

## Safari Books Online



Safari Books Online is an on-demand digital library that delivers expert in both book and video form from the world's leading authors in technology and business.

Technology professionals, software developers, web designers, and business and creative professionals use Safari Books Online as their primary resource for research, problem solving, learning, and certification training.

Safari Books Online offers a range of and pricing programs for organizations, government, and individuals. Subscribers have access to thousands of books, training videos, and prepublication manuscripts in one fully searchable database from publishers like O'Reilly Media, Prentice Hall Professional, Addison-Wesley Professional, Microsoft Press, Sams, Que, Peachpit Press, Focal Press, Cisco Press, John Wiley & Sons, Syngress, Morgan Kaufmann, IBM Redbooks, Packt, Adobe Press, FT Press, Apress, Manning, New Riders, McGraw-Hill, Jones & Bartlett, Course Technology, and dozens more. For more information about Safari Books Online, please visit us online.

## 1 Introduction

# ***Why get certified?***

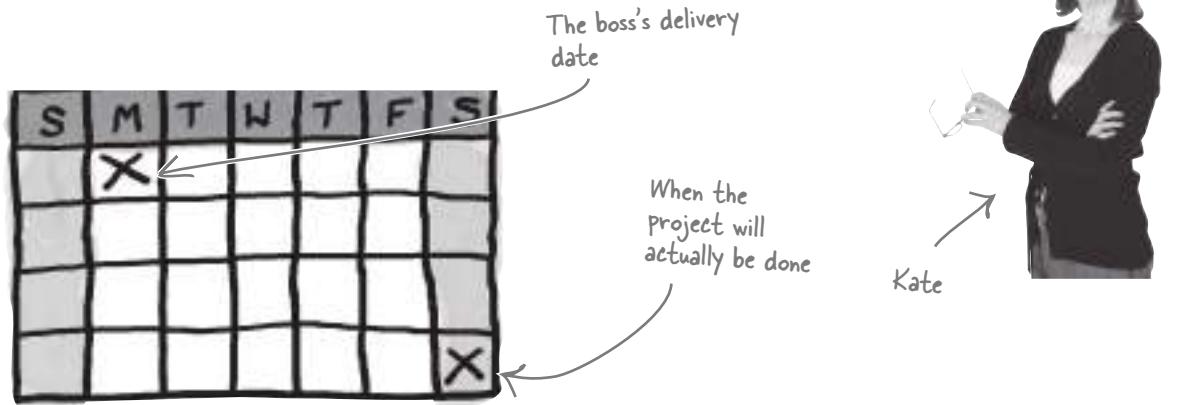


**Tired of facing the same old problems?** If you've worked on a lot of projects, you know that you face the same problems, over and over again. It's time to learn some common solutions to those problems. There's a whole lot that project managers have learned over the years, and passing the PMP exam is your ticket to putting that wisdom into practice. Get ready to change the way you manage your projects forever.

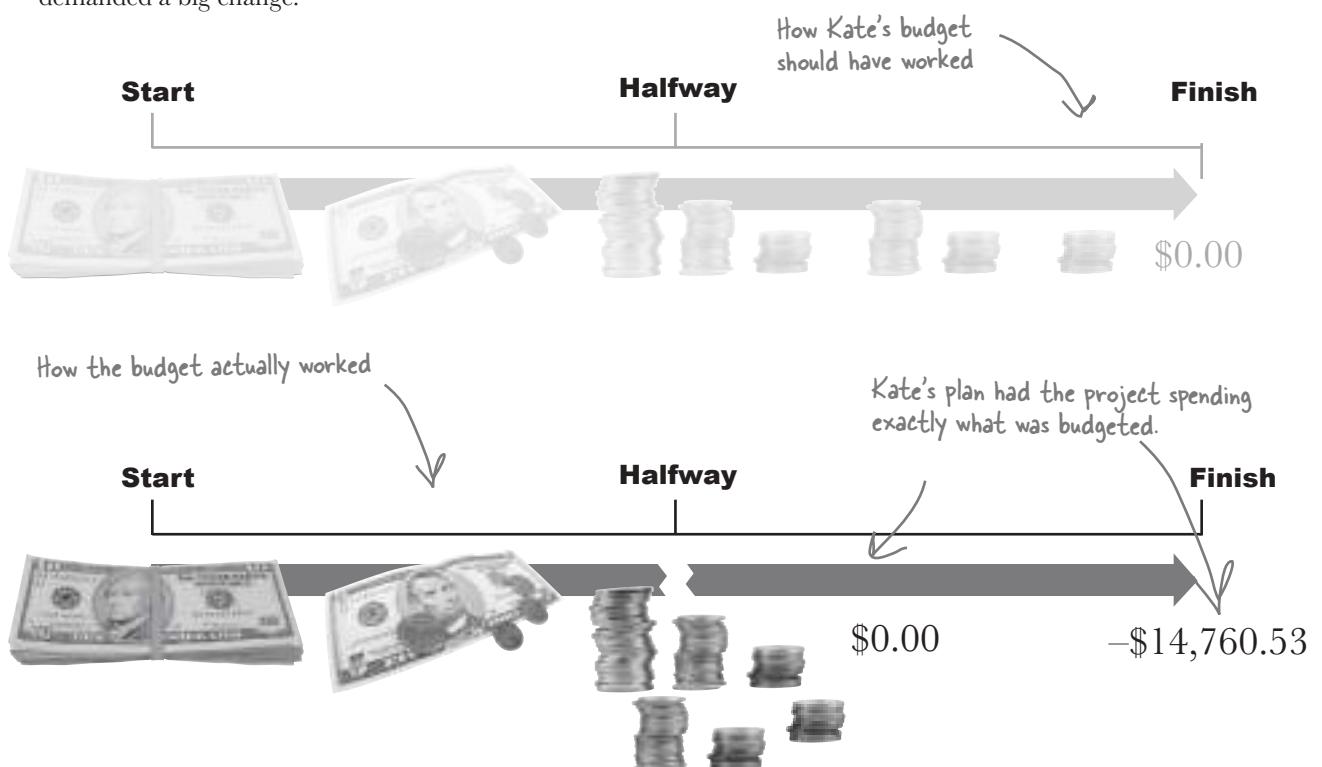
*same old, same old*

## Do these problems seem familiar?

Kate's boss promised a delivery date that she couldn't possibly meet.



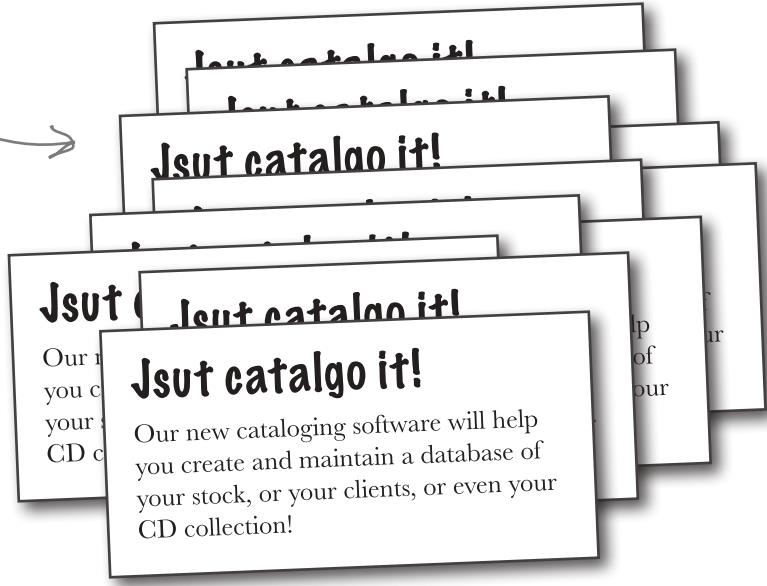
Then, when the project was halfway done, the customer demanded a big change.



Then, just as the project was about to be completed, someone noticed a couple typos, and 10,000 leaflets had to be reprinted.

Two simple typos, and now the project is over budget and dissatisfying to the customer.

Then, when it was time to fix those typos, Kate realized that the printer was booked for another project.



The short timeframe didn't give Kate enough time to plan for risks.



