cost, quality, resources, communications, risk, procurement, changes, and configuration, and put that information into the beginnings of management plans.	
11	Obtain formal (legal) sign-off and final acceptance of the product of the project from the customer.	
12	Increase the effectiveness of processes.	
13	Recalculate how much the project will cost and how long it will take, and create forecasts.	
14	Plan what will be communicated on the project, to whom, by whom, when, and how.	
15	Spend time trying to improve quality.	
16	Make sure the business case and the analysis supporting the need for the project are documented and understood. Also make sure the expected benefits are understood and likely to be realized through the project.	
17	Evaluate how effectively the team members function as a team.	
18	Determine how and when you will analyze processes in use on the project.	
19	Determine measurable project and product objectives.	
20	Manage schedule and cost reserves.	
21	Focus on looking for exceptions to the approved project management plan in team members' performance, rather than checking up on every person's work.	
22	Develop the final project management plan, project documents, and performance measurement baseline by performing schedule network analysis, looking for options, and confirming that project objectives can be met.	
23	Gather final lessons learned.	
24	Keep everyone focused on completing the project to the project charter and project management plan.	
25	Calculate estimate to complete.	
26	Understand how the project supports the organization's strategic objectives.	
27	Implement approved improvements to project processes.	
28	Identify stakeholders, and determine their influence, expectations, and impact.	
29	Determine variances.	
30	Meet with managers to gain resource commitments.	
31	Use and interpret earned value calculations.	
32	Ensure a high-level product scope is identified through an evaluation of a business need, and then documented in the project charter.	

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	Actions	During Which Process Group Is This Done?
33	Create and distribute a final report of project or phase performance.	
34	Use your judgment to determine what variances are important and if they warrant recommending a change or corrective action.	
35	Finalize the "execute" and "monitor and control" aspects of all management plans.	
36	Index and archive project records.	
37	Keep managers apprised of when their resources will be needed on the project.	
38	Evaluate customer satisfaction regarding the project and the deliverables.	
39	Determine who will be on the project team to help with project planning.	
40	During the project, share knowledge and make recommendations to increase project effectiveness throughout the organization.	
41	Perform procurement inspections.	
42	Turn high-level stakeholder needs, wants, and expectations into requirements.	
43	Look for newly arising risks.	
44	Determine what processes should be followed on the project to reduce the need to supervise work, improve quality, and make use of standards.	
45	Obtain formal acceptance of interim deliverables from the customer.	
46	Determine what specifically will constitute project success.	
47	Assess individual team member performance.	
48	Make or obtain a decision in integrated change control about whether changes should be approved, rejected, or deferred.	
49	Manage quality to ensure the defined practices and procedures are being followed and are still appropriate for the project.	
50	Evaluate the effectiveness of implemented corrective actions.	
51	Manage stakeholder engagement and expectations, increase project support, and prevent problems.	
52	Plan ways to measure project performance, including determining the measurements to be used, when they will be taken, and how they will be interpreted.	
53	Keep the project's business case in focus while managing the project, especially when problems occur.	
54	Determine the process that will be used to request, approve, and manage changes on the project.	
55	Obtain seller responses to bid documents.	
56	Implement planned risk responses as appropriate.	
57	Evaluate the use, cost, and other aspects of physical resources. Make appropriate changes and adjustments.	
58	Collect and share project information as it is discovered.	
59	Negotiate with potential sellers; sign contracts.	

