

Scope Management

F I V E

Scope management is the process of defining what work is required and then making sure all of that work—and only that work—is completed. This is generally an easy topic, but we all have gaps in our knowledge, even regarding things like scope management that we deal with daily. The following are gaps that many people do not know they have. Read through this list, and see if it helps you uncover any gaps in your knowledge.

TRICKS OF THE TRADE Things to Know about Scope Management for the Exam

- You must plan how you will determine the scope, as well as how you will manage and control scope. This is part of your scope management plan.
- Scope must be clearly defined and formally approved before work starts.
- Requirements are elicited from all stakeholders, not just the person who assigned the project.
- Requirements elicitation¹ can take a substantial amount of time, especially on large projects, which may involve obtaining requirements from hundreds of people.
- Requirements must be evaluated against the business case, ranked, and prioritized to determine what is in and out of scope.
- A work breakdown structure (WBS)² is used on all projects. Using this tool enables you to clarify identified scope as well as find additional scope.

QUICKTEST

- Product scope
 - Multicriteria decision analysis
- Project scope
 - Affinity diagrams
 - Mind maps
- Scope management process
 - Requirements categories
 - Business
 - Stakeholder
 - Solution
 - » Functional
 - » Nonfunctional
 - Transition
 - Project
 - Quality
 - Technical
- Requirements documentation
 - Interpersonal and team skills
 - Nominal group technique
 - Observation
 - Facilitation
 - » Consensus
 - » User stories
- Project scope statement
- Work breakdown structure (WBS)
 - Decomposition
 - Control account
 - Work package
 - Activity
 - How to create a WBS
 - Benefits of using a WBS
 - Uses for a WBS
- WBS dictionary
- Scope baseline
- Group decision-making
 - Voting
 - » Unanimous
 - » Autocratic
 - » Majority
 - » Plurality
- Product analysis
- Deliverables
 - Verified
 - Accepted

Scope Management

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INITIATING	PLANNING <i>(This is the only process group with a set order.)</i>	EXECUTING	MONITORING & CONTROLLING	CLOSING
Select project manager	Determine development approach, life cycle, and how you will plan for each knowledge area	Execute work according to the project management plan	Take action to monitor and control the project	Confirm work is done to requirements
Determine company culture and existing systems	Define and prioritize requirements	Produce product deliverables (product scope)	Measure performance against performance measurement baseline	Complete final procurement closure
Collect processes, procedures, and historical information	Create project scope statement	Gather work performance data	Measure performance against other metrics in the project management plan	Gain final acceptance of product
Divide large projects into phases or smaller projects	Assess what to purchase and create procurement documents	Request changes	Analyze and evaluate data and performance	Complete financial closure
Understand business case and benefits management plan	Determine planning team	Implement only approved changes	Determine if variances warrant a corrective action or other change request(s)	Hand off completed product
Uncover initial requirements, assumptions, risks, constraints, and existing agreements	Create WBS and WBS dictionary	Continuously improve; perform progressive elaboration	Influence factors that cause change	Solicit customer's feedback about the project
Assess project and product feasibility within the given constraints	Create activity list	Follow processes	Request changes	Complete final performance reporting
Create measurable objectives and success criteria	Create network diagram	Determine whether quality plan and processes are correct and effective	Perform integrated change control	Index and archive records
Develop project charter	Estimate resource requirements	Perform quality audits and issue quality report	Approve or reject changes	Gather final lessons learned and update knowledge bases
Identify stakeholders and determine their expectations, interest, influence, and impact	Estimate activity durations and costs	Acquire final team and physical resources	Update project management plan and project documents	
Request changes	Determine critical path	Manage people	Inform stakeholders of all change request results	
Develop assumption log	Develop schedule	Evaluate team and individual performance; provide training	Monitor stakeholder engagement	
Develop stakeholder register	Develop budget	Hold team-building activities	Confirm configuration compliance	
	Determine quality standards, processes, and metrics	Give recognition and rewards	Create forecasts	
	Determine team charter and all roles and responsibilities	Use issue logs	Gain customer's acceptance of interim deliverables	
	Plan communications and stakeholder engagement	Facilitate conflict resolution	Perform quality control	
	Perform risk identification, qualitative and quantitative risk analysis, and risk response planning	Release resources as work is completed	Perform risk reviews, reassessments, and audits	
	Go back—iterations	Send and receive information, and solicit feedback	Manage reserves	
	Finalize procurement strategy and documents	Report on project performance	Manage, evaluate, and close procurements	
	Create change and configuration management plans	Facilitate stakeholder engagement and manage expectations	Evaluate use of physical resources	
	Finalize all management plans	Hold meetings		
	Develop realistic and sufficient project management plan and baselines	Evaluate sellers; negotiate and contract with sellers		
	Gain formal approval of the plan	Use and share project knowledge		
	Hold kickoff meeting	Execute contingency plans		
	Request changes	Update project management plan and project documents		

Rita's Process Chart™ Scope Management

Where are we in the project management process?

- While the project is being completed, you must check to make sure you are doing all the work included in the project management plan—and only that work.
- Gold plating a project (adding extras) is not allowed.
- Any change to scope must be evaluated for its effect on time, cost, risk, quality, resources, and customer satisfaction.
- Changes to scope require an approved change request.
- Scope changes should not be approved if they relate to work that does not fit within the project charter.
- You need to continuously determine what is and is not included in the project.
- You are responsible for getting acceptance of deliverables throughout the project.

Note that creating a WBS is a required part of project management. A WBS is not a list! If you have never created one or do not currently use a WBS on your projects, this chapter will help you understand how beneficial this tool is and what it can do for you. Remember, the exam asks questions at an expert level and assumes you have experience using the various tools of project management. Therefore, you need to know how the WBS can help you clearly define requirements, plan how you will manage scope, and control scope.

The following should help you understand how each part of scope management fits into the overall project management process:

The Scope Management Process	Done During
Plan Scope Management	Planning process group
Collect Requirements	Planning process group
Define Scope	Planning process group
Create WBS	Planning process group
Validate Scope	Monitoring and controlling process group
Control Scope	Monitoring and controlling process group

You should understand the following concepts for the exam:

Product Scope PAGE 131 Product scope is another way to say “requirements that relate to the product, service, or result of the project.” It can also be defined as the product deliverables with their associated features and functions. It answers the question, “What end result is needed?” There may be a separate, preliminary project to determine product scope, or you may define the requirements as part of your project.

Let’s look at an example of product scope. On a project to build a new train terminal, the product scope is “a new train terminal that meets these technical specifications.” To determine if the project successfully achieved the product scope, the resulting product (the new train terminal) is compared to the product requirements, which were recorded in the requirements documentation and the project scope statement for the project.

Project Scope PAGE 131 The project scope is the work the project team will do to deliver the product of the project; it encompasses the product scope. In the train terminal example, the project scope will be “a new train terminal that meets these technical specifications,” plus all the work needed to deliver the train terminal. In other words, project scope includes the planning, coordination, and management activities (such as meetings and reports) that ensure the product scope is achieved. These efforts become

part of the scope baseline and scope management plan, which are parts of the project management plan. To determine whether the project scope has been successfully completed, the work accomplished is measured against the scope baseline.

The Scope Management Process To avoid the risk that you will read the rest of this chapter and miss an important concept, let's make this point clear right away: there are a lot of acceptable ways to manage scope. If you do it differently than described here, you are not necessarily wrong; you may just be managing scope differently based on the needs of your projects. For the exam, think of the scope management process as including the following steps:

1. Develop a plan for how you will plan, validate, and control scope and requirements on the project.
2. Determine requirements, making sure all requirements support the project's business case as described in the project charter.
3. Sort and balance the needs of stakeholders to determine scope.
4. Create a WBS to break the scope down to smaller, more manageable pieces, and define each piece in the WBS dictionary.
5. Obtain validation (signed acceptance) that the completed scope of work is acceptable to the customer or sponsor.
6. Measure scope performance, and adjust as needed.

Again, this may not be the way scope management is performed in your organization. For example, many organizations establish a separate project to elicit and evaluate requirements and determine what the project will be. This is especially true for work that demands a large requirements-gathering effort and for projects on which the people involved in determining requirements are different from those who will perform the work to produce them. The decision of whether to determine requirements as a separate project should be made based on the needs of the project and the organization.

On change-driven projects, requirements are identified and documented at a sufficient level of detail so they can be prioritized and estimated at a high level. The work is broken into releases and iterations, and the work of each release or iteration is defined in more detail just before the work is done.



When taking the exam, assume that you will need to determine requirements as part of the project.

If you work as a seller, your process might begin with the receipt of a lengthy technical description (possibly 300 pages) of what the customer wants. In such a case, the requirements step is more about clarifying the product requirements supplied by the customer rather than determining them. However, the project requirements would still need to be determined.



Assume that you are the project manager for the buyer for all questions on the exam that involve procurement, unless the question specifically states otherwise.

Here is something else to notice about the scope management process. It includes making sure all requirements support the project's business case, as described in the project charter. This means that no one can request or add work that is not related to the reason documented in the charter for initiating the project. Yet, in your real world, do you see people who want work done and try to attach it to any project they can in order to get that work accomplished? Do you see scope on projects that does not support the

company's business objectives? It happens all the time. To prevent it, a project manager must be assertive. This is also the attitude you should have when you take the exam. You must be able to say no when someone tries to add unnecessary scope to your project. Unnecessary scope adds time, cost, and risk to the project that you just do not need. You have to be able to say, "That sounds like it is a separate project. It should go through the project approval process, instead of being added to my project." Understanding that a project manager needs to properly plan and protect the project is essential for passing the exam.

Plan Scope Management PAGE 134

Process Plan Scope Management
Process Group Planning
Knowledge Area Scope Management

Each of the project management knowledge areas has a management plan. For scope, there are actually two—a scope management plan and a requirements management plan. Together these plans provide direction on how the project and product scope will be defined, managed, and controlled. Before we discuss these plans in more detail, let's look at the inputs to creating them.

The project charter, project life cycle description, and organizational process assets are all inputs to the Plan Scope Management process. The project charter includes a high-level description of the product, service, or result the project is intended to produce. It also documents high-level project requirements.

The project life cycle description breaks the project into the phases that it will go through to produce the product, service, or result. It's also important to note that scope management planning must be performed in accordance with organizational policies and procedures. Historical records and lessons learned from previous, similar projects may be useful for the team in their planning efforts.

In addition to the above inputs, every project has a development approach. This could be plan-driven (predictive or waterfall), change-driven (iterative, adaptive, or agile), or a combination, or hybrid, approach. The development approach influences how requirements will be elicited as well as how the scope statement and WBS will be developed (for the entire project at once, or at a high level for the overall project, and then in more detail for each release).