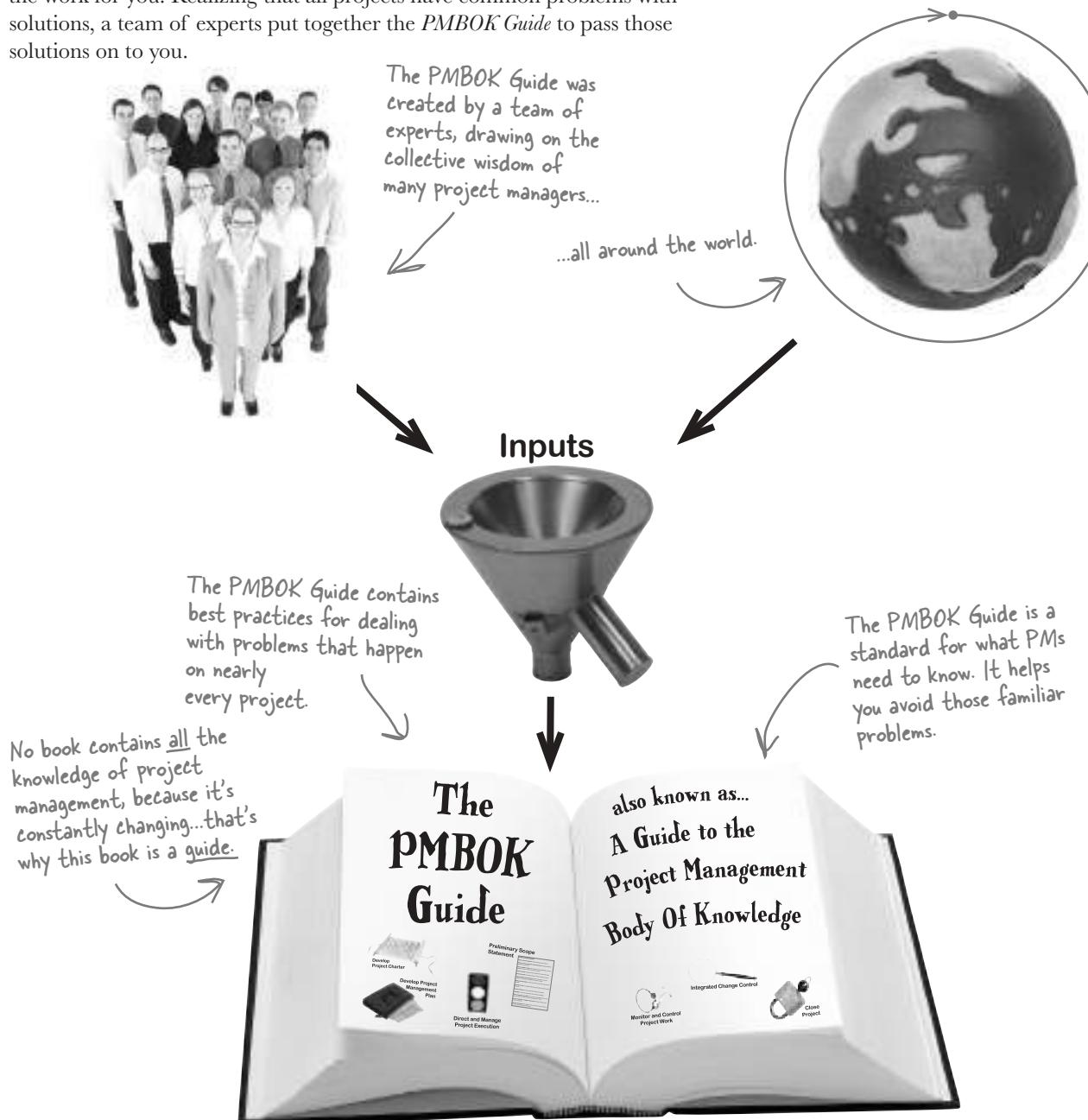
And even though she knew there was a pretty good chance that someone else might need the printer, she didn't have time to come up with a backup plan.

Now the project's going to be late and over budget, and the customer won't be happy.



## Projects don't have to be this way

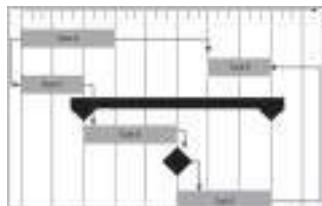
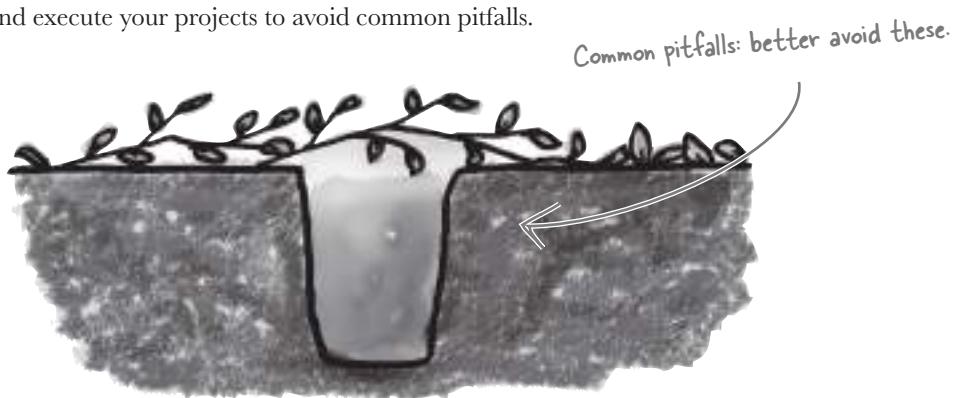
It may seem like all projects have these types of problems, but there are proven solutions to them...and someone else has already done a lot of the work for you! Realizing that all projects have common problems with solutions, a team of experts put together the *PMBOK Guide* to pass those solutions on to you.



# Your problems...already solved

Every project eventually runs into the same kinds of issues. But a project manager with good training can spot them early, and quickly figure out the best solutions. The *PMBOk Guide* will help you:

- ✓ Learn from past projects that have run into similar problems to avoid running into them again.
- ✓ Learn a common vocabulary for project management that is used by PMs around the world.
- ✓ Plan and execute your projects to avoid common pitfalls.



The *PMBOk Guide* has great ideas on how to estimate your tasks and put them in the right sequence to get your projects done as quickly and efficiently as possible.



It outlines techniques for planning and tracking your costs.



It helps you learn how to plan for and protect against defects in your project.

# What you need to be a good project manager

The *PMBOK Guide* is full of practical tools that can help you manage your projects better. But all of that doesn't mean much if you don't have the three core characteristics of a successful project manager. You've got to pay attention to all three if you want to make your project a success. This is what you'll need if you're going to take on the role of project manager:

**1**

## Knowledge

If you pay attention to what's going on in the field of project management, you can learn from everyone's successes and mistakes so that you can be better at your job.

This means knowing all of the tools and techniques in the *PMBOK Guide* and how and when to use them.

**2**

## Performance

It's not enough to know what you need to do—you've got to deliver, too. This one is all about keeping your nose to the grindstone and doing good work.

You and your team will have to work hard to deliver a successful project, too.

**3**

## Personal skills

Since you're managing people, you've got to pay attention to what motivates them and what makes things harder on them. Your job as a PM is to make personal connections with your team and help keep everybody on the right track.

As a PM, you've got to lead your team through the project lifecycle, so you need to be skilled at managing people if you're going to be successful, even if they don't report to you directly.



Not paying attention to these characteristics is sure to give your project problems. Which of the characteristics of a successful project manager was neglected in the failed projects listed below? Sometimes, more than one will apply; just pick the one that makes the most sense to you.

The project was delivered early, but it didn't have all of the features that the customers asked for. The VP had suggested a new requirements gathering technique, but the PM shot it down because he'd never heard of it.

**Neglected characteristic:**

---

The project was late because the team couldn't meet the company's standards for productivity. They were always coming into work late and leaving early and taking long lunches. It seemed like the project manager just didn't think the project was important.

**Neglected characteristic:**

---

The project manager thought his job was to meet the deadline above all else. So he demanded that the product be released on the date it was due, regardless of quality. The team wanted to create a high-quality product, and they fought with the PM throughout the project to try to get him to change his mind. In the end, the team washed their hands of the product after it was released and refused to support it.