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Answer The Project Management Scramble Game

	Actions	During Which Process Group Is This Done?
1	Use the project scope statement to gain approval of the "final" scope from stakeholders before further planning is done.	Planning
2	Determine high-level requirements, constraints, assumptions, and risks.	Initiating
3	Measure against the performance measurement baseline.	Monitoring and controlling
4	Implement approved changes, including corrective actions, preventive actions, and defect repair.	Executing
5	Reanalyze identified risks.	Monitoring and controlling
6	Use high-level planning and estimating data to determine whether the product can be achieved within the given constraints.	Initiating
7	Verify and document that the project, or project phase, meets completion or exit criteria set in place during project planning.	Closing
8	Conduct team-building activities.	Executing
9	Evaluate the effectiveness of risk responses in a risk review.	Monitoring and controlling
10	Determine how you will plan the planning, executing, and monitoring and controlling efforts for stakeholders, requirements, scope, schedule, cost, quality, resources, communications, risk, procurement, changes, and configuration, and put that information into the beginnings of management plans.	Planning
11	Obtain formal (legal) sign-off and final acceptance of the product of the project from the customer.	Closing
12	Increase the effectiveness of processes.	Executing
13	Recalculate how much the project will cost and how long it will take, and create forecasts.	Monitoring and controlling
14	Plan what will be communicated on the project, to whom, by whom, when, and how.	Planning
15	Spend time trying to improve quality.	Monitoring and controlling
16	Make sure the business case and the analysis supporting the need for the project are documented and understood. Also make sure the expected benefits are understood and likely to be realized through the project.	Initiating
17	Evaluate how effectively the team members function as a team.	Executing
18	Determine how and when you will analyze processes in use on the project.	Planning
19	Determine measurable project and product objectives.	Initiating
20	Manage schedule and cost reserves.	Monitoring and controlling
21	Focus on looking for exceptions to the approved project management plan in team members' performance, rather than checking up on every person's work.	Executing

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	Actions	During Which Process Group Is This Done?
22	Develop the final project management plan, project documents, and performance measurement baseline by performing schedule network analysis, looking for options, and confirming that project objectives can be met.	Planning
23	Gather final lessons learned.	Closing
24	Keep everyone focused on completing the project to the project charter and project management plan.	Executing
25	Calculate estimate to complete.	Monitoring and controlling
26	Understand how the project supports the organization's strategic objectives.	Initiating
27	Implement approved improvements to project processes.	Executing
28	Identify stakeholders, and determine their influence, expectations, and impact.	Initiating
29	Determine variances.	Monitoring and controlling
30	Meet with managers to gain resource commitments.	Planning
31	Use and interpret earned value calculations.	Monitoring and controlling
32	Ensure a high-level product scope is identified through an evaluation of a business need, and then documented in the project charter.	Initiating
33	Create and distribute a final report of project or phase performance.	Closing
34	Use your judgment to determine what variances are important and if they warrant recommending a change or corrective action.	Monitoring and controlling
35	Finalize the "execute" and "monitor and control" aspects of all management plans.	Planning
36	Index and archive project records.	Closing
37	Keep managers apprised of when their resources will be needed on the project.	Executing
38	Evaluate customer satisfaction regarding the project and the deliverables.	Closing
39	Determine who will be on the project team to help with project planning.	Planning
40	During the project, share knowledge and make recommendations to increase project effectiveness throughout the organization.	Executing
41	Perform procurement inspections.	Monitoring and controlling
42	Turn high-level stakeholder needs, wants, and expectations into requirements.	Initiating
43	Look for newly arising risks.	Monitoring and controlling
44	Determine what processes should be followed on the project to reduce the need to supervise work, improve quality, and make use of standards.	Planning
45	Obtain formal acceptance of interim deliverables from the customer.	Monitoring and controlling
46	Determine what specifically will constitute project success.	Initiating
47	Assess individual team member performance.	Executing

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	Actions	During Which Process Group Is This Done?
48	Make or obtain a decision in integrated change control about whether changes should be approved, rejected, or deferred.	Monitoring and controlling
49	Manage quality to ensure the defined practices and procedures are being followed and are still appropriate for the project.	Executing
50	Evaluate the effectiveness of implemented corrective actions.	Monitoring and controlling
51	Manage stakeholder engagement and expectations, increase project support, and prevent problems.	Executing
52	Plan ways to measure project performance, including determining the measurements to be used, when they will be taken, and how they will be interpreted.	Planning
53	Keep the project's business case in focus while managing the project, especially when problems occur.	Executing
54	Determine the process that will be used to request, approve, and manage changes on the project.	Planning
55	Obtain seller responses to bid documents.	Executing
56	Implement planned risk responses as appropriate.	Executing
57	Evaluate the use, cost, and other aspects of physical resources. Make appropriate changes and adjustments.	Monitoring and controlling
58	Collect and share project information as it is discovered.	Executing
59	Negotiate with potential sellers; sign contracts.	Executing