Scope Management Plan PAGE 137 The scope management plan, which is the primary output of the Plan Scope Management process, is part of the project management plan, and the project manager uses it to guide the project until closing. The scope management plan essentially contains three parts which detail how scope will be planned, executed, and controlled. It defines the following:

- How to achieve the scope
- What tools to use to plan how the project will accomplish the scope
- How to create the WBS
- How scope will be managed and controlled to the project management plan
- How to obtain acceptance of deliverables

Each project's scope management plan is unique, but it may cover topics that can be standardized for the company or for the type of project. Therefore, companies can often utilize templates, forms, and standards for scope management. These are valuable assets to have on a project.

The scope management plan can be developed in stages, or iterated, during project planning. The first step is to plan how scope will be defined. As represented in the planning order of Rita's Process Chart™, the project manager and the team will have enough information to decide how the scope will be validated and

controlled. Those decisions will then become part of the scope management plan. Another aspect of iterations is that later parts of project planning, such as the Plan Risk Responses process, can result in scope being added to the project, thereby changing the scope management plan, project scope statement, and WBS.

The idea behind the creation of the scope management plan and all management plans is: if you cannot plan it, you cannot do it. Even for a change-driven project, you need to plan some level of scope before work begins. Yet many people make the mistake of starting to work on a project before the product and project scope are defined and before they have properly planned how they will manage scope. Do you? Remember that creating a scope management plan is a required part of project management. The efforts of preparing a scope management plan and a requirements management plan (see the following paragraph) may be repeated, or iterated, throughout the project.

Requirements Management Plan PAGE 137 The requirements management plan, the second and final output of the Plan Scope Management process, also falls under the PMI-ism of “plan before you do.” This plan is also referred to as the business analysis plan. In addition to describing the methods you intend to use to identify requirements, the plan should answer the following questions: “Once I have all the requirements, what will I do to analyze, prioritize, manage, and track changes to them? What should I include in the requirements traceability matrix?” (The requirements traceability matrix is described later in this chapter.)

The scope management plan and the requirements management plan are parts of the project management plan. The next process, Collect Requirements, begins to put these plans into action.

Collect Requirements PAGE 138

Process Collect Requirements
Process Group Planning
Knowledge Area Scope Management

Requirements are what stakeholders need from a project or product. Remember, work should not be included in a project just because someone wants it. Instead, requirements should relate to solving problems or achieving the objectives outlined in a project charter. Requirements may include requests about how the work is planned and managed. For example, a stakeholder could request that systems not be shut down to accommodate a project during peak business hours. Requirements may include the capabilities stakeholders would like to see in the product, such as a software application that allows multiple users to access it at the same time. Requirements can also relate to the following:

- **Quality** “The component D must be able to withstand 200 pounds of pressure.”
- **Business processes** “You must track and report the project’s expenses in this way.”
- **Compliance** “By law, we have to meet this safety standard.”
- **Project management** “We require risk management procedure X to be used on the project.”

The Collect Requirements process looks for all requirements, not just those related to the product of a project. This process is critical to project success, as a missed requirement could mean significant changes and conflict throughout the remainder of a project—and even project failure.

This process involves using the project charter, the assumption log, the stakeholder register, agreements, and organizational process assets to create the requirements document and the requirements traceability matrix. Review these inputs in the following paragraphs, and think through how each of these inputs might help you in collecting requirements.

Project Charter The high-level project and product descriptions are defined in the project charter, which was developed during initiating. The Collect Requirements process begins with these descriptions, and elicits more detailed input about what is required.

Assumption Log The assumption log documents known stakeholder assumptions related to product and project requirements. Collect Requirements includes refining and adding to this list of assumptions.

Stakeholder Register Remember that the stakeholder register was created in initiating. It includes a list of stakeholders identified thus far in the project, as well as their requirements and expectations.

Agreements If the project includes procurements, the requirements of the buyers are documented in the contracts. Any agreed-upon requirements included in letters of agreement within an organization are also a source of requirements.

Organizational Process Assets Organizational process assets, such as historical records and lessons learned, include requirements from past, similar projects and help identify relevant processes and expectations. For example, historical records may provide data about reporting requirements, project management requirements, system compatibility requirements, and compliance requirements. Lessons learned from other projects, which may identify commonly overlooked areas of scope, can be used to help ensure such requirements are not missed on the current project.

On large projects, there could be hundreds of stakeholders, and no single method of collecting requirements will work for all stakeholders. Since missing a needed requirement can be very expensive and time-consuming and can cause other problems later, a concerted effort must be made to find as many requirements as possible before work starts on a project or development phase.

The Collect Requirements effort also includes eliciting stakeholders' expectations—their beliefs or mental pictures about how the project will turn out—and translating those expectations into requirements as necessary. Collecting requirements may involve using various techniques (described next). The project manager needs to choose the techniques that are the most appropriate for the project and its stakeholders. Note that many of these techniques can also be used in other data-gathering efforts, such as identifying risks during the risk management process.

The following tools and techniques can be used to collect requirements.

Brainstorming Be careful here—many people think brainstorming is just a meeting where people discuss ideas, but it is more than that. The purpose of brainstorming is not so much to get individuals to share their thoughts on a topic as it is to encourage participants to build on each other's ideas. One person mentions an idea to solve a problem or, in this case, determine scope. That idea generates an idea from another participant, which leads to yet another idea, and so on. The results of brainstorming sessions vary depending on the participants. It can be highly beneficial to include people with different perspectives or backgrounds. The participants may be internal or external to the project and/or the organization. After all the ideas have been captured, the group can evaluate and rank them using the nominal group technique or multicriteria decision analysis, as described in the following sections.

Interviews On the exam, this technique may also be referred to as expert interviews. The team or project manager interviews project stakeholders to elicit their requirements for a specific element of the product or project work, or for the overall project. These interviews can take place between two individuals or in group settings. Interviews can also be conducted via email or phone, or using virtual collaboration tools.

Focus Groups The focus group technique helps elicit opinions and requirements for the product or an aspect of the project from stakeholders and subject matter experts. Members of a focus group are usually selected from a specific demographic group of customers. They discuss their ideas with each other, and the conversation is directed by a moderator.

Questionnaires and Surveys Questionnaires or surveys are typically used for large groups. The questions are asked in such a way as to elicit requirements from the respondents.

Benchmarking Another way to help identify and define requirements is to look at what the competition is doing. Benchmarking focuses on measuring an organization's performance against that of other organizations in the same industry. There are limitations to this technique, however. Benchmarking can be very time-consuming and costly. It may also inhibit the team's creativity because the focus is on studying solutions that have been used elsewhere, rather than on developing new, innovative ideas.

Voting Soliciting input about requirements from stakeholders often results in conflicting requirements. It is essential to resolve these conflicts, as well as to review, analyze, accept or reject, and prioritize requirements before recording them in project documents. Voting is commonly used to make decisions in a group setting. If the group agrees on a requirement *unanimously* (everyone agrees), the decision is easy. The decision-making process is also simplified if a single person is assigned to make the decision for the entire group. However, this *autocratic* method of decision-making can have negative impacts on the project if the stakeholders do not buy into the decision.

When there are conflicting opinions, groups may also take a *majority* approach. With this approach, the group chooses the decision that more than half of its members support. If there is no majority opinion, the group may go with the decision that has the largest number of supporters. This is known as the *plurality* approach.

Multicriteria Decision Analysis³ Another way to rank ideas is through multicriteria decision analysis. With this technique, stakeholders quantify requirements using a decision matrix based on factors such as expected risk levels, time estimates, and cost and benefit estimates.

Affinity Diagrams⁴ In this technique, the ideas generated from any other requirements-gathering techniques are grouped by similarities. Each group of requirements is then given a title. This sorting makes it easier to see additional areas of scope (or risks) that have not been identified (see fig. 5.1).

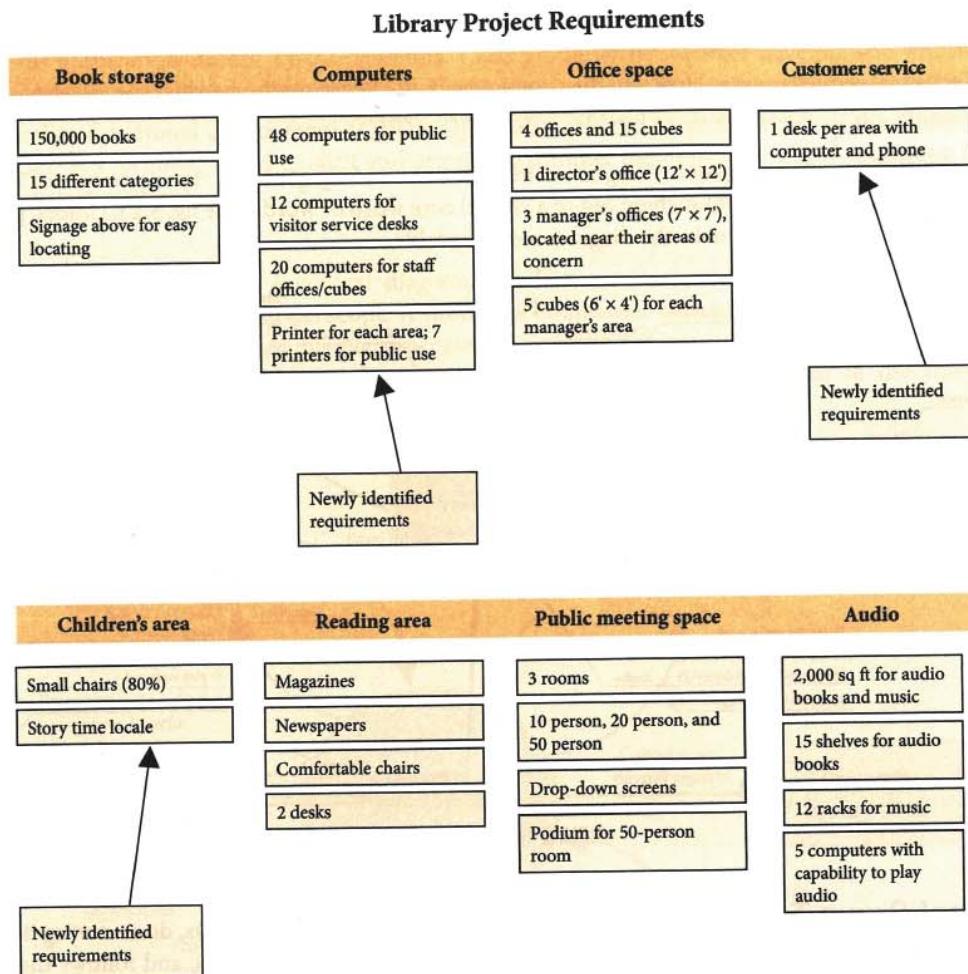


FIGURE 5.1 Affinity diagram

Affinity diagrams can also be organized by requirements categories. The following are some common categories used when collecting requirements:

- **Business requirements** Why was the project undertaken? What business need is the project intended to address?
- **Stakeholder requirements** What do stakeholders want to gain from the project?
- **Solution requirements** What does the product need to look like? What are its *functional* requirements (how the product should work) and *nonfunctional* requirements (what will make the product effective)?
- **Transition requirements** What types of handoff procedures or training are needed to transfer the product to the customer or organization?
- **Project requirements** How should the project be initiated, planned, executed, controlled, and closed?