**Neglected characteristic:**

---

The project team had so many conflicts about the project that they couldn't work together. They made decisions that undercut one another, and in the end they couldn't deliver anything at all.

**Neglected characteristic:**

---

The project was late because the team cut corners that led to sloppy work, and they had to go back and fix all of their mistakes.

**Neglected characteristic:**

---

The project manager refused to learn to use the scheduling software and templates the company had bought for the team. Instead, he kept track of the schedule in his head and on his whiteboard. Near the end of the project, he realized that he'd forgotten about some important tasks, and his ship date slipped by two months.

**Neglected characteristic:**

---



Not paying attention to these characteristics is sure to give your project problems. Which of the characteristics of a successful project manager was neglected in the failed projects listed below? Sometimes, more than one will apply; just pick the one that makes the most sense to you.

Your project was delivered early, but it didn't have all of the features that the customers asked for. The VP had suggested a new requirements gathering technique, but the PM shot it down because he'd never heard of it

**Neglected characteristic:**

## **Knowledge**

The project was late because the team couldn't meet the company's standards for productivity. They were always coming into work late and leaving early and taking long lunches. It seemed like the project manager just didn't think the project was important.

**Neglected characteristic:**

## **Performance**

The project manager thought his job was to meet the deadline above all else. So he demanded that the product be released on the date it was due, regardless of quality. The team wanted to create a high-quality product and they fought with the PM throughout the project to try to get him to change his mind. In the end, the team washed their hands of the product after it was released and refused to support it.

**Neglected characteristic:**

## **Personal skills**

This could be a knowledge issue too, because the manager didn't learn enough about the stakeholders' expectations.



This could also be a knowledge issue because the manager didn't learn the scheduling software or templates. The differences aren't always 100% clear-cut.

The project team had so many conflicts about the project that they couldn't work together. They made decisions that undercut one another, and in the end they couldn't deliver anything at all.

**Neglected characteristic:**

## **Personal skills**

The project was late because the team cut corners that led to sloppy work, and they had to go back and fix all of their mistakes.

**Neglected characteristic:**

## **Performance**

The project manager refused to learn to use the scheduling software and templates the company had bought for the team. Instead, he kept track of the schedule in his head and on his whiteboard. Near the end of the project, he realized that he'd forgotten about some important tasks, and his ship date slipped by two months.



**Neglected characteristic:**

## **Performance**

there are no  
**Dumb Questions**

**Q:** How can the *PMBOK Guide* claim to be the entire body of knowledge for project management?

**A:** Actually, it doesn't claim that at all. That's why the *PMBOK Guide* is called "A **Guide** to the Project Management Body of Knowledge." It's a reference book that organizes a lot of information about how project managers do their jobs—but it doesn't claim to have all the information itself. Instead, it provides you with a framework for managing projects and tells you what information you need to know.

A lot of people are surprised to find out that there are a bunch of things on the PMP exam that are never explicitly mentioned in the *PMBOK Guide*. (Don't worry: we'll cover that stuff in the rest of this book.) There's a whole lot of information that modern project managers should know about risk management and time management and cost and quality...and you're expected to learn more about the knowledge areas as you move forward in your career. That's why you should never limit your study to just what's in the *PMBOK Guide*. It's meant only as a guide to all of the knowledge areas that project managers use on the job.

**Q:** What if I don't do all of this stuff in my job?

**A:** The *PMBOK Guide* isn't necessarily meant to be followed like a recipe for every project. It's a broad collection of many tools and processes that are used across the project management profession, and project managers have a lot of discretion about how they run their projects. So you shouldn't throw out all that you're doing at work and replace it with every single one of the tools in this book immediately. But you'll notice as you go that some of the tools you're learning about will solve problems

for you on the job. When you find places where these tools can help, you really should start using them. Seriously, it's the best way to learn. You might find that your projects go better after you start using a new concept that you learn while you study.

**Q:** I've heard that there are a whole bunch of formulas you have to memorize for the PMP exam. Will I have to do that?

**A:** Yes, but it won't be that bad. The formulas are actually really useful. They help you understand how your project is doing so you can make better decisions. When you read about them later in the book, you'll focus on how to use them and why. Once you know that, it's not about memorizing a bunch of useless junk. The formulas will actually make sense, and you'll find them intuitive and helpful in your day-to-day work.

**Q:** Aren't certification exams just an excuse that consultants use so that they can charge their clients more money?

**A:** Some consultants charge more money because they are certified, but that's not the only reason to get certified. The best reason to get PMP Certification is because it helps you understand all of the project management concepts available to help you do your job better. If you learn these tools and apply them to your job, you will be a better project manager. And hey, if it turns out you can make more money too, that's great.

What's more, it's worth keeping in mind that for a project manager, being PMP-certified is a requirement for a large amount of contracting work, especially in government, and it's increasingly seen in job postings of all kinds. Some employers won't even interview project managers who don't have a PMP Certification!

**Q:** Doing all of the stuff in the *PMBOK Guide* seems like it will take a long time. How much of this really applies to me?

**A:** That's a great question. You might find that there are documents that are mentioned in the *PMBOK Guide* that you're not used to writing or creating for your projects, and some planning steps that you've never taken before. That's because the *PMBOK Guide* is a framework, not a recipe for a successful project.

When you get your certification, it means that you have a solid understanding of all of the tools and techniques that are typically used by project managers to plan projects, track them, and deal with problems that come up along the way. It doesn't mean that you follow the exact same recipe for project success every time you lead a project.

**Q:** But I work for a company that always runs projects on really tight deadlines. You can't honestly expect me to write a bunch of project documents and use all of these formulas for my projects.

**A:** One of the useful things that you'll learn in Chapter 8 of this book is that sometimes the processes that seem like a lot of work up front actually end up saving you time in the end.

If you find a problem in a two-hour planning meeting that would've cost you two weeks to fix, then that two hours you spent planning actually saved your project two weeks of time. A lot of the planning and documentation that you'll be tested on is there to help you head off problems before they derail your project. So in the end, doing all of that work up front and writing it all down can actually make your project go faster and be cheaper than not doing it would've been!

**The PMBOK Guide is just a guide, but if you understand all the material in it, then you'll ultimately be a better project manager.**

# Understand your company's big picture

Your project is an important part of the work your company is doing, but you need to understand how it fits in to the higher-level strategy your company is executing, too. That's where programs and portfolios come in.



## Portfolio

A portfolio is a group of projects or programs that are linked together by a business goal. If an architecture firm was venturing into remodelling existing buildings as well as designing new ones, it might split its efforts into separate New Construction and Remodelling portfolios, since the goals for each are quite different.

## Program

A program is a group of projects that are closely linked, to the point where managing them together provides some benefit. The firm knows from experience that creating huge skyscrapers is dramatically different than building residential homes, so residential home construction would be its own separate program.

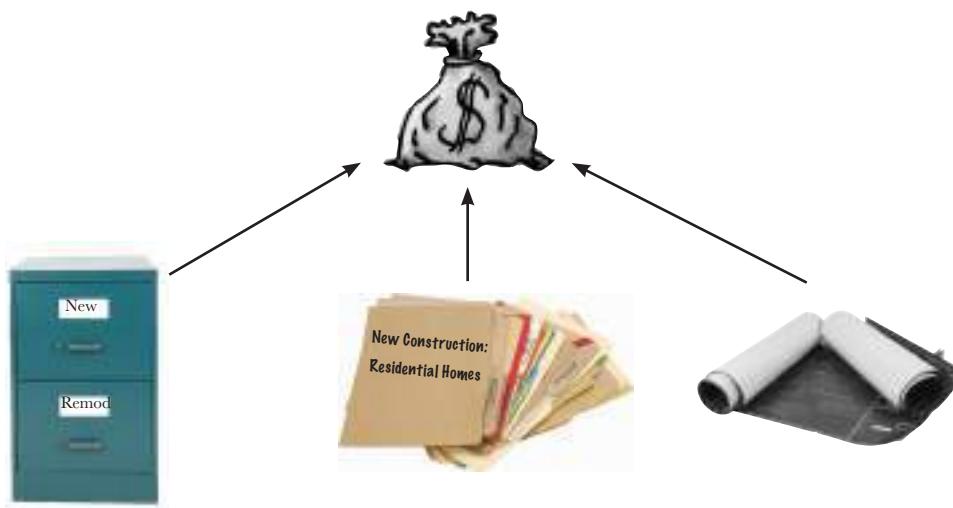
## Project

A project is any work that produces a specific result and is temporary. Projects always have a beginning and an end. Building a house is a classic example of a project. Projects can be part of programs or portfolios, but portfolios and programs can't be part of a project.