Inputs and Outputs Inputs and outputs are logical and should not require memorization if you have a good understanding of the actions involved in each of the knowledge area processes. Test your understanding by answering the following question: What is an input to a WBS? Make sure you read the Create WBS discussion carefully in the Scope Management chapter, and pay attention throughout this book to when and how a WBS is used.

TRICKS OF THE TRADE

Why worry about inputs and outputs? Here is a trick to help you gain confidence in your understanding of the project management processes

An input means:

"What do I need before I can..."

An output means:

"What will I have when I am done with..."

Or, *"What am I trying to achieve when I am doing..."*

Do not expect all the inputs tested on the exam to be included or clearly stated in the *PMBOK® Guide*. For example, you know you need the project team (or at least an initial version of the project team) to create a WBS, yet the team is not specifically listed as an input to creating a WBS in the *PMBOK® Guide*. The remaining chapters of this book will help you understand the processes of project management along with their inputs and outputs.

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Practice Exam

1. A project manager has received some help from the team, and she needs help from them again so that she can create a detailed project budget. Which project management process group is she in?
   A. Initiating
   B. Before the project management process
   C. Planning
   D. Executing

2. The project charter is created in which project management process group?
   A. Executing
   B. Planning
   C. Closing
   D. Initiating

3. The project team has just completed the initial project schedule and budget. The next thing to do is to:
   A. Identify risks.
   B. Begin iterations.
   C. Determine communications requirements.
   D. Create a bar (Gantt) chart.

4. A detailed project schedule can be created only after creating the:
   A. Project budget
   B. Work breakdown structure
   C. Project management plan
   D. Detailed risk assessment

5. The person who should be in control of the project during project planning is the:
   A. Project manager
   B. Team member
   C. Functional manager
   D. Sponsor

6. Which of the following is not an input to the initiating process group?
   A. Company processes
   B. Company culture
   C. Historical WBSs
   D. Project scope statement

7. The project sponsor has just signed the project charter. What is the next thing to do?
   A. Begin to complete work packages.
   B. Validate scope.
   C. Start integrated change control.
   D. Start to create management plans.

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8. The high-level project schedule constraints have just been determined. What project management process group are you in?
   A. Initiating
   B. Planning
   C. Executing
   D. Monitoring and controlling

9. The WBS and WBS dictionary have been completed, and the project team has begun working on identifying risks. The sponsor contacts the project manager, requesting that the responsibility assignment matrix be issued. The project has a budget of $100,000 and is taking place in three countries using 14 human resources. There is little risk expected for the project, and the project manager has managed many projects similar to this one. What is the next thing to do?
   A. Understand the experience of the sponsor on similar projects.
   B. Create an activity list.
   C. Make sure the project scope is defined.
   D. Complete risk management and issue the responsibility assignment matrix.

10. A project manager does not have much time to spend on planning before the mandatory start date arrives. He therefore wants to move through planning as effectively as possible. What advice would you offer?
    A. Make sure you have a signed project charter and then start the WBS.
    B. Create an activity list before creating a network diagram.
    C. Document all the known risks before you document the high-level assumptions.
    D. Finalize the quality management plan before you determine quality metrics.