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- **Quality requirements** What quality measures does the product need to meet? What constitutes a successfully completed deliverable?
- **Technical requirements** How will the product be built? What are the product specifications?

Mind Maps⁵ A mind map is a diagram of ideas or notes to help generate, classify, or record information. It looks like several trees branching out of a central core word or words (see fig. 5.2). Colors, pictures, and notations can be used to make the diagram more readable.

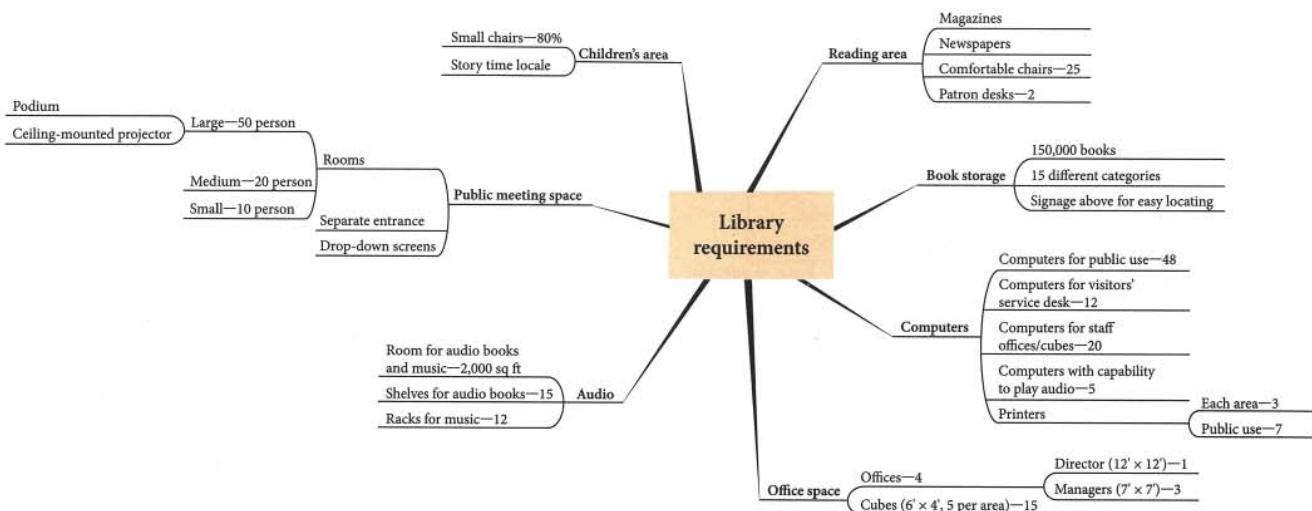


FIGURE 5.2 Mind map

Nominal Group Technique⁶ This technique is usually, but not always, done during the same meeting as brainstorming. It tends to be more structured than other techniques, and follows these four steps: a question or issue is posed, all meeting participants write down and then share their ideas, the group discusses what's been shared, and then ideas are ranked based on which ideas are the most useful.

Observation Observation is a great way to learn about business processes and to get a feel for the work environment of stakeholders. This technique generally involves job shadowing—watching a potential user of the product at work and, in some cases, participating in the work to help identify requirements.

Facilitation Facilitation brings together stakeholders with different perspectives, such as product designers and end users, to talk about the product and, ultimately, define requirements. This technique uses a *consensus* approach, which achieves general agreement about a decision. Those who would prefer another option are willing to accept the decision supported by most members of the group.

Stakeholders may develop user stories during these facilitated sessions. User stories describe functionality or features that stakeholders hope to see and are often written in the following format:

As a <role>, I want <functionality/goal> so that <business benefit/motivation>.

For example: "As a community organizer, I want the new library to offer public meeting spaces so that we have a central place to gather and can expose community members to the benefits of the library through neighborhood events."

Examples of facilitation sessions include the following:

- **Joint application design (JAD) sessions** Used primarily in software development efforts, JAD sessions involve eliciting requirements and input to enhance the processes of developing the software.
- **Quality functional deployment (QFD)** QFD (also referred to as the Voice of the Customer, or VOC) is a technique used to elicit and prioritize customer requirements. It is generally used in the manufacturing industry.

Context Diagrams⁷ A context diagram, also known as a context level data flow diagram, is frequently used to define and model scope. It shows the boundaries of the product scope by highlighting the product and its interfaces with people, processes, or systems. Figure 5.3 shows an example of a context diagram for the payroll system upgrade described in the second project charter in the Integration Management chapter.

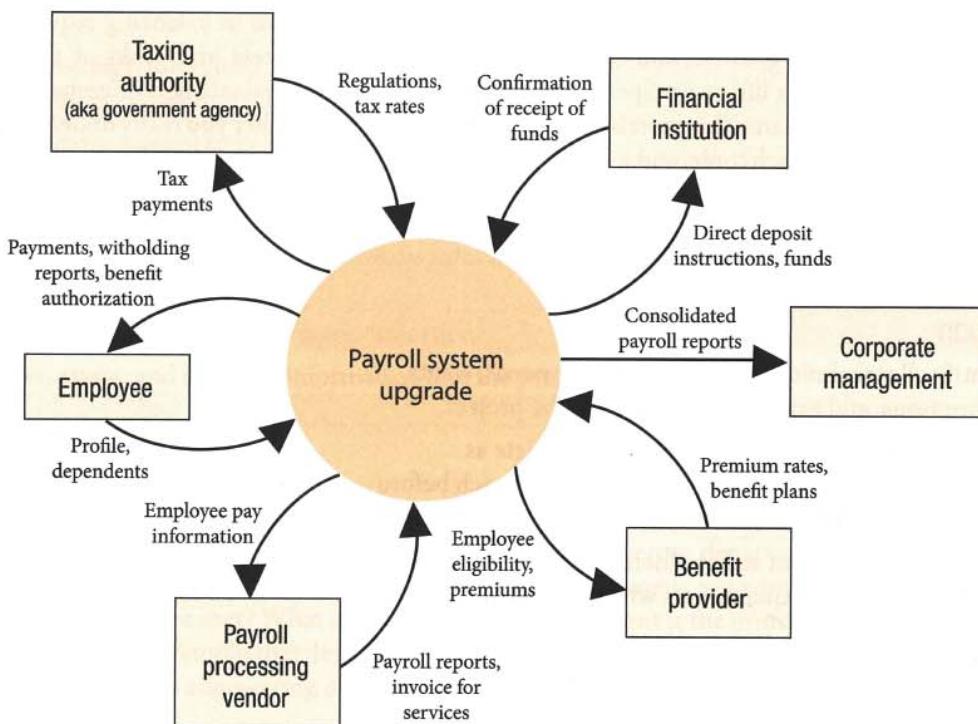


FIGURE 5.3 Context diagram

Prototypes A prototype is a model of the proposed product that is presented to stakeholders for feedback. The prototype may be updated multiple times to incorporate stakeholders' feedback until the requirements have been solidified for the product.

Balancing Stakeholder Requirements This effort is an important aspect of the Collect Requirements process. Part of balancing requirements from stakeholders involves making sure the requirements can be met within the project objectives. If they cannot, then you need to look for options to adjust the competing demands of scope, time, cost, quality, resources, risk, and customer satisfaction. Balancing requirements also involves prioritizing requirements and resolving any conflicts.

The need to balance stakeholder requirements continues beyond the Collect Requirements process. It may only become apparent later in the project that some requirements do not match those of the project or those of other stakeholders. Whenever this occurs, you need to balance the requirements against the interests of the project and resolve any conflicts.

This type of balancing is never easy or fast. It can become impossible if you do not have clear project objectives and if you do not identify and prioritize all requirements from all stakeholders during the Collect Requirements process. Do you try to get as close to final requirements as possible when managing projects? Are your requirements ranked by order of importance? On adaptive projects, do you rank requirements in a backlog? If not, think about how such actions could improve your projects. When you take the exam, assume that every effort has been made by the project manager to uncover all requirements and that those requirements are ranked by order of importance.

Exercise This exercise outlines some of the key actions involved in balancing requirements from stakeholders. It goes beyond the Collect Requirements process and looks at this effort throughout the project life cycle. Spend some time thinking about balancing requirements while getting ready for the exam. This exercise will help you determine whether you really understand the process. Go through each topic, and put a check mark next to the actions you understand. Put an X next to the actions you are able to apply in the real world. Then spend time thinking about the unmarked topics.

Action	Understand	Can Do
Identify all stakeholders; understand their needs, wants, assumptions, and expectations related to the project.	✓	X
Work to get requirements as clear and complete as appropriate for the selected development approach before starting project work.		
Use information about stakeholders and their requirements to resolve competing requirements while work is being done on the project.		
Look for competing interests during project planning; don't just wait for competing interests to show up during project executing.		
Look for possible options to resolve competing interests and alternative ways of completing project activities. This may involve using techniques such as brainstorming, schedule compression, reestimating, and other project management and management-related practices.		
Resolve competing requirements from stakeholders based on how the requirements affect the project. (See the guidelines listed in the following discussion.)		
Give priority to the customer. (For the exam, know that if any needs conflict with those of the customer, the customer's needs normally take precedence.)		
Use quality management to support the project's satisfaction of the needs for which it was undertaken.		

Action	Understand	Can Do
Deal with problems and conflicts as soon as they arise through the use of team building, problem-solving, and conflict management techniques.	✓	X
Say no to some of the competing interests. (For the exam, assume the project manager has the authority to say no when necessary to protect the project.)		
Fix the project when the project metrics start to deviate from the requirements, rather than changing the requirements to meet the results of the project.		
Work toward fair resolutions of disputes—ones that consider the interests of all stakeholders as well as the needs of the project.		
Hold meetings, interviews, and discussions to facilitate the resolution of competing requirements.		
Call on management to help resolve competing interests when the project manager and the team cannot come up with a fair and equitable solution.		
Use negotiation techniques to resolve disputes between stakeholders.		
Plan and implement effective communication.		
Gather, assess, and integrate information into the project.		