Projects in a program are often dependent on each other. Program management focuses on these interdependencies.

# Your project has value

Think about the projects you've worked on in your career. Each one of them did something beneficial for your company. You might've created a product and sold it to customers to make money directly. You might've made someone's job easier by automating work that would've taken time and effort to do. No matter how you count the benefit you created when you completed your project, that benefit is the real reason that your company decided to do the work in the first place. That benefit has an impact on the overall **business value** of the company you work for. Sometimes it can be easy to spend so much time dealing with your project's issues that you lose track of the goals you set out to achieve. It's important to think about the value of your project with every decision you make.



## Portfolio

Portfolio managers divide up the projects, programs, and operations your company is doing so that they align with business goals. That way, they can be sure that projects get the most out of managing their timelines, budgets, and resource commitments so that the company's goals are met.

## Program

Program managers focus on the places where projects depend on each other and coordinate activities to make sure that the work gets done in the most direct way possible.

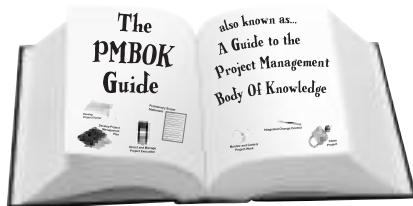
## Project

Project managers keep the team focused on the business value the project is providing. By constantly helping each team member to understand how his or her work impacts the project's value, project managers make sure that everyone on the team makes the best decisions to keep the project on track.

**Business value is the sum of all of the things your company is made of, from desks and chairs to people and the intellectual property they produce.**

# Portfolios, programs, and projects have a lot in common

We've talked about the differences between portfolio management, program management, and project management, but there are a lot of similarities between them too.



## Professions with proven processes

Portfolio managers and program managers have a set of proven processes, tools, and techniques that have been used to manage many successful programs and portfolios. Like the PMP, the Project Management Institute offers certifications in Portfolio (PfMP) and Program Management (PgMP) too.



## Business value

Portfolio managers prioritize work to meet a company's strategic goals. Managing a program is all about keeping track of resources and other constraints affecting groups of projects so that all of those projects can achieve some shared benefit. Projects, on the other hand, are about managing the work to achieve some result. A portfolio's strategic goals, a program's shared benefit, and the result of that project add business value to your company.



## Deal with constraints

Portfolio managers need to prioritize work in environments with limited resources, budgets, risk tolerance, and many other constraints that set up the environment for their portfolio's success. Program managers need to manage groups of projects that are being produced by the same resource pool or from the same budget. Project managers often have predefined schedules, resource constraints, and scope requirements to manage. All three need to use the processes, tools, and techniques that have worked for other managers to balance all of the constraints in their business environments.

# Portfolios, programs, and projects all use charters

All of the work you do to initiate, plan, execute, control, and close your project helps your program and portfolio managers understand how your project is doing and keep it on track. Following all of the processes in the *PMBOK Guide* will ensure that the programs and portfolios of which your project is a part always know how you're doing and what you'll accomplish. While there are many differences in the documents that are used in portfolio and program management, all three use a **charter** to define their objectives.

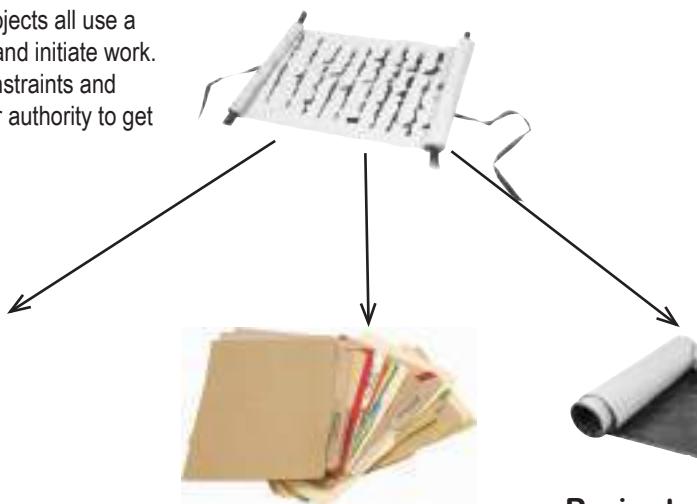
## Charter

Portfolios, programs, and projects all use a charter to define their goals and initiate work. A charter lists any known constraints and goals and gives the manager authority to get the work started.



### Portfolio charter

A portfolio charter will lay out the strategic benefits that a portfolio is going to accomplish. It will list all of the programs and projects included in the portfolio.



### Program charter

A program charter will define the shared benefit that the program is achieving as well as the list of projects it includes.



### Project charter

A project charter gives a project description, summary schedule, and business case, and assigns a project manager.

We'll talk about the project charter in depth in Chapter 4.

While the charter is used in projects, programs, and portfolios, you really only need to focus on the project charter for the exam. We'll spend a lot of time on the project charter later in the book.



## Projects, Programs, and Portfolios Way Up Close

Let's take a look at a charter for a portfolio, a program, and a project for a software company called Ranch Hand Games to get a better understanding of how they break down.

### Ranch Hand Games: Portfolio Charter

#### Project Description: *The Online Gaming Portfolio*

Market research shows that console gaming and PC gaming will not increase as fast as the online market in the coming fiscal year. Ranch Hand has launched a number of programs to target the online gaming market and increase our market share by 10% in the next 15 months.

The following programs and projects are part of this portfolio:

#### Programs:

- Online Arcade Program
- Online Gaming Sales and Marketing Campaign
- Server Upgrade Program
- Online Store Program

#### Projects:

- Cows Gone Wild II
- Zarthak and the Flugelhorn

A portfolio manager will monitor the combined performance of all of the programs and projects to evaluate how the portfolio is doing.

### Ranch Hand Games: Program Charter

#### Project Description: *The Online Arcade Program*

This is a targeted rewrite of all of our early games from the late 1980s and early 1990s for the online gaming market. All of these products will be released at the same time to coincide with a major trade show. Since many of these games were created using shared code, they'll need to be managed together to make configuration management easier and coordinate development activities.

#### Projects:

Portfolios contain both programs and projects.

You can tell if this project succeeds if the requirements are met and the product is high quality.

Your project sponsor provided the charter. We'll learn more about sponsors and charters in Chapter 4.

### Ranch Hand Games: Project Charter

#### Project Description: *Cows Gone Wild II*

This is a follow-up to the hugely successful Cows Gone Wild title. It will include an online gaming component and is part of the Online Gaming portfolio.

#### Project Requirements:

- Must allow for up to eight online players per team
- Real-time text and voice communication between players
- Faster, more realistic graphics rendering
- New characters and scenery

#### Summary Milestone Schedule

Requirements complete	Mar 4
Code complete	Jun 1
Alpha release for internal testing	Jun 20
Beta release for external testing	Aug 31
General release	Nov 15

This program needs to be managed because all of the projects in it share code. If the projects were all managed independently, there would be time and effort wasted on all of the project teams trying to coordinate with one another.



You'll need to know the difference between a portfolio, a program, and a project on the exam. Which one of those does each story below describe?

A consulting company wanted to increase the amount of billable time for each consultant, so it started several company-wide programs to help consultants to get more productivity out of each year.

A university wanted to build admissions websites for all of its departments. It realized that all of the sites would be feeding into the same registration interface and decided to manage all of them together in order to save time.

A company wanted to switch from a paper-based Human Resources group to a software-based one. It spent some time looking into the best software packages for the job, and decided to manage all of the HR functions together since it needed the same people to help with all of the work.

A company wanted to build a better reporting interface so that it could have more accurate data on year-end goals.

A software game company wanted to build up its online presence. It started several marketing and sales initiatives, created some new games, and rewrote some old ones in order to reach more gamers online.