11. The best time to assign a project manager to a project is during:
    A. Integration
    B. Project selection
    C. Initiating
    D. Planning

12. A project manager gets a call from a team member notifying him that there is a variance between the speed of a system on the project and the desired or planned speed. The project manager is surprised because that performance measurement was not identified in planning. If the project manager then evaluates whether the variance warrants a response, he is in which part of the project management process?
    A. Initiating
    B. Executing
    C. Monitoring and controlling
    D. Closing

13. A team member notifies the project manager that the activities comprising a work package are no longer appropriate. It would be best for the project manager to be in what part of the project management process?
    A. Corrective action
    B. Integrated change control
    C. Monitoring and controlling
    D. Project closing

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14. During a team meeting, a team member asks about the measurements that will be used on the project to assess performance. The team member feels that some of the measures related to activities assigned to him are not valid measurements. The project is most likely in what part of the project management process?
    A. Closing
    B. Monitoring and controlling
    C. Executing
    D. Initiating

15. Which of the following is the most appropriate thing to do during the initiating process group?
    A. Create a detailed description of the project deliverables.
    B. Get familiar with the company culture and structure as they relate to the project.
    C. Identify the root cause of problems.
    D. Ensure all project management processes are complete.

16. Which of the following is a characteristic of project management processes?
    A. Iterative
    B. Unique
    C. Unnecessary
    D. Standardized

17. Which project management process group generally takes the most project time and resources?
    A. Planning
    B. Design
    C. Integration
    D. Executing

18. You are managing two projects and have been assigned to a third project that has just been approved. You begin the new project, and are able to manage it well along with the others you are managing. During initiating, you are focused on accomplishing a number of activities. Which of the following are you not concerned with at this time?
    A. Identifying and documenting business needs
    B. Creating a project scope statement
    C. Dividing a large project into phases
    D. Accumulating and evaluating historical information

19. The software development project has progressed according to plan. The team is very enthusiastic about the product they have created. Now they are looking ahead to finding new projects to work on. You caution them that the current project cannot be considered complete until after the closing process group. Closure includes all the following except:
    A. Determining performance measures
    B. Turning over the product of the project
    C. Documenting the degree to which each project phase was properly closed after its completion
    D. Updating the company's organizational process assets

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20. The first phase of your project has come to an end. What is the most important thing to ensure is done before beginning the next phase?
    A. Verify that the resources are available for the next phase.
    B. Check the project's progress compared to its baselines.
    C. Confirm that the phase has reached its objectives, and have its deliverables formally accepted.
    D. Recommend corrective action to bring the project results in line with project expectations.

21. During which process group does the team measure and analyze the work being done on the project?
    A. Initiating
    B. Executing
    C. Monitoring and controlling
    D. Closing

22. Which process groups must be included in every project?
    A. Planning, executing, and closing
    B. Initiating, planning, and executing
    C. Planning, executing, and monitoring and controlling
    D. Initiating, planning, executing, monitoring and controlling, and closing

23. Which of the following is the most appropriate thing to do in project closing?
    A. Work with the customer to determine acceptance criteria.
    B. Confirm all the requirements in the project have been met.
    C. Collect historical information from previous projects.
    D. Gain formal approval of the management plans.

24. Which process group focuses on completing the requirements of the project?
    A. Initiating
    B. Planning
    C. Executing
    D. Closing

25. All the following occur during the planning process group except:
    A. Develop Project Charter
    B. Create WBS
    C. Estimate Costs
    D. Sequence Activities

26. A market demand, a business need, and a legal requirement are examples of:
    A. Reasons to hire a project manager
    B. Reasons projects are initiated
    C. Reasons people or businesses become stakeholders
    D. Reasons to sponsor a project

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Answers

1. **Answer** C
   Explanation Notice the use of the word "detailed." Such a budget is created during project planning.

2. **Answer** D
   Explanation The project charter is needed before planning and execution of the work can begin. Therefore, it is created and approved in project initiating.

3. **Answer** C
   Explanation Communications requirements and quality standards are needed before risks (especially risks related to communications and quality) can be determined. Iterations cannot begin until the risks are identified, qualified, and quantified, and the responses are developed. Through iterations, the WBS and other parts of the project management plan are revised. A bar chart would have been done during the creation of the schedule, so it cannot be the next thing. Of the choices listed, determine communications requirements is the best option.