Resolving Competing Requirements Many project managers have no idea how to prioritize competing requirements. What if, for example, the engineering department wants your project to focus on decreasing defects while the accounting department wants your project to focus on lowering costs? Can both needs be met? What if the engineering department is the primary stakeholder or even the sponsor of the project? Should that department's needs outweigh the needs of the accounting department? What if the needs of the engineering department actually hurt the accounting department?

Some issues are so complex they cannot be resolved by the project manager alone, and require management intervention. However, there are some standard guidelines for balancing competing requirements. Walk through the following list for each requirement.

You should resolve competing requirements by accepting those that best comply with following:

- The business case stating the reason the project was initiated (market demand, legal requirement, etc.)
- The project charter
- The project scope statement (if this is available at the time of the conflict)
- The project constraints

A stakeholder's request to do or add something to the project that is not related to the reason the project was initiated should be rejected. If a requirement is related to the reason the project was initiated but does not fall within the project charter, this request should also be rejected. Any suggested changes to the project

charter must be brought to the sponsor for approval. When considering constraints, if the most important constraint is schedule, then any requirements that would delay the schedule will not likely be accepted. Those that enhance the schedule (without serious impact to other project constraints) will more likely be accepted. Requests that do not fall within these guidelines could become part of a future project instead.

Requirements Documentation PAGE 147 After requirements have been collected and finalized, they are documented. Imagine you have elicited requirements from hundreds of people. Can you see how documenting those requirements would be useful? This documentation is an output of the Collect Requirements process and helps to ensure all requirements are clear and unambiguous.

Requirements documentation can contain various types of information, but the one thing that must be included is acceptance criteria. To avoid having requirements that could easily be misunderstood, a great question to ask stakeholders is, “How will we know if the work we do will meet this requirement?” Not only is this a good way to make sure you understand the stakeholder’s requirement, but it also helps to ensure the work being done will be acceptable.

It’s also important to note that the level of detail of documentation is iterated until each requirement satisfies the criteria of being clear, complete, and measurable. Requirements must be described in such a way that associated deliverables can be tested or measured against the requirements in the Validate Scope process to confirm that the deliverables are acceptable.

Requirements Traceability Matrix⁸ PAGE 148 Have you ever worked on a project in which some requirements got lost in the details? In the process of determining requirements, one requirement often leads to additional, more refined requirements and clarifications—especially on large projects. It can be difficult to remember where a requirement came from and what its significance is to the project. Losing focus on the reason for a requirement can result in a major strategic or project objective not being met. The requirements traceability matrix, another output of the Collect Requirements process, helps link requirements to the objectives and/or other requirements to ensure the strategic goals are accomplished (see fig. 5.4). The matrix is used throughout the project in analyzing proposed changes to project or product scope.

Information such as requirement identification numbers, the source of each requirement, who is assigned to manage the requirement, and the status of the requirement should be documented in the requirements traceability matrix. For large projects, however, including all this information in the matrix would make it cumbersome and difficult to use. Another option is to store this data in a separate repository, preserving the matrix as an easy-to-reference tool. For the exam, simply understand that the requirements traceability matrix links requirements to objectives and/or other requirements, and that the requirements attributes, such as identification numbers, source, and status, also need to be documented.

Assigning responsibility for management of each requirement is similar to the concept of risk owners, described in the Risk Management chapter. An owner helps ensure the customer receives what they asked for and that the objectives are met. Assigning team members to manage requirements also helps free up the project manager’s time. The role of requirement owner is another example of the type of work team members may do on a project in addition to their efforts to produce the product.

Objectives	Reading area			Book storage		Public meeting space		Children's area		Audio		Office space		Computers							
	Magazines	Newspapers	Comfortable chairs—25	Patron desks—2	150,000 books	15 different categories	Signage above for easy locating	Rooms	Separate entrance	Drop-down screens	Small chairs—80%	Story time locale	Room for audio books and music	Shelves for audio books—15	Racks for music—12	Offices—4	Cubes—15	For public use—48	For visitor service desk—12	For staff—20	With audio capability—5
Improve access to job resources by 20%.	X		X				X		X							X	X			X	
Improve local children's reading levels by two grade levels in one year.			X		X	X					X					X					
Provide a pleasant place for community members to meet.	X	X	X				X	X		X		X	X	X							
Replace the existing library by end of next quarter.	X	X	X		X	X	X				X		X	X	X	X	X	X	X	X	

FIGURE 5.4 Requirements traceability matrix

Define Scope PAGE 150

Process Define Scope
Process Group Planning
Knowledge Area Scope Management

The Define Scope process is primarily concerned with what is and is not included in the project and its deliverables. This process uses information from the project charter, scope management plan, the requirements documentation created in the Collect Requirements process, the assumption log, and the risk register to define the project and product scope.

Remember that planning is iterative. When the requirements have been determined and the scope is defined, the project manager follows the project management planning process outlined in Rita's Process Chart™ to determine the schedule and budget. If the resulting schedule and budget do not meet the sponsor's or management's expectations for the project, the project manager needs to balance the requirements (scope) against budget and schedule constraints. Through iterations, options for meeting the scope, schedule, and cost objectives of the project are developed. These options are then presented to management for a decision. This work may include compressing the schedule, identifying alternative ways to perform the work on the project, or adjusting the budget or scope. The result is a realistic schedule and budget that can achieve the project's agreed-upon scope.

The process of scope definition is ongoing throughout the project. The following are two key reasons this process is important on the exam:

- Many project managers complain about unrealistic schedules. For the exam, you need to understand that unrealistic schedules are the project managers' fault because they have not done planning in an iterative way, as described in the previous paragraph. Project managers must reconcile the scope to the schedule and the budget, as well as to other project constraints, to resolve any issues before work begins.
- Project managers spend a large portion of their time during executing and monitoring and controlling looking for options to adjust the project and still meet the project schedule or budget. Therefore, all the analysis tools used in planning to come up with a realistic schedule and budget are also utilized while the work is being done.

Whether a project uses a plan-driven or change-driven approach, the process of Define Scope is iterated as the project progresses. Its purpose is always to determine what scope is and is not in the project.

Product Analysis PAGE 153 As noted at the beginning of this section, part of defining scope is determining what the deliverables of the project are. Product analysis is performed to analyze the objectives and description of the product as stated by the customer or sponsor. That information is then used to define tangible deliverables. The work of product analysis may entail analyzing the product description and stated requirements, or using techniques such as systems engineering, value analysis, or value engineering. Product analysis is a critical tool that allows the project manager to make sure the product and project scope are understood and accurate. For the exam, realize you may need to determine and define deliverables as part of the project, rather than receiving a complete list from the customer.

Project Scope Statement⁹ PAGE 154 The primary result, or output, of the Define Scope process is the project scope statement. This document in effect says, "Here is what we will do on this project." Or it could say, "Here is the approved project and product or service scope for this project." On a plan-driven project, the development of the project scope statement can take a lot of time and involve the expert judgment of many stakeholders and even experts from outside the organization. The project scope statement for a change-driven project will be less detailed, but will still have sufficient detail to define what is in and out of scope. The product scope will be progressively elaborated as needed. While defining requirements and, in turn, defining scope, you should identify areas where people requested scope but it was not approved to be included in the project. You should also clarify areas where the scope could easily be misunderstood. It is a waste of project time and money to create scope that is not needed or approved, yet it is easy for this to occur. One way to avoid this problem is to identify in the project scope statement what is not in the project, to make it clear that such additions are not allowed.

The project scope statement, along with the WBS and WBS dictionary (described in the next section), comprise the scope baseline, which is part of the project management plan. The project scope statement may include the following:

- Product scope
- Project scope, including a description
- Deliverables of the project
- Acceptance criteria
- What is not part of the project
- Assumptions and constraints

Create WBS PAGE 156

Process Create WBS
Process Group Planning
Knowledge Area Scope Management

What is a WBS? Correctly understanding this project management tool is essential for successful projects, and for passing the exam.

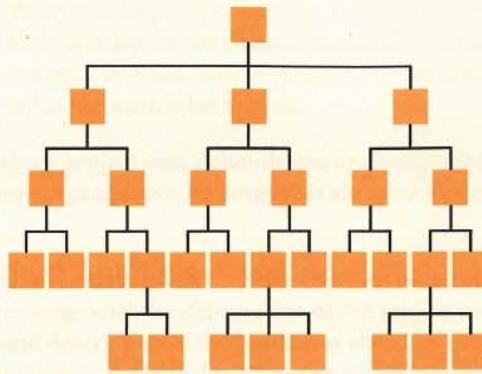
Exercise Test yourself! What is a WBS?

Answer The WBS is a required element of project management. This organizational tool shows all of the scope on a project, broken down into manageable deliverables. Without a WBS, a project can and will take longer, deliverables and the work to produce them are likely to be missed, and your project will be negatively impacted. So, there is no choice. All projects, even small ones, need a WBS. Read the rest of this section to learn more about what a WBS is and how it adds value to projects.

If you have not created a WBS, or do not practice using this tool, you will likely answer questions incorrectly when taking the exam. What if a question described details of a project to you and then asked, “You are in the middle of planning this project, and you are creating a WBS. Which of the following do you most likely need to worry about?” It is difficult to answer such questions with only academic knowledge. You need experience using this tool.

Let’s work through the topic of the WBS together. Try the following exercise.

Exercise Many people simply make a list of things to do as their method of defining all the deliverables on a project. This is a mistake; there are enormous advantages to using a WBS instead. Test yourself. Can you explain why the image on the right side (a list) is not as good as the diagram on the left (a WBS)?



Vendors

Custom Vendor Selection

- Agenda for visits
- Evaluation criteria
- Team preparation
- Visit schedule
- Report on visits
- Vendor scores
- Finalist list

Vendor Reference Checks

- Reference format
- Vendor reference requests
- Reference evaluation forms

Answer Here are just a few answers that explain why a WBS is better than a list:

- Both the way a list is created and the way it displays information make it easy to overlook some deliverables. In contrast, the construction of a WBS graphically provides a structured vision for a project and helps to ensure that nothing slips through the cracks and no deliverables are forgotten.
- A list can be cumbersome and does not allow you to clearly break down a large project into small enough pieces. With a WBS, you can easily break down deliverables into work packages (smaller deliverables, not activities). A WBS also shows how work packages are derived.
- A list is usually created by one person, whereas a WBS is created with input from the team and stakeholders. Involving the team and stakeholders helps gain buy-in, and increased buy-in leads to improved performance. In contrast, a list can make people wary of a project because they are not able to understand the project by looking at a list, nor do they know how the list was created.
- The process of creating a WBS allows the team to walk through a project in their minds and thus improves project plans. The execution of a project is typically easier and less risky as a result.
- Being involved in the creation of a WBS helps people better understand a project. It also makes a project seem more achievable.
- A WBS shows a complete hierarchy of a project, making it easier to see how one deliverable relates to another. A list is just a list.