A construction company bid on several parking garage projects at the same time. It won one of the bids, and built the garage a month under schedule and \$5,000 under budget.



You'll need to know the difference between a portfolio, a program, and a project on the exam. Which one of those does each story below describe?

A consulting company wanted to increase the amount of billable time for each consultant, so it started several company-wide programs to help consultants to get more productivity out of each year.

### **Portfolio**

A company wanted to switch from a paper-based Human Resources group to a software-based one. It spent some time looking into the best software packages for the job, and decided to manage all of the HR functions together since it needed the same people to help with all of the work.

### **Program**

A software game company wanted to build up its online presence. It started several marketing and sales initiatives, created some new games, and rewrote some old ones in order to reach more gamers online.

### **Portfolio**

A university wanted to build admissions websites for all of its departments. It realized that all of the sites would be feeding into the same registration interface and decided to manage all of them together in order to save time.

### **Program**

A company wanted to build a better reporting interface so that it could have more accurate data on year-end goals.

### **Project**

A construction company bid on several parking garage projects at the same time. It won one of the bids, and built the garage a month under schedule and \$5,000 under budget.

### **Project**

# What a project IS...

## Temporary

Projects always have a start and a finish. They start when you decide what you are going to do, and they end when you've created the product or service you set out to create. Sometimes they end because you decide to stop doing the project. But they are never ongoing.

Operations are ongoing. If you're building cars on an assembly line, that's an operation. If you're designing and building a prototype of a specific car model, that's a project.

## Creating a unique result

When you create the product of your project, it is measurable. If you start a project to create a piece of software or build a building, you can tell that software or that building from any other one that has been produced.

You might also see the word "process" instead of "operation." A team might run a project to build software, but the company might have an ongoing process for keeping the servers that run the software from going down. In fact, the group that keeps those servers running is often called "IT Operations." Get it?

## Progressively elaborated

You learn more and more about a project as it goes on. When you start, you have goals and a plan, but there is always new information to deal with as your project progresses, and you'll always have to make decisions to keep it on track. While you do your best to plan for everything that will happen, you know that you will keep learning more about your project as you go.

# ... and what a project is NOT

Projects are NOT: always strategic or critical

Projects are NOT: ongoing operations (or processes)

Projects are NOT: always successful



Which of these scenarios are operations, and which are projects?

1. Building an extension on a house

Operation

Project

7. Knitting a scarf

Operation

Project

2. Shelving books at the library

Operation

Project

8. Making a birdhouse

Operation

Project

3. Baking a wedding cake

Operation

Project

9. Changing your air filters every six months

Operation

Project

4. Stapling programs for a play

Operation

Project

10. Running an assembly line in a toy factory

Operation

Project

5. Watering your plants twice a week

Operation

Project

11. Organizing a large conference

Operation

Project

6. Walking the dog every day

Operation

Project

12. Going to the gym three times a week

Operation

Project

→ Answers on page 20.

## BULLET POINTS: AIMING FOR THE EXAM

- **Knowledge, performance, and personal skills** are the three areas that project managers focus on to get better at their jobs.
- A **project charter** is a document that describes a project's requirements and high-level schedule, assigns a project manager, and authorizes the project.
- A **program** is a collection of projects that should be managed together in order to achieve a specific goal or benefit to the company.
- A **portfolio** is a collection of projects or programs.
- A **project** gathers a team together to do work that's **temporary**, creates a **unique result**, and is **progressively elaborated**.
- An **operation** (or **process**) is work that's done in a way that's repeatable and ongoing, but is not a project.

# A day in the life of a project manager

You probably already know a lot of what a project manager does: gets a project from concept to completed product. Usually a project manager works with a team of people to get the work done. And PMs don't usually know a lot about the project when they start. When you think about it, you can categorize pretty much everything a project manager does every day into three categories.



## Gather product requirements

Being a project manager almost always means figuring out what you're going to build. It's one of the first things you do when you start to plan the project! But as you go, you are always learning more and more. Sometimes that can mean changes to your product, while other times it's just more detail on what you already knew.

*One of the most important stakeholders is the sponsor. That's the person who provides financial and political support for the project.*



## Manage stakeholder expectations

There are a lot of people involved in making most projects happen: the team that actually does the work, the people who pay for it, everybody who will use the product when you're done, and everybody who might be impacted by the project along the way. Those people are called your **stakeholders**. And a big part of the PM's job is communicating with everybody and making sure their needs are met.

*You'll need to use your interpersonal skills to keep everyone on the same page.*

## Deal with project constraints

Sometimes there will be **constraints** on the project that you'll need to deal with. You might start a project and be told that it can't cost more than \$200,000. Or it absolutely MUST be done by the trade show in May. Or you can do it only if you can get one specific programmer to do the work. Or there's a good chance that a competitor will beat you to it if you don't plan it well. It's constraints like these that make the job more challenging, but it's all in a day's work for a project manager.

Even though you're constantly gathering requirements, managing stakeholders, and working within constraints, different situations can call for different tools for dealing with all of those challenges. When you think about it, all of the tools and techniques that are discussed in the *PMBOK Guide* are there to help you do those three things at different points in your project's lifecycle. That's why the *PMBOK Guide* divides up the work you do on a project into the five process groups. The groups help you organize all of the work you do as your project progresses and keep your role in the project straight.

*You'll learn all about the process groups in Chapter 3!*





Which of these scenarios are operations, and which are projects?

1. Building an extension on a house

Operation



Project

2. Shelving books at the library

Operation



Project

3. Baking a wedding cake

Operation



Project

4. Stapling programs for a play

Operation



Project

5. Watering your plants twice a week

Operation



Project

6. Walking the dog every day

Operation



Project

7. Knitting a scarf

Operation



Project

8. Making a birdhouse

Operation



Project

9. Changing your air filters every six months

Operation



Project

10. Running an assembly line in a toy factory

Operation



Project

11. Organizing a large conference

Operation



Project

12. Going to the gym three times a week

Operation



Project

## there are no Dumb Questions

**Q:** Do project constraints just mean restrictions on time and cost?

**A:** No. A project constraint is any limitation that's placed on your project before you start doing the work. It's true that project managers are really familiar with time and cost constraints, because those are really common. But there are lots of other kinds of constraints, too.

Here's an example. Let's say that some of your team members won't be available for three weeks because they have to attend a

mandatory training session. That's called a **resource constraint**, because some of your project resources (people you need) are restricted.

There are lots of other kinds of constraints, too: risk constraints, scope constraints, and quality constraints.

**Q:** Wait a minute—a quality constraint? Shouldn't I always run my project to build high-quality products?

**A:** Of course. But quality is more important for some projects than it is for

others, and as a project manager, you need to be realistic about it.