4. **Answer** B
   Explanation In the project management process, the project budget, detailed risk assessment, and project management plan come after the schedule is created. The only answer that could be an input is the work breakdown structure.

5. **Answer** A
   Explanation The project manager should be named early in the project, during project initiating if possible. It is then their responsibility to control the project throughout its life.

6. **Answer** D
   Explanation Notice the question asks which is not an input to project initiating. Did you read it correctly? Companies should have processes in place for hiring resources, reporting, and managing risks on projects (to name only a few). These are inputs to project initiating, as are company culture and historical WBSs. The project scope statement is an output of project planning.

7. **Answer** D
   Explanation To answer this type of question, look for the choice that occurs closest to the process group you are in. The project charter is created during project initiating. Completing work packages is done during project executing. Validating scope and performing integrated change control are done during project monitoring and controlling. Starting to create management plans is the best choice, as it is part of project planning.

8. **Answer** A
   Explanation High-level constraints are identified in the project charter, which is created during project initiating.

9. **Answer** B
   Explanation Look at the order of planning the project that the team has chosen. Although understanding the experience of the sponsor might sound like a good idea, the sponsor is a stakeholder, and understanding the stakeholders is part of stakeholder analysis. That should have occurred before the creation of a WBS. Project scope must be defined before a WBS can be created. Completing risk management and issuing the responsibility assignment matrix cannot be best, as that work does not come next in the process. Other work must be done before risk management can effectively be completed. Creating an activity list comes next after the WBS and WBS dictionary.

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10. **Answer** B
Explanation This question is asking which of the choices is the most effective way to move through project planning. Starting the WBS immediately after obtaining a project charter skips the important steps of defining the scope and other activities. High-level assumptions are determined in project initiating. Quality metrics are determined as part of the quality management plan, not after it. The activity list is created before the network diagram, so that is the best option.

11. **Answer** C
Explanation The project manager should be assigned during project initiating.

12. **Answer** C
Explanation Even though the measurement was not identified in planning, the project manager would still have to investigate the variance and determine if it is important. The project manager is in project monitoring and controlling.

13. **Answer** C
Explanation If you chose another part of the project management process, you probably forgot that the situation needs to be evaluated by the project manager before recommending a change or beginning integrated change control.

14. **Answer** C
Explanation This situation does not describe an actual measurement (a monitoring and controlling activity) but rather a meeting occurring during project executing.

15. **Answer** B
Explanation A detailed description of the project deliverables is created during project planning, as part of creating the project scope statement. Root cause analysis occurs during project monitoring and controlling, not initiating. Ensuring all project management processes are complete occurs during project closing. It is important for a project manager to become familiar with the company culture and structure as they relate to the project as early in the project as possible. This is the most appropriate choice to do in project initiating.

16. **Answer** A
Explanation As the project life cycle progresses, more information becomes available, allowing the team to manage the project to a more detailed level.

17. **Answer** D
Explanation Did you notice that planning and executing are the only process groups offered as choices? Therefore, design and integration can be eliminated as options. Doing the actual work (in executing) will generally take the most project time and resources.

18. **Answer** B
Explanation A project scope statement is created during project planning.

19. **Answer** A
Explanation Performance measures are determined earlier in the project so they can be used to measure progress during the project, making determining performance measures the only correct answer to this question.

20. **Answer** C
Explanation A phase or project must be formally closed and accepted.

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21. **Answer** C
Explanation During monitoring and controlling, project performance is measured and needed changes are identified and approved.

22. **Answer** D
Explanation All five process groups are addressed in each project. It is the responsibility of the project manager to determine the level of attention to give to each process group.

23. **Answer** B
Explanation Collecting historical information and determining high-level acceptance criteria are done in project initiating. Gaining approval of management plans is part of project planning. Confirming that project requirements have been met occurs in project closing.

24. **Answer** C
Explanation Project executing is where work is done to produce the product of the project.

25. **Answer** A
Explanation Develop Project Charter occurs in project initiating.

26. **Answer** B
Explanation These are all reasons projects are initiated.

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