Will this be on the exam? Not directly, but you will need to fully understand a WBS, and this discussion describes aspects of using a WBS that many people do not understand.

Review the WBS example in figure 5.5.

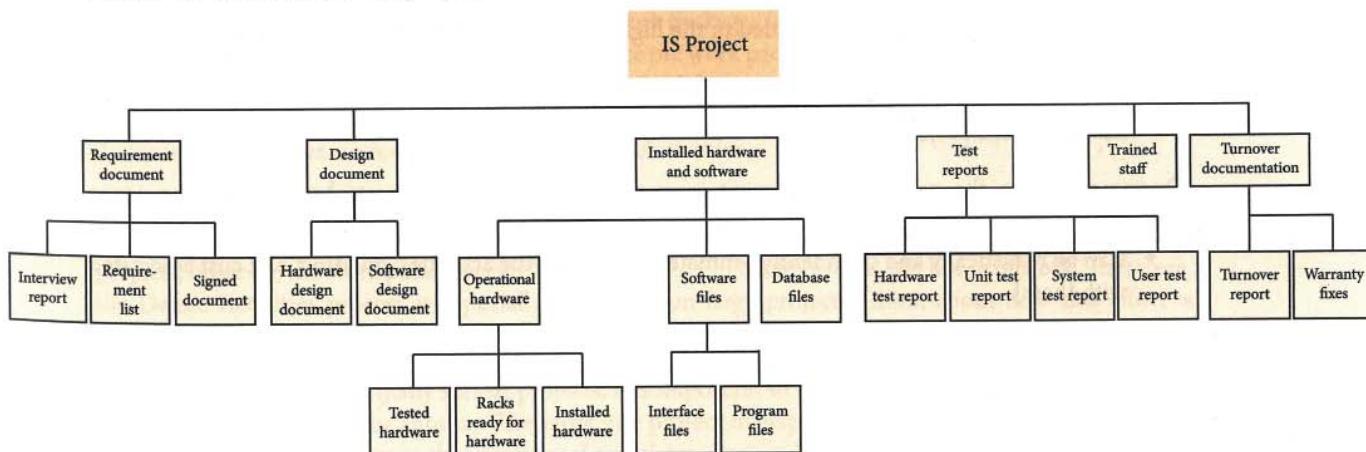


FIGURE 5.5 A WBS (on a summary level) for a hardware/software creation and installation project

Most commonly, the project name goes at the top of a WBS. The next level is typically the same as the development life cycle. The subsequent levels break the project into deliverables, which are then broken down again into smaller component deliverables, ultimately to create work packages (described next). Such decomposition continues until reaching the level appropriate to manage the project.

Although a WBS may look like a corporate organizational chart, it is not! It serves a different function. A WBS allows you to break down a seemingly overwhelming project into pieces you can plan, organize, manage, and control. The creation of a WBS is an effort to decompose deliverables into smaller component deliverables called work packages. Decomposition can be done using a top-down approach (starting with the high-level pieces of a project), a bottom-up approach (starting at the work package level), or by following organizational and industry guidelines or templates.

Note that on a WBS, work refers not to an activity, but to the work products or deliverables that result from an activity or group of activities. So, for the exam, note that each work package should consist of nouns—things (deliverables), rather than actions (activities). A WBS is deliverable-oriented. This does not mean that only customer deliverables are included. The complete scope of a project, including product scope, project scope, and project management efforts are included as well.

**TRICKS
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Watch out for the word “task.” What many people refer to as a “task” in the real world (and in some project management software) is generally called an “activity” on the exam. An activity is a particular piece of work scheduled for a project. For the exam, you should typically expect to manage to the activity level. Tasks are smaller components of work that make up an activity—they can be used to further break down an activity into smaller components of work.

Every WBS is unique, and every project manager will approach creating a WBS in their own way. But there are a few guidelines that every project manager should follow when creating a WBS:

- A WBS should be created by the project manager using input from the team and other stakeholders.
- Each level of a WBS is a breakdown of the previous level.
- An entire project should be included in the highest levels of a WBS. Eventually, some levels will be further broken down.
- A WBS includes only project deliverables that are required; deliverables not included in the WBS are not part of the project.

During planning, the project management team and subject matter experts break down the scope description until the work package level is reached. This occurs when the deliverables:

- Can be realistically and confidently estimated (including the activities, duration, and cost associated with them)
- Can be completed quickly
- Can be completed without interruption and without the need for more information
- May be outsourced

At this point, you might enter the work packages—the items at the lowest level of the WBS—into some sort of project scheduling software. You would not try to finalize the list of work packages by using software, however. That list comes from the creation of the WBS.

The levels in the WBS are often numbered for ease of location later. When the WBS is complete, identification numbers are assigned to help distinguish where a work package is in the WBS. There are many different numbering systems you can use. Figure 5.6 provides an example.

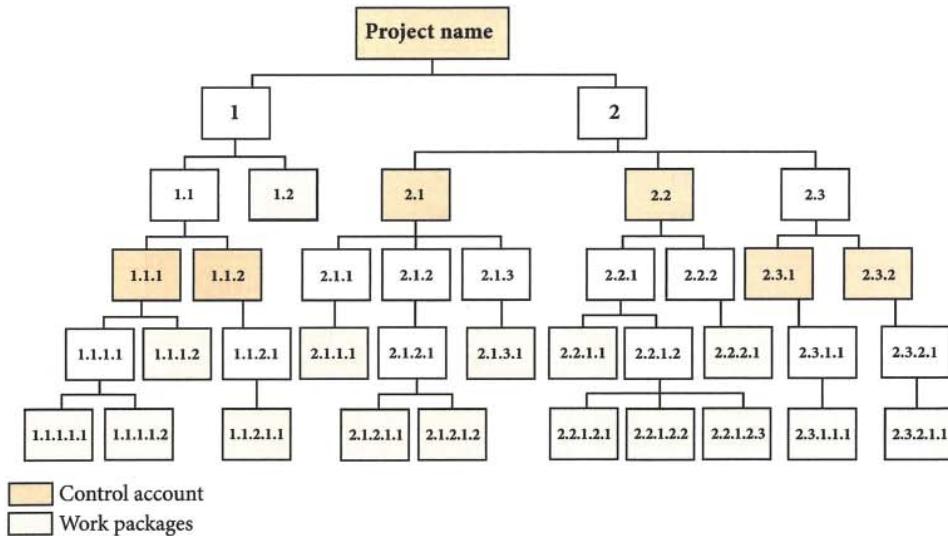


FIGURE 5.6 Sample WBS numbering system

You may see the terms “control account”¹⁰ or “planning package” on the exam. Sometimes found at higher levels within the WBS (as shown in figure 5.6), a control account is a tool that allows you to collect and analyze work performance data regarding costs, schedule, and scope. Control accounts, which may include one or more planning packages, provide a way to manage and control costs, schedule, and scope at a higher level than the work package. Each work package in the WBS is assigned to only one control account.

As planning progresses, the team breaks down the work packages from the WBS into the schedule activities (or “activities,” for short) that are required to produce the work packages. Note that this further breakdown of the WBS into an activity list is done as part of the schedule management process of Define Activities. The team uses the project scope statement, WBS, and WBS dictionary (described later in this chapter) to help define which activities are required to produce the deliverables.

For example, on small projects, the WBS is often broken down into work packages that take between 4 and 40 hours to complete. Medium-sized projects may have work packages with 8 to 80 hours of work. On large projects, however, the work packages may be much larger and could involve 300 hours of work. Therefore, the Define Activities process is especially important on large projects. Think about how this effort is different on a large project than on a small project.

If your company works on many similar projects, it is important to realize that the WBS from one project may be used as the basis for another. Therefore, the project management office should collect and share WBS examples and encourage the creation of templates. Project WBSs become part of the company’s organizational process assets, and may be used by similar projects in the future.

Great project managers not only see the value of the information provided in the WBS, they also recognize the value of the effort involved in creating the WBS. Do you really understand what a WBS is? Try the next exercise. If you miss many of the answers, review this section, and rethink your knowledge before taking the exam.

Scope Management

F I V E

Exercise

Test yourself! What are the benefits of using a WBS?

Answer This exercise may seem similar to the previous exercise, but it is important to clearly understand the value of a WBS. The following are benefits of using a WBS:

- Helps prevent work from slipping through the cracks
- Provides project team members with an understanding of how deliverables fit into the overall project management plan and gives the project team an indication of the impact of their work on the project as a whole
- Facilitates communication and cooperation between and among the project team and other stakeholders
- Helps manage stakeholder expectations regarding deliverables
- Helps identify risks
- Helps prevent changes
- Focuses the project team's experience on what needs to be done, resulting in increased quality and a project that is easier to manage
- Provides a basis for estimating resources, costs, and schedules
- Provides proof of the need for resources, funds, and schedules
- Helps with planning control efforts and establishing acceptance criteria for deliverables
- Gets team buy-in and builds the project team
- Helps people get their minds around the project

A WBS is the foundation of a project. This means almost everything that occurs in planning after the creation of a WBS is related to the WBS. For example, project costs and schedules are estimated at the work package or activity level, and not for the project as a whole. Also note that a WBS can help a project manager identify more risks by examining a project at the work package level. Work packages are assigned to

individuals or parts of the performing organization, depending on the size of the project. Does the WBS shown in figure 5.7 make sense to you?

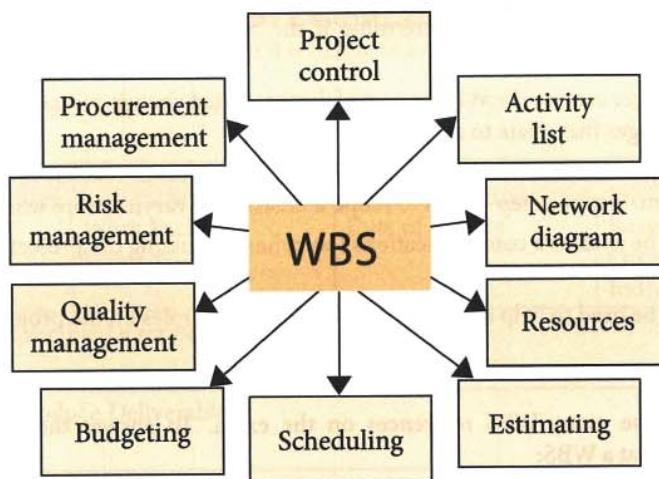


FIGURE 5.7 The WBS is the foundation of the project.