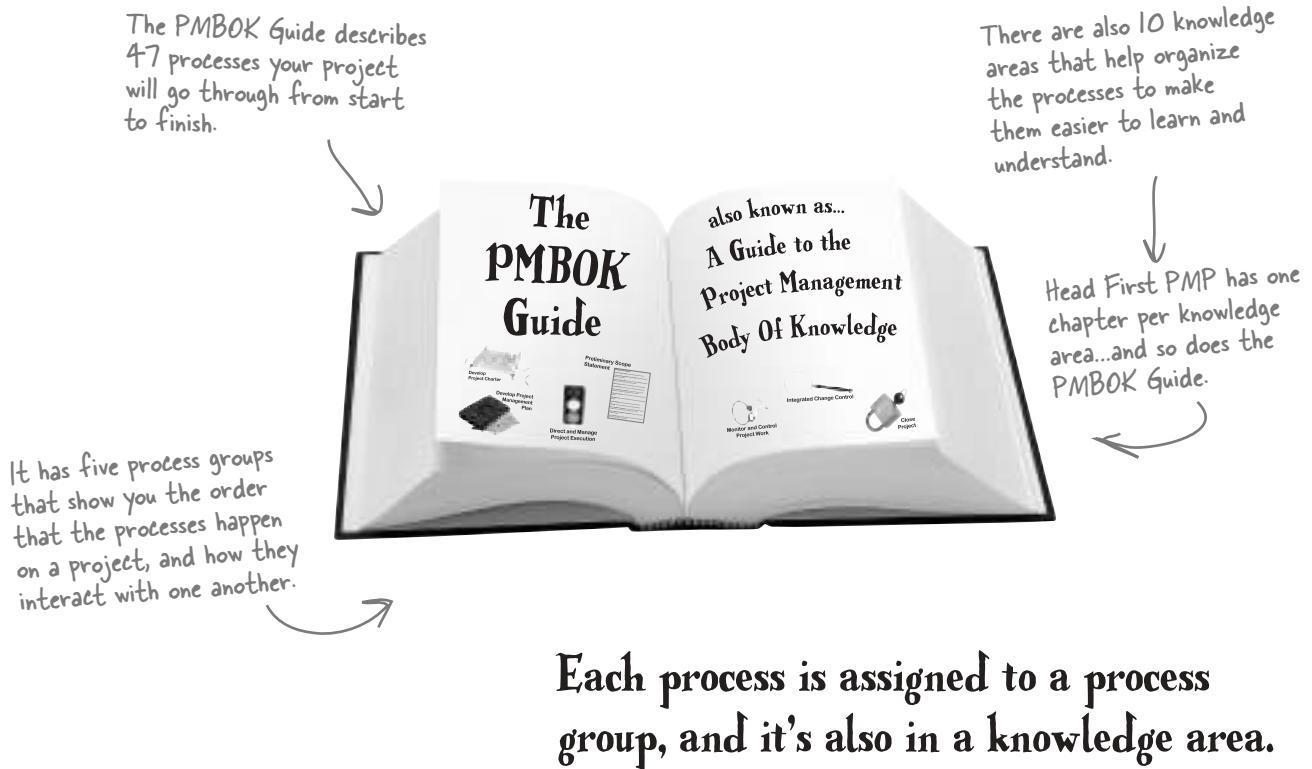
If you're running a project to build a playground, quality is important. You don't want to build unsafe playground equipment, because children could get hurt. Does that mean that you spend the highest possible portion of your budget on quality? Take a minute and think about how you'd approach quality for that project, as compared to, say, a project to build a heart monitor for a medical device company. It's likely that quality is a much more important constraint for the heart monitor than it is for the playground.

# How project managers run great projects

There are plenty of ways that you can run a project; people have been running projects for about as long as civilization has been around. But some project managers run their projects really effectively, while others consistently come in late, over budget, and with poor quality. So what makes the difference between a great project and one that faces challenges?

That's exactly the question that the folks at the Project Management Institute asked when they started putting together their *Guide to the Project Management Body of Knowledge*. They surveyed thousands of project managers and analyzed tens of thousands of successful and unsuccessful projects to come up with a structured way of thinking about how to effectively run a project.

One goal of the *PMBOK Guide* is to give you a repeatable way to run your projects. It does so by breaking the work down into 47 processes that describe different, specific kinds of work that project managers do. To help you understand how those processes fit together, they came up with two different ways to think about them. Each process falls into one of the five process groups, which tell you the sequence that the processes are performed on a project. But the *PMBOK Guide* is also a tool for organizing knowledge about project management, so each process also falls into one of 10 knowledge areas. The *PMBOK Guide* is organized around these knowledge areas...and so is this book!



# Project management offices help you do a good job, every time

Every project your company completes can teach you a lot about what works and what doesn't within your company's culture. **Project management offices**

(PMOs) help you to learn from all of the work that's been done in the past. They'll give you the templates and the guidance you need to make sure your project takes the right approach and makes sense to everyone you work with. There are three different kinds of PMOs that you might run into in your career.



## Supportive

PMOs that play a supportive role provide all of the templates you need to fill out while your project is under way. They'll lay out the standards for how you should communicate your project's scope, resources, schedule, and status as your project progresses from its initial stages through to delivery and closing.

## Controlling

PMOs that control the way project management is done in a company will be able to check that you're following the processes they prescribe. Like supportive PMOs, they'll tell you what templates you should fill out and prescribe a framework for doing project management in your company. They'll also periodically review the work that you're doing on your project to make sure you're following their guidelines.



## Directive

PMOs that take a directive approach actually provide project managers to project teams. In a directive PMO, the project manager usually reports to the PMO directly. That reporting structure makes sure that the project managers follow the frameworks and templates prescribed by the PMO, because their job performance depends on it.

Directive  
PMOs have a  
lot of control  
over the way  
things are done  
on projects.

# Good leadership helps the team work together

It's not enough to have a good plan and all the resources you need to make your project a success. You need to think about your **interpersonal skills** if you want to keep your project on track. Here are a few examples:

## Leadership

A good leader gets the team to see the end goal and focus on getting there. With the right leadership, team members feel like they can take control of the work they're doing, and make good decisions to help the team achieve its goals as directly as possible.

## Team building and trust

### building

Everything you do to help team members feel like they can rely on one another is part of team building. When a team feels like they're all working together to achieve the project's goals, they're able to do so much more than each of them can do individually. Trust building is all about sharing information with all of your stakeholders so that they know they can trust one another.



## Motivation

Some people are motivated by the kind of work they do, some are looking for experience that will help their résumés, and others are hoping for a promotion or a pay raise. Understanding what motivates your team members and helping them to achieve their personal goals will help your project, too.

Some teams can be so motivated by the value of the project that their personal goals are secondary to making the project a success. When that happens, they can be really productive as a team.



# Project teams are made of people

Keeping your team motivated and helping them to feel included are just a couple of the interpersonal skills that make your project a success. You also need to help your team members work through problems and maintain an environment where it's easy for everyone to get along. Here are a few more **interpersonal skills** that a good project manager uses to keep the team on track:

## Influencing

Sometimes you need to collaborate with others to get your work done. When you influence people, you focus on the shared benefit of the work with them and share power toward a common goal. You're probably using your influence to make things happen every day on the job.

↑  
You usually can't just tell people to do what you want and have them do it.

## Conflict management

When people work together, there will always be disagreements. A good project manager works to find positive solutions when conflicts pop up.

↑  
We'll talk more about conflict management in Chapter 13.

There are a few more interpersonal skills discussed in the PMBOK Guide that we'll talk about along the way:

- \* Communication (Chapter 10 is all about communication).
- \* Negotiation and decision making (we'll talk more about those in Chapter 9).

## Coaching

As the people on your team grow and take on new responsibilities, they might want some help developing new skills. That's where coaching comes in. When you coach people, you help them develop their skills and get better at what they do. Sometimes this means helping them find training, while other times it's just acting as a sounding board to help your team members sort through the problems they run into.

↑  
A good PM is always looking for ways to help the team get better at what they do.

## Political and cultural awareness

It's important to make sure that everybody on the team feels included. You need to be aware of the topics that might alienate people or make them feel uncomfortable, so that you can maintain an open and inclusive environment on your team.



Can you think of a time when one of these skills helped your team succeed on a past project?

## there are no Dumb Questions

**Q:** Directive and controlling PMOs seem pretty similar to me. What's the difference again?

**A:** That's a good question. Both of them are pretty active in managing the projects they govern, but there are some differences.

Controlling PMOs tend to review the work a project team does at various points in the project to make sure that they are following the company's agreed-upon process. The people who work in the controlling PMO are like auditors who take a look at a project team's work products to make sure they're complying with the company's project management rules.

Directive PMOs actually manages the projects on their own. The people who work in the PMO take on the role of project manager for all of the projects the PMO is responsible for.

**Q:** My company doesn't have a PMO at all. Do the 47 processes apply only to companies that have PMOs? How much of what's in the *PMBOK Guide* applies to plain old project managers who aren't in a PMO?

**A:** Yes! The *PMBOK Guide* is all about project management, and all of the processes it talks about are meant to be used on projects to help them succeed. If your company has a PMO, following the 47 processes will help you work with that PMO. But if you don't have a PMO where you work, it's still good for a project to follow all 47 of them.

**Q:** Does the PMP exam test you on your interpersonal skills?

**A:** Yes. You need to know what all of the interpersonal skills are and when you would use them in managing your project. Interpersonal skills are an important part of

managing a team. If your team members each feel like their opinion is valued and they are motivated to do good work, you'll have a much better chance at success.

**Q:** Hold on, how are team building and coaching different?

**A:** Another good question. Team building usually means going out, having lunch, doing group exercises, and in general socializing as a team so that the group gets more familiar with one another and can have a better internal set of relationships. Coaching is about identifying your team members' talents and helping them develop them.

Say a member of your team is really good at explaining technical concepts to other people. You might want to coach that person to write project documents that will help the whole team understand what they're doing better. That would let the team member get better at using her talent, and also help with team communication.

## Operations management handles the processes that make your company tick

Think about all of the processes your company goes through every day to keep things running smoothly. You probably have worked with operations teams on many of your projects—from accounting departments to support teams to infrastructure teams who maintain software environments. Each operations team is staffed with specialists in the aspect of your company that they run. Sometimes, you’ll work with them to build out parts of your project; sometimes, you’ll depend on them to do work before your project can proceed. Operations teams are almost always stakeholders in your projects.

Operations management will direct, oversee, and control the business processes you work with on your project every day.

You'll learn more about stakeholders when we talk about stakeholder management in Chapter 13.



### Sharpen your pencil

Which kind of project management office is being described?

1. Provides the process documents and templates for your project.

Supportive    Controlling    Directive

2. You meet with them once a month to go over project docs and make sure you’re following the right process.

Supportive    Controlling    Directive

3. Provides a knowledge base of common project problems and lessons learned for you to use.

Supportive    Controlling    Directive

4. A centralized group of project managers who are assigned to manage projects.

Supportive    Controlling    Directive

5. When a project gets started, this group makes sure that they’ve followed all of the initiating processes and have the right approvals to start working.

Supportive    Controlling    Directive

6. When you sit down to do your risk planning for your project, you go to them to find a good example of a risk plan that’s been useful on other projects.

Supportive    Controlling    Directive

7. This team audits your project work at regular intervals to confirm the status reports you’re giving and guide you when you run into trouble.

Supportive    Controlling    Directive

→ Answers on page 28.

A bunch of interpersonal skills, in full costume, are playing a party game called “Who am I?” They’ll give you a clue—you try to guess who they are based on what they say. Assume they always tell the truth about themselves. Fill in the blanks to the right to identify the attendees.

**Any of the charming skills you’ve seen so far just might show up!**



## Name \_\_\_\_\_

I get everybody on the team to understand the goals of the project so that they can get behind them.

---

I work to maintain an open and inclusive environment by paying attention to the things that team members might be sensitive to.

---

I try to figure out what each team member wants out of the project, and then I help him or her get it.

---

I share power with other people in order to get some shared benefit.

---

I help team members get better at doing project work.

---

When arguments or disagreements happen, I try to solve them in a way that benefits the team as much as possible.

---

I help everybody on the team feel like they can rely on one another.

---

I’m transparent with all of the stakeholders in my project so that everyone has all of the information they need to make good decisions.

---

→ Answers on page 29.

## Sharpen your pencil Solution

Which kind of project management office is being described?

1. Provides the process documents and templates for your project.

Supportive    Controlling    Directive

2. You meet with them once a month to go over project docs and make sure you're following the right process.

Supportive    Controlling    Directive

3. Provides a knowledge base of common project problems and lessons learned for you to use.

Supportive    Controlling    Directive

4. A centralized group of project managers who are assigned to manage projects.

Supportive    Controlling    Directive

5. When a project gets started, this group makes sure that the team has followed all of the initiating processes and have the right approvals to start working.

Supportive    Controlling    Directive

6. When you sit down to do your risk planning for your project, you go to them to find a good example of a risk plan that's been useful on other projects.

Supportive    Controlling    Directive

7. This team audits your project work at regular intervals to confirm the status reports you're giving and guide you when you run into trouble.

Supportive    Controlling    Directive

It's true that all of the types of PMOs provide process documents, but only the supportive PMO provides them as its main function.

A bunch of interpersonal skills, in full costume, are playing a party game called “Who am I?” They’ll give you a clue—you try to guess who they are based on what they say. Assume they always tell the truth about themselves. Fill in the blanks to the right to identify the attendees.

**Any of the charming skills you’ve seen so far just might show up!**



I get everybody on the team to understand the goals of the project so that they can get behind them.

I work to maintain an open and inclusive environment by paying attention to the things that team members might be sensitive to.

I try to figure out what each team member wants out of the project and then I help him or her get it.

I share power with other people in order to get some shared benefit.

I help team members get better at doing project work.

When arguments or disagreements happen, I try to solve them in a way that benefits the team as much as possible.

I help everybody on the team feel like they can rely on one another.

I’m transparent with all of the stakeholders in my project so that everyone has all of the information they need to make good decisions.

**Name**

**Leadership**

**Political and cultural awareness**

**Motivation**

**Influencing**

**Coaching**

**Conflict resolution**

**Team building**

**Trust building**

## A PMP certification is more than just passing a test

Getting your PMP certification means that you have the knowledge to solve most common project problems.

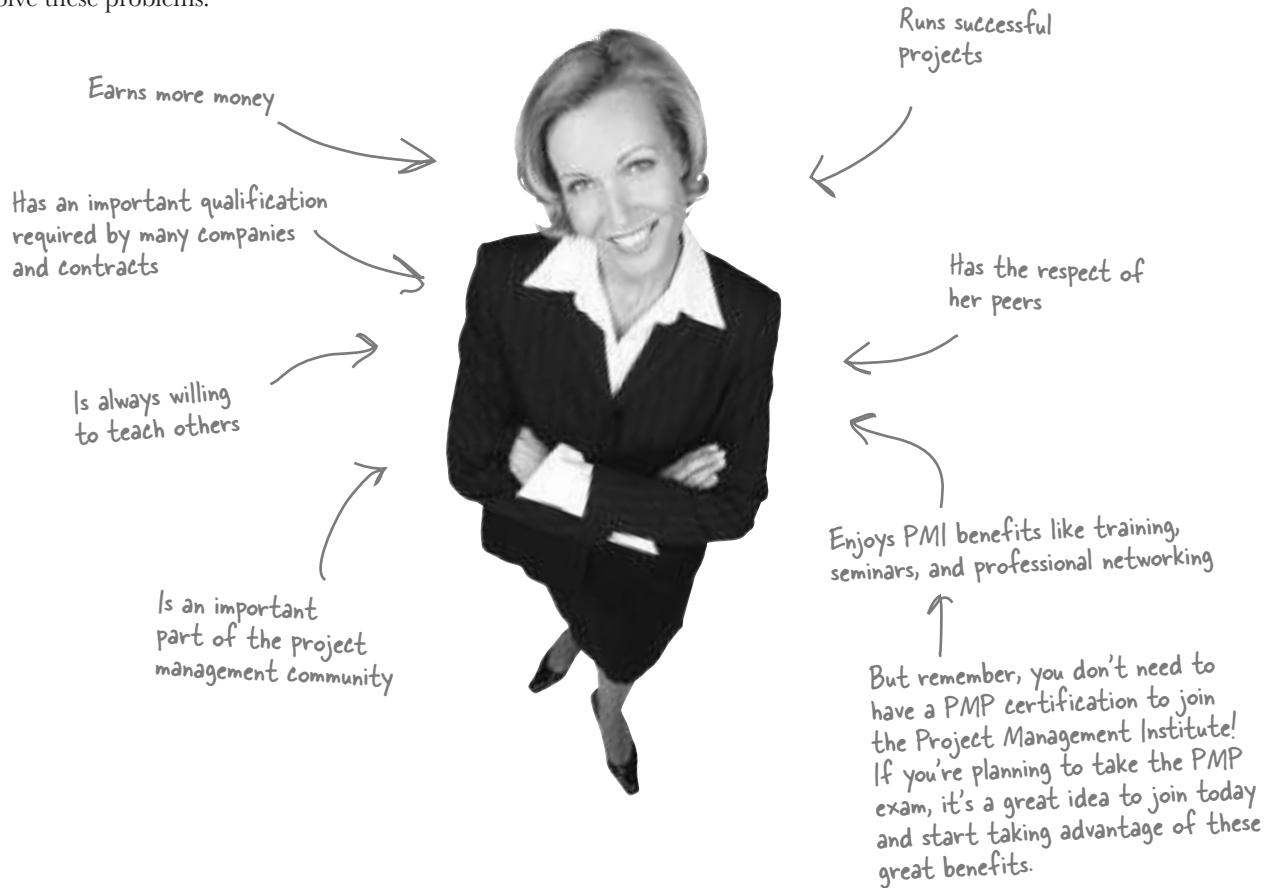
It proves that you know your stuff.