Let's think about the project control element in figure 5.7. Many people forget to use the project management tools from project planning while the work is being done. They may create a WBS just because it is a required part of a complete scope baseline, but then forget about it. As a result, they do not get the full benefit of the tool. If an exam question asks what you do with a WBS once it has been created, what will you answer?

Exercise What do you do with a WBS once it has been created?

If you were going to test someone's WBS knowledge, would you ask questions about the basics of creating a WBS, or would you test their knowledge by asking how a WBS can help a project manager to better manage a project? The exam strongly weighs toward the latter. So, take some time to really think about this question.

Answer When completed, the WBS can be used any time the scope of a project needs to be reevaluated. For example:

- When there is a scope-related change request, a project manager can use the WBS, along with the project scope statement, to determine if the request is within the planned scope of the project.
- A project manager can use the WBS as part of the integrated change control process to evaluate impacts of changes that relate to scope.
- Project managers can control scope creep¹¹ by using the WBS to reinforce what work is to be done. (The term “scope creep” refers to scope increasing or varying from what was planned.)
- The WBS can be used as a communications tool when discussing the project with the team or the customer.
- The WBS can be used to help new team members see their roles on the project.

**TRICKS
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There may be many WBS references on the exam. To answer these questions correctly, remember that a WBS:

- Is a graphical picture of the hierarchy of a project
- Identifies all deliverables to be completed (if it is not in the WBS, it is not part of the project)
- Is the foundation upon which a project is built
- Is very important and should exist for every project
- Ensures that the project manager thinks through all aspects of a project
- Can be reused for other projects
- Does not show dependencies

**TRICKS
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The previous list should help you get a few more tricky questions right on the exam. Now, would you like to get one more right? Many people confuse the terms “WBS” and “decomposition.” The best way to think of decomposition¹² is that decomposition is what you are doing, and a WBS is the means to do it. In other words, you decompose a project using a WBS.

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The exam may use the term “deconstruction” instead of “decomposition.” Both terms mean the same thing.

WBS Dictionary PAGE 162 Think about how a work package is identified in a WBS. It is usually described using only one or two words. But assigning a deliverable with such a brief description to a team member allows for too much possible variation. In other words, it allows for scope creep. A WBS dictionary is the solution to this problem. This document provides a description of the work to be done for each WBS work package, and it lists the acceptance criteria for each deliverable, which ensures the resulting work matches what is needed. Therefore, a project manager can use a WBS dictionary to prevent scope creep before work even starts, rather than dealing with scope creep while the work is being done.

The WBS dictionary is an output of the Create WBS process. This document may be used as part of a work authorization system, which informs team members when their work package is going to start. A WBS dictionary can include descriptions of schedule milestones, acceptance criteria, durations, interdependencies, and other information about work packages. You can also use it to control what work is

done when, to prevent scope creep, and to solidify a stakeholder's understanding of the effort required for each work package. The WBS dictionary essentially puts boundaries around what is included in a work package, similar to the way the project scope statement puts boundaries around what is included in a project. Note that some of the entries in a WBS dictionary, such as durations and interdependencies, may be filled in during iterations, rather than when it is first drafted.

A WBS dictionary may look similar to the example shown in figure 5.8.

WBS Dictionary			
Control Account ID #	Work Package Name/Number	Date of Update	Responsible Organization/Individual
Work Package Deliverable Description			
Work Involved to Produce Deliverable			
Acceptance Criteria (How to know if the deliverable/work is acceptable)			
Assumptions and Constraints			
Quality Metrics			
Technical Source Document			
Risks			
Resources Assigned			
Duration			
Schedule Milestones			
Cost			
Due Date			
Interdependencies Before this work package _____ After this work package _____			
Approved By: Project Manager _____ Date: _____			

FIGURE 5.8 WBS dictionary

Scope Baseline PAGE 161 As discussed in the Integration Management chapter, baselines help the project manager control their projects. Baselines are simply the final and approved versions of certain pieces of the project management plan. For scope, the baseline is made up of the final versions of the WBS, the WBS dictionary, and the project scope statement that are approved at the end of planning, before the project work begins. As the work on the project is being done, the project manager reviews how the project is progressing and compares that data to the baseline by answering the following questions:

- How is my project going, and how does that compare to the baseline?
- What scope has been completed on the project?
- Does it match what is defined in the WBS, WBS dictionary, and project scope statement?

If scope is needed that is not in the baseline, a change has to be formally approved through the integrated change control process, and a new item (or items) needs to be added to the WBS, WBS dictionary, and project scope statement to show the scope addition. This updated documentation becomes the new scope baseline for the project. Any other components of the project management plan and project documents that are affected by the change in scope also need to be updated, including requirements documentation and the assumption log.

A project's (and project manager's) measurements of success include whether the project has met all the requirements, including the scope baseline. Because a project manager's performance is evaluated along with the success of the project, it is essential to use the tools, techniques, and practices of project management in the real world. These assets make it so much easier to achieve success on a project and to get a great evaluation of your own performance as the project manager.

Validate Scope PAGE 163

Process Validate Scope
Process Group Monitoring & Controlling
Knowledge Area Scope Management

Many people are confused about what it means to validate scope. If you correctly understand scope validation, you can get five more questions right on the exam. These next few pages will clarify this process and help you find gaps in your knowledge.

TRICKS OF THE TRADE First, think about the name of the process. Many people think Validate Scope means confirming the validity and appropriateness of the scope definition during project planning. This is incorrect, however. The Validate Scope process actually involves frequent, planned meetings with the customer or sponsor to gain formal acceptance of deliverables during project monitoring and controlling. That's a big difference, isn't it?

Let's look at the inputs to this process. Try this exercise.

Exercise Can you list the inputs of Validate Scope? (Remember that the word “input” means, “What do I need before I can...?”)

Answer

- Work must be completed and checked before each meeting with the customer; therefore, you must have what are called *verified deliverables* from the Control Quality process.
 - It's helpful to have the approved scope with you when you meet with the customer, so you need the *scope baseline* from the project management plan.
 - You'll also need to share information about the requirements of the project and show the customer how those requirements have been validated. This information can be found in the *requirements management plan* and the *requirements traceability matrix*.
 - In addition, you should have the *requirements documentation* with you, in order to compare the requirements to actual results. You can then determine whether any action or change needs to take place.
 - Other project documents, such as *quality reports* and *lessons learned*, should also be reviewed at the start of this process. Quality reports can include information about open or closed issues as well as issue management, while lessons learned can be used to improve the process of validating project deliverables.
 - Another component you should have from the project management plan is the *scope management plan*, which shows the previously agreed-upon deliverables and plans for gaining formal acceptance for them.
 - Lastly, you will need to refer to *work performance data* from the Direct and Manage Project Work process to assess how well product deliverables are meeting the requirements.



Did you notice that we didn't just list the inputs, but actually described how they will be used? Whenever you think about the inputs of a project management process, make sure you can describe them and explain where they come from and what they can offer. Similarly, make sure you understand how outputs flow logically from each process. For the exam, this deeper understanding will often give you more insight into situational questions, help you distinguish between relevant and extraneous data, and help you select the correct answers.

Now let's try outputs.

Exercise Name the outputs of Validate Scope. (Remember that "output" means, "What will I have when I am done with...?")

Answer Another way of looking at an output is to think about why you are doing this and what the expected result is. Validate Scope is done to help ensure the project is on track from the customer's point of view during the project, rather than just hoping to get final acceptance in project closure. It is better to find changes and issues during the project than at the end. The customer will either accept deliverables or make change requests. In either case, the project documents will need to be updated to reflect completion or changes. Therefore, the outputs are:

- Work performance information (analyzed work performance data)
- Accepted deliverables
- Change requests
- Updates to the lessons learned register, requirements traceability matrix, and requirements documentation



Beyond the potentially misleading name, there are a few more tricky aspects of the Validate Scope process. First, it can be done at the end of each project phase in the project life cycle (to get formal acceptance of the phase deliverables along the way) and at other points throughout the project as part of monitoring and controlling (to get formal acceptance of any deliverables that require approval in the middle of the phase or project). Therefore, you validate scope with the customer multiple times throughout the life of a project. In a change-driven project, this will happen at the end of each iteration as part of the iteration review with the customer. Second, the difference between the Validate Scope and the Close Project or Phase processes can also be a little tricky. Whereas the Validate Scope process results in formal acceptance by the customer of interim deliverables, part of the reason for the Close Project or Phase process is to get final acceptance or sign-off from the customer for the project or phase as a whole.

TRICKS
OF THE
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The third tricky aspect is understanding how Validate Scope relates to the Control Quality process. See the high-level diagram in figure 5.9.

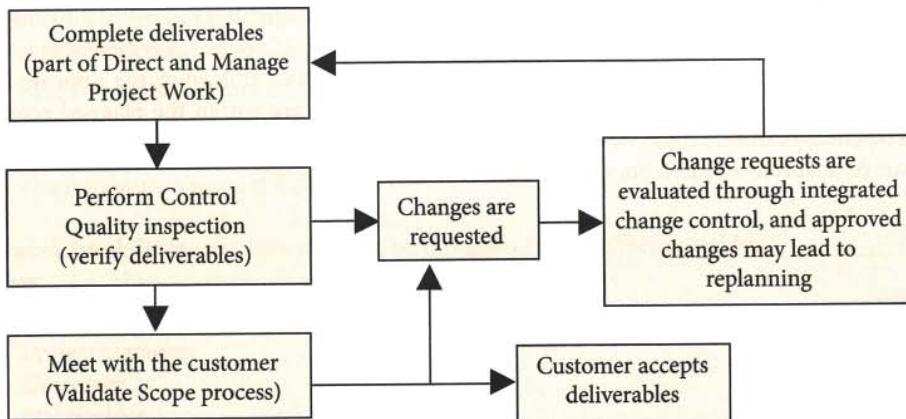


FIGURE 5.9 Relationship between Validate Scope and Control Quality

Although Control Quality is generally done first (to make sure the deliverable meets the requirements before it is shown to the customer), the two processes are very similar as both involve checking for the correctness of work. The difference is the focus of the effort and who is doing the checking. In Control Quality, the quality control department checks to see if the requirements specified for the deliverables are met and makes sure the work is correct. In Validate Scope, the customer checks and hopefully accepts the deliverables.

Control Scope PAGE 167

Process Control Scope
Process Group Monitoring & Controlling
Knowledge Area Scope Management

Many project managers do not really control their projects. If this is true for you, you might have some gaps in your knowledge of this process. Control Scope involves measuring and assessing work performance data against the scope baseline and managing scope baseline changes. At any point in a project, the project manager must be sure that the scope is being completed according to the project management plan. As you take the exam, assume that the project manager is controlling scope in this way. Assume proper project management is being done on the project unless the question states otherwise.

To control scope, you first need to have a clear definition of the scope (the scope baseline from the project management plan), and you need to have work completed on the project. You also need to be aware of the original requirements recorded in the requirements documentation and the requirements traceability matrix (inputs to this process). You then have to measure the completed work against the scope baseline, perform data analysis, including analyzing any variances, and determine whether the variances are significant enough to warrant changes. If necessary, you would submit a change request through the Perform Integrated Change Control process to assess the impact the change would have on all aspects of the project. New work performance information may result, along with updates to the project management plan and project documents.

Scope Management FIVE

Remember that the Control Scope process is extremely proactive. It includes thinking about where changes to scope are coming from on the project and what can be done to prevent or remove the need for any more changes from that source. Properly using project management tools, techniques, and practices will save you from unnecessary problems throughout the life of a project.

As a project manager, your job is not to just process other people's changes; it is to control the project to the project management plan and to meet all baselines. Therefore, you should not be easily swayed or influenced, and you should not let others add scope or change scope without following the approved change management process and without ensuring the suggested changes are within the planned scope of the project. As discussed earlier, people who want work to be done will try to add it to the project whether it is logically part of the project or not. So, you must control the project scope.

Practice Exam

1. A project has a number of deliverables that are complex and have to be assembled. As the project manager, you know the work breakdown structure will help stakeholders to see interim deliverables that will be integrated into the final project deliverables. To help manage the individual elements, you have used a work breakdown numbering system. This numbering system allows the project team to:
 - A. Systematically estimate costs of work breakdown structure elements.
 - B. Provide project justification.
 - C. Identify the level at which individual elements are found.
 - D. Use it in project management software.
2. The work breakdown structure can best be thought of as an effective aid for _____ communications.
 - A. Team
 - B. Project manager
 - C. Customer
 - D. Stakeholder
3. The product of the project has been completed and delivered to the customer by the team. They are informed by the customer that several of the deliverables are not acceptable, as they do not meet the requirements specified early in the project. The project manager and team review the requirements documentation, and are in agreement that the product deliverables meet the customer's requirements as they understand them. The project manager, who is new to the organization, seeks the advice of the project management office in determining what went wrong. After some discussion, the PMO realizes that the Validate Scope process was not performed appropriately by the project manager. Which of the following is a key output of the Validate Scope process?
 - A. A more complete scope management plan
 - B. Customer acceptance of project deliverables
 - C. Requirements analysis
 - D. Confirmation of the project scope statement
4. During project executing, a team member comes to the project manager because he is not sure what work he needs to accomplish on the project. Which of the following documents contains detailed descriptions of work packages?
 - A. WBS dictionary
 - B. Activity list
 - C. Project scope statement
 - D. Scope management plan
5. During which part of the project management process is the project scope statement created?
 - A. Initiating
 - B. Planning
 - C. Executing
 - D. Monitoring and controlling

Scope Management FIVE

6. The program was planned years ago, before there was a massive introduction of new technology. While planning the next project in this program, the project manager has expanded the scope management plan because as a project becomes more complex, the level of uncertainty in the scope:
 - A. Remains the same
 - B. Decreases
 - C. Decreases then increases
 - D. Increases
7. During a meeting with some of the project stakeholders, the project manager is asked to add work to the project scope. The project manager had access to correspondence about the project before the project charter was signed and remembers that the project sponsor specifically denied funding for the scope mentioned by these stakeholders. The best thing for the project manager to do is to:
 - A. Let the sponsor know of the stakeholders' request.
 - B. Evaluate the impact of adding the scope.
 - C. Tell the stakeholders the scope cannot be added.
 - D. Add the work if there is time available in the project schedule.
8. A new project manager is being mentored by a more experienced PMP-certified project manager. The new project manager is having difficulty finding enough time to manage the project because the project scope is being progressively elaborated. The PMP-certified project manager advises that the basic tools for project management, such as a work breakdown structure, can be used during project executing to assist the project manager. For which of the following can a work breakdown structure be used?
 - A. Communicating with the customer
 - B. Showing calendar dates for each work package
 - C. Identifying the functional managers for each team member
 - D. Describing the business need for the project
9. During a project team meeting, a team member suggests an enhancement to the scope that is beyond the scope of the project charter. The project manager points out that the team needs to concentrate on completing all the work and only the work required. This is an example of:
 - A. Change management
 - B. Scope management
 - C. Quality analysis
 - D. Scope decomposition
10. A project has just started the second phase, in which work packages are being created. A new team member has completed his work packages for this phase and has asked the project manager to validate the scope of his work packages. The team member is anxious to have the customer see his work packages. The project manager, although confident in this new team member, wants the team member to gain confidence after the customer sees his work packages. When should the Validate Scope process be done?
 - A. At the end of the project
 - B. At the beginning of the project
 - C. At the end of each phase of the project
 - D. During the planning processes

F I V E Scope Management

11. The project is mostly complete. The project has a schedule variance of 300 and a cost variance of -900. All but one of the quality control inspections have been completed, and all have met the quality requirements. All items in the issue log have been resolved. Many of the resources have been released. The sponsor is about to call a meeting to obtain product validation when the customer notifies the project manager that they want to make a major change to the scope. The project manager should:
 - A. Meet with the project team to determine if this change can be made.
 - B. Ask the customer for a description of the change.
 - C. Explain that the change cannot be made at this point in the process.
 - D. Inform management.
12. You have just joined the project management office after five years of working on projects. One of the things you want to introduce to your company is the value of creating and utilizing work breakdown structures. Some of the project managers are angry that you are asking them to do "extra work." Which of the following is the best thing you could tell the project managers to convince them to use work breakdown structures?
 - A. Work breakdown structures will prevent work from slipping through the cracks.
 - B. Work breakdown structures are of greater value on large projects.
 - C. Work breakdown structures are best when the project involves contracts.
 - D. Work breakdown structures are the only way to identify risks.
13. A new project manager has asked you for advice on creating a work breakdown structure. After you explain the process to her, she asks you what software she should use to create the WBS and what she should do with it when it is completed. You might respond that the picture is not the most valuable result of creating a WBS. The most valuable result of a WBS is:
 - A. A bar chart
 - B. Team buy-in
 - C. Activities
 - D. A list of risks
14. To manage a project effectively, work should be broken down into small pieces. Which of the following does not describe how far to decompose the work?
 - A. Until it has a meaningful conclusion
 - B. Until it cannot be logically subdivided further
 - C. Until it can be done by one person
 - D. Until it can be realistically estimated
15. A project manager may use _____ to make sure the team members clearly know what is included in each of their work packages.
 - A. The project scope statement
 - B. The product scope
 - C. The WBS dictionary
 - D. The schedule
16. On an agile software development project, the project manager asks business stakeholders to create user stories, which will be used in the development and testing of the new application. The main purpose of a user story is:
 - A. To document features or functions required by stakeholders
 - B. To create a record of issues encountered on the project
 - C. To perform what-if analysis
 - D. To communicate progress

Scope Management FIVE

17. The development phase of a new software product is near completion. A number of quality issues have increased the cost of building the product, but the project manager and team feel these costs will be inconsequential once the project gets to market. The next phases are testing and implementation. The project is two weeks ahead of schedule. Which of the following processes should the project manager be most concerned with before moving into the next phase?
- A. Validate Scope
 - B. Control Quality
 - C. Manage Communications
 - D. Control Costs
18. You are managing a six-month project and have held biweekly meetings with your project stakeholders. After five-and-a-half months of work, the project is on schedule and budget, but the stakeholders are not satisfied with the deliverables. This situation will delay the project completion by one month. The most important process that could have prevented this situation is:
- A. Monitor Risks
 - B. Control Schedule
 - C. Define Scope
 - D. Control Scope
19. All of the following are parts of the scope baseline except the:
- A. Scope management plan
 - B. Project scope statement
 - C. Work breakdown structure
 - D. WBS dictionary
20. One of the stakeholders on the project contacts the project manager to discuss some additional scope they would like to add to the project. The project manager asks for details in writing and then works through the Control Scope process. What should the project manager do next when the evaluation of the requested scope is complete?
- A. Ask the stakeholder if any more changes are expected.
 - B. Complete integrated change control.
 - C. Make sure the impact of the change is understood by the stakeholder.
 - D. Find out the root cause of why the scope was not identified during project planning.
21. During the completion of project work, the sponsor asks the project manager to report on how the project is going. In order to prepare the report, the project manager asks each of the team members what percent complete their work is. There is one team member who has been hard to manage from the beginning. In response to being asked what percent complete he is, the team member asks, "Percent complete of what?" Tired of such comments, the project manager reports to the team member's boss that the team member is not cooperating. Which of the following is most likely the real problem?
- A. The project manager did not get buy-in from the manager for the resources on the project.
 - B. The project manager did not create an adequate reward system for team members to improve their cooperation.
 - C. The project manager should have had a meeting with the team member's boss the first time the team member caused trouble.
 - D. The project manager did not assign work packages.

22. Being prepared to do a complete job of developing and finalizing the scope baseline requires that you have done a thorough and timely job of identifying and analyzing stakeholders, and of collecting requirements. The development of the scope baseline can best be described as involving:
- The functional managers
 - The project team
 - All the stakeholders
 - The business analyst
23. Which of the following is an output of the Collect Requirements process?
- Requirements traceability matrix
 - Project scope statement
 - Work breakdown structure
 - Change requests
24. The cost performance index (CPI) on the project is 1.13, and the benefit-cost ratio is 1.2. The project scope was created by the team and stakeholders. Requirements have been changing throughout the project. No matter what the project manager has tried to accomplish in managing the project, which of the following is he most likely to face in the future?
- Having to cut costs on the project and increase benefits
 - Making sure the customer has approved the project scope
 - Not being able to measure completion of the product of the project
 - Having to add resources to the project
25. Validate Scope is closely related to:
- Control Quality
 - Sequence Activities
 - Manage Quality
 - Schedule Management
26. A highway renewal project you are managing appears to have some missing scope. Your understanding of the scope was that the highway was to be resurfaced. Now, one of the construction foremen has come to ask why he finds no mention of repainting the lines on the repaved road. He also wants to know if there are any guard rail replacement work packages in the project. You have seen some of the resurfaced road that is completed, with the new lines painted on them. Which of the following is most likely to have caused the misinterpretation of the project scope statement?
- Imprecise language
 - Poor pattern, structure, and chronological order
 - Variations in size of work packages or detail of work
 - Too much detail
27. Which of the following is correct in regard to the Control Scope process?
- Effective scope definition can lead to a more complete project scope statement.
 - The Control Scope process must be done before scope planning.
 - The Control Scope process must be integrated with other control processes.
 - Controlling the schedule is the most effective way of controlling scope.

Scope Management FIVE

28. Which of the following best describes the Validate Scope process?
- A. It provides assurances that the deliverable meets the specifications, is an input to the project management plan, and is an output of Control Quality.
 - B. It ensures the deliverable is completed on time, ensures customer acceptance, and shows the deliverable meets specifications.
 - C. It ensures customer acceptance, shows the deliverable meets specifications, and provides a chance for differences of opinion to come to light.
 - D. It is an output of Control Quality, occurs before Define Scope, and ensures customer acceptance.
29. Which of the following best describes product analysis?
- A. Working with the customer to determine the product description
 - B. Mathematically analyzing the quality desired for the project
 - C. Gaining a better understanding of the product of the project in order to create the project scope statement
 - D. Determining whether the quality standards on the project can be met
30. Which of the following best describes the difference between the Control Scope process and the Perform Integrated Change Control process?
- A. Control Scope focuses on making changes to the product scope, and Perform Integrated Change Control focuses on making changes to integration.
 - B. Control Scope focuses on controlling the scope of the project, and Perform Integrated Change Control focuses on determining the impact of a change of scope on time, cost, quality, risk, resources, and customer satisfaction.
 - C. Control Scope focuses on controlling the scope of the project, and Perform Integrated Change Control focuses on making changes to integration.
 - D. Control Scope focuses on making changes to the product scope, and Perform Integrated Change Control focuses on determining the impact of a change to scope, time, cost, quality, risk, resources, and customer satisfaction.
31. The project was tasked to develop a new software to be used by three sales channels of an auto parts company. The project was consistently on time and within budget, and the stakeholders approved prototypes of the software. However, when the completed software was installed and beta tested, a problem was discovered. Although the software performed as expected on in-store and call center-assisted purchases, it was found to be incompatible with other software necessary to complete online transactions. Therefore, the customer refused to accept the final deliverable, and the team was left to find a new software package that would accommodate all the customer's needs.
- Which of the following did the team not do?
- A. Collect requirements from the right stakeholders.
 - B. Test interim deliverables.
 - C. Control stakeholder engagement.
 - D. Accurately define product scope.

Answers

1. Answer C

Explanation The numbering system allows team members to quickly identify the level in the work breakdown structure where the specific element is found. It also helps to locate the element in the WBS dictionary.

2. Answer D

Explanation The term “stakeholder” encompasses all the other choices. In this case, it is the best answer since the WBS can be used as a communications tool for all stakeholders to see what is included in the project.

3. Answer B

Explanation The output of the Validate Scope process is customer acceptance of project deliverables. The other choices all happen during project planning, well before the time the Validate Scope process takes place.

4. Answer A

Explanation The WBS dictionary defines each element in the WBS. Therefore, descriptions of the work packages are in the WBS dictionary. Activity lists may identify the work package they relate to, but they do not contain detailed descriptions of the work packages. The project scope statement defines the project scope, but it does not describe the work a team member is assigned. The scope management plan describes how scope will be planned, managed, and controlled. It does not include a description of each work package.

5. Answer B

Explanation The project scope statement is an output of the Define Scope process, which occurs during project planning.

6. Answer D

Explanation Not all questions will be difficult. The level of uncertainty in scope increases based on the scale of effort required to identify all the scope. On larger projects, it is more difficult to catch everything.

7. Answer C

Explanation Although one could let the sponsor know about the stakeholders’ request, the best choice listed would be to say no, as this was already considered. An even better choice would be to find the root cause of the problem, but that choice is not offered here.

8. Answer A

Explanation A WBS does not show dates or responsibility assignments. The business need is described in the project charter. In this situation, the project scope is being fine-tuned. It would save the project manager time in effectively managing progressive elaboration if the WBS was used as a communications tool. Using the WBS helps ensure everyone (including the customer) understands the scope of the work.

9. Answer B

Explanation The team member is suggesting an enhancement that is outside the scope of the project charter. Scope management involves focusing on doing all the work and only the work in the project management plan that meets the objectives of the project charter. The project manager is performing scope management.

Scope Management FIVE

10. Answer C

Explanation The Validate Scope process occurs during project monitoring and controlling. It is done at the end of each project phase to get approval for phase deliverables, as well as at other points to get approval for interim deliverables.

11. Answer B

Explanation Do not jump into the problem without thinking. The customer only notified the project manager that they want to make a change. They did not describe the change. The project manager should not say no until they know more about the potential change, nor should the project manager go to management without more information. The project manager must understand the nature of the change and have time to evaluate the impact of that change before doing anything else. Of these choices, the first thing to do is to determine what the change is. The project manager might then analyze the potential change with the team, but only if their input is required.

12. Answer A

Explanation Work breakdown structures are required on projects of every size, regardless of whether contracts are involved. Work breakdown structures can be used to help identify risks, but risks can be identified using other methods as well. Preventing work from being forgotten (slipping through the cracks) is one of the main reasons the tool is used, and is the best choice offered here.

13. Answer B

Explanation The WBS is an input to all of these choices. However, team buy-in is a direct result of the WBS creation process, while the other choices use the WBS to assist in their completion. Involving the team in creating the WBS provides project team members with an understanding of where their pieces fit into the overall project management plan and gives them an indication of the impact of their work on the project as a whole.

14. Answer C

Explanation The lowest level of the WBS is a work package, which can be completed by more than one person. The other choices are aspects of a work package.

15. Answer C

Explanation The project scope statement describes work on a high-level basis. Work packages need to be specific to enable team members to complete their work without gold plating. The product scope does not tell team members what work is assigned to them. The team should have a copy of the schedule, but a schedule does not show them what work is included in each of their work packages. Work packages are described in the WBS dictionary. NOTE: Do not think of the WBS dictionary as a dictionary of terms.

16. Answer A

Explanation A user story is a way of stating a requirement, often using the following format: As a <role>, I want <functionality/goal>, so that <business benefit/motivation>. User stories may be developed in facilitation sessions or as part of other requirements-gathering activities.

17. Answer A

Explanation The Validate Scope process deals with acceptance by the customer. Without this acceptance, the project manager will not be able to move into the next project phase.

18. Answer C

Explanation Monitor Risks, Control Schedule, and Control Scope are monitoring and controlling processes. This situation asks how to prevent the problem, which would have been done during planning. The project deliverables are defined in the Define Scope process, which is a part of project planning. Good planning reduces the likelihood of a situation like the one described in the question, by including the right people and spending adequate time clarifying the project scope.

19. Answer A

Explanation The scope baseline includes the WBS, WBS dictionary, and the project scope statement. The scope management plan is not part of the scope baseline.

20. Answer B

Explanation Notice that there are many things the project manager could do listed in the choices; however, the question asks what the project manager should do next. Management of the change is not complete when the Control Scope process is completed. It is important to look at the impact of the change on other parts of the project, such as schedule and budget. Therefore, performing integrated change control is the best thing to do next. This would probably be followed by making sure the impact of the change is understood by the stakeholder, then determining why this scope was not identified in planning, and asking the stakeholder if more changes are expected.

21. Answer D

Explanation The project manager is not losing resources (which is implied by not getting the manager's buy-in). Although a reward system would help with cooperation, the real problem here is not cooperation. Meeting with the team member and his boss cannot be the answer because it also does not solve the problem at hand (the team member not knowing what he is to do). If you selected this choice, be very careful! You can get 10 to 20 questions wrong on the exam simply because you do not see the real problem! The whole discussion of the team member and his actions is a distractor. The real problem in this scenario is not that the team member is being uncooperative. He is asking a question that many team members want to ask in the real world. "How can I tell you how things are going if I do not know what work I am being asked to do?" The real problem is the lack of a WBS and work packages. If there were a WBS and work packages for the project, the team member would not have to ask such a question.

22. Answer B

Explanation After obtaining input from the customer and other stakeholders, the project team is responsible for developing the scope baseline. Remember that the scope baseline includes the WBS, WBS dictionary, and project scope statement.

23. Answer A

Explanation The project scope statement is an output of the Define Scope process. The work breakdown structure is an output of the Create WBS process. Scope change requests are outputs of the Validate Scope and Control Scope processes. The requirements traceability matrix is an output of the Collect Requirements process, and is used to track the requirements throughout the life of the project.

24. Answer C

Explanation There are many pieces of data in this question that are distractors from the real issue. Though it is common to have to cut costs and add resources to a project, nothing in the question should lead you to think these will be required in this situation. Customers do not generally approve the project scope (what you are going to do to complete their requirements); instead, they approve the product scope (their requirements). Since requirements are used to measure the completion of the product of the project, not having complete requirements will make such measurement impossible.

Scope Management FIVE

25. Answer A

Explanation Control Quality checks for correctness, and Validate Scope checks for acceptance.

26. Answer A

Explanation Much of the work on the project is dictated by the project scope statement. Any imprecision in such a key document will lead to differing interpretations.

27. Answer C

Explanation Though it is correct that effective scope definition can lead to a more complete project scope statement, this cannot be the answer, because it does not deal with control. Scope planning occurs before the Control Scope process, not after it. Controlling the schedule is not the best way to control scope, so that is not the best answer. The control processes do not act in isolation. A change to one will most likely affect the others. Therefore, the need to integrate the Control Scope process with other control processes is the best answer.

28. Answer C

Explanation The project management plan is completed before the Validate Scope process. The Validate Scope process does not deal with time, but rather with acceptance. The Validate Scope process does not occur before the Define Scope process. The choice stating that the Validate Scope process ensures customer acceptance, shows the deliverable meets specifications, and provides a chance for differences of opinion to come to light is entirely correct, making that the best answer.

29. Answer C

Explanation You need to have a product description before you can do product analysis. Analyzing the level of quality desired is related to the Plan Quality Management process. Determining whether the quality standards on the project can be met is done in the Manage Quality process. Product analysis includes gaining a better understanding of the product of the project in order to create the project scope statement.

30. Answer B

Explanation Notice how the choices are similar to each other? Simply look at the first part of each choice “Control Scope focuses on . . .” and see which version of the first part of the statement is correct. Then read the second part of each choice. The only statement that is entirely correct is: Control Scope focuses on controlling the scope of the project, and Perform Integrated Change Control focuses on determining the impact of a change of scope on time, cost, quality, risk, resources, and customer satisfaction.

31. Answer B

Explanation Based on the scenario presented, the team was aware of the high-level requirement that the software perform in all three sales channels. It seems that they had collected requirements from the right stakeholders, and accurately defined the scope. Somehow in the development of the software, an important requirement was overlooked, or was not properly developed. If the software had been tested in all three channels before it was delivered to the customer, the issue would have been identified, and the change control process to fix the problem would have been followed. Testing is an important aspect of the Control Scope process.