Once you're certified, your projects are more likely to succeed because:

you have the skills and knowledge to make them successful.

## Meet a real-life PMP-certified project manager

PMs have demonstrated that they understand the tools it takes to be successful at leading projects. They know what it means to juggle their project priorities and still have their projects come out on top. Being certified doesn't mean you won't have problems on your projects anymore, but it does mean that you'll have the wisdom of many experienced and smart project managers behind you when you make decisions about how to solve these problems.



## This could be YOU!

## Exam Questions

---

1. Which of the following is NOT a type of project management office?

- A. Directive
- B. Value-driven
- C. Supportive
- D. Controlling

2. Which of the following is NOT a characteristic of a project?

- A. Temporary
- B. Strategic
- C. Specific result
- D. Progressively elaborated

3. An energy company is investing in a series of initiatives to look for alternative energy sources so that the company can be competitive in 10 years. The initiatives are tracked and managed together because this goal is vital to the success of the company. This is an example of:

- A. A portfolio
- B. A program
- C. A project
- D. A enterprise environmental factor

4. Which of the following is NOT a responsibility of a project manager?

- A. Managing stakeholder expectations
- B. Managing project constraints
- C. Gathering product requirements
- D. Sponsoring the project

5. Which of the following is NOT an interpersonal skill?

- A. Motivation
- B. Brainstorming
- C. Team building
- D. Coaching

## Exam Questions

6. Which of the following is NOT true about interpersonal skills?

- A. Coaching means helping your team to get more exercise.
- B. Motivation means helping team members get what they want out of the project.
- C. Influencing means sharing power with people to get something done.
- D. Conflict management means finding positive solutions to conflicts during the project.

7. Which of the following is NOT true about portfolio management?

- A. The portfolio manager judges the success of the portfolio by combining data from all of its programs and projects.
- B. A portfolio can contain projects and programs.
- C. A portfolio is organized around a business goal.
- D. A portfolio is always a group of programs.

8. You're managing a project to remodel a kitchen. You use earned value calculations to figure out that you're going to run \$500 over budget if your project continues at the current rate. Which of the following core characteristics of a project manager are you using to find the problem?

- A. Knowledge
- B. Performance
- C. Personal
- D. None of the above

9. At the beginning of a project, a software team project manager is given a schedule with everyone's vacations on it. She realizes that because the software will be delivered to the QA team exactly when they have overlapping vacations, there is a serious risk of quality problems, because there won't be anyone to test the software before it goes into production. What BEST describes the constraint this places on the project?

- A. Quality constraint
- B. Time constraint
- C. Resource constraint
- D. Risk constraint

10. A project manager is having trouble with his project because one of his team members is not performing, which is causing him to miss an important date he promised to a stakeholder. He discovers that the team member knew about the project problem, but didn't tell him because the team members are all afraid of his bad temper. Which BEST describes how the project manager can avoid this situation in the future?

- A. Increasing his knowledge of the PMBOK Guide
- B. Measuring personal performance
- C. Improving his personal skills
- D. Managing stakeholder expectations

# ~~Exam Questions~~

## 1. Answer: B

Although PMOs are usually value-driven, that's not a valid type of PMO. The three types of PMOs are supportive, controlling, and directive. Supportive PMOs provide templates and guidelines for running projects, controlling PMOs audit projects to ensure adherence to processes and standards, and directive PMOs provide project managers to manage projects.

## 2. Answer: B

A project doesn't have to be strategic or critical. It only needs to be temporary, have a specific result, and be progressively elaborated.

 Look out for questions like this one on the exam. Common sense might tell you that a project should be important for a company to want to do it, but that's not what the question is asking.

## 3. Answer: A

Since the initiatives are being managed together because of a strategic business goal, you can tell that this is a portfolio.

 Portfolios are organized around business goals, and programs are organized around a shared benefit in managing them together.

## 4. Answer: D

The sponsor is the person who pays for the project. The project manager doesn't usually play that role.

In fact, you'll learn more about its role in defining

## 5. Answer: B

 project requirements in a couple of chapters.

Brainstorming is an activity that you do with other people, but it's not an interpersonal skill that you need to hone to help manage all of the stakeholders on your project.

## 6. Answer: A

Coaching is really about helping your team members to get better at what they do. Anything you do to challenge them to develop their skills is coaching.

## 7. Answer: D

Since a portfolio can be a group of programs and projects, option D is the one that's not true. It can be a group of programs, but it doesn't *have to be*.

*Answers*

## ~~Exam Questions~~

### 8. Answer: A

Your knowledge of earned value management techniques is how you can predict that the project will be over budget. Knowing that could help you plan ahead to avoid further cost overruns. Minimally, it can help you to reset expectations with your stakeholders so they have a better idea of what's coming.

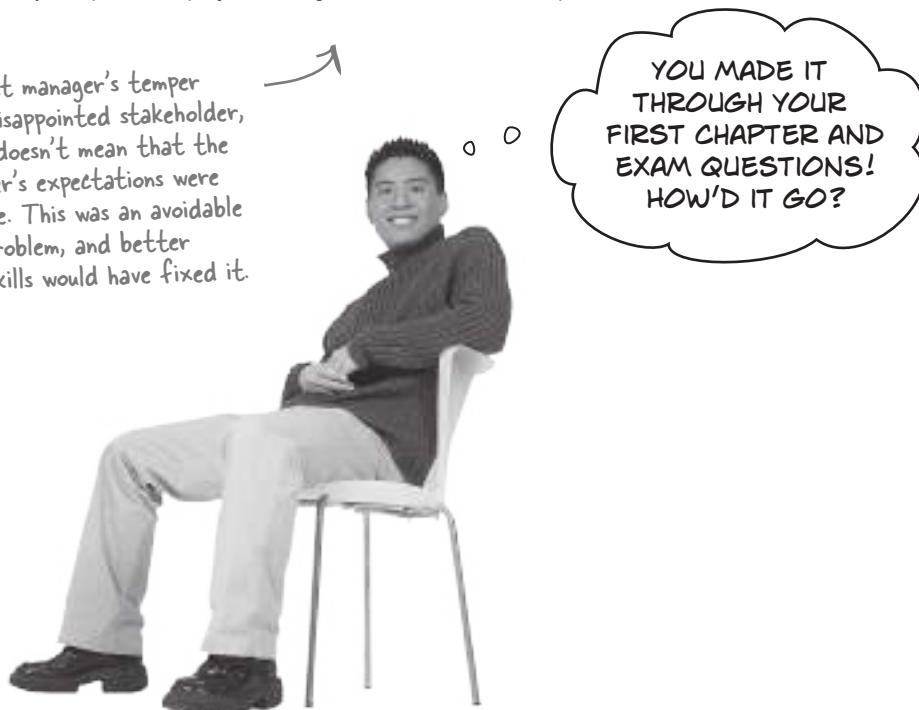
### 9. Answer: C

This is a resource constraint, because the project manager's resources—in this case, the people who will be testing the software—are not going to be available to her when she needs them. Yes, this will cause problems with the quality, introduce risks, and cause schedule problems. But they're not schedule, time, or risk constraints, because there's no outside limitation placed on the project quality, schedule, or risks. The only outside limitation is the resource availability. If they were available, there wouldn't be a problem!

### 10. Answer: C

The way that the project manager interacts with the people on his team interfered with his work getting done. This is a good example of how a lack of personal skills can lead directly to major project problems down the line, and it's why this particular project manager needs to work on his personal skills.

The project manager's temper led to a disappointed stakeholder, but that doesn't mean that the stakeholder's expectations were out of line. This was an avoidable project problem, and better personal skills would have fixed it.





## 2 Organizations, constraints, and projects

### *In good company*



**If you want something done right...better hope you're in the right kind of organization.** All projects are about teamwork—but how your team works depends a lot on the type of organization you're in. In this chapter, you'll learn about the different types of organizations around—and which type you should look for the next time you need a new job.

## A day in Kate's life

**Morning**

WE JUST FINISHED  
TESTING, AND THE  
PRODUCT SHOULD BE  
READY TO GO TO TEST ON  
SCHEDULE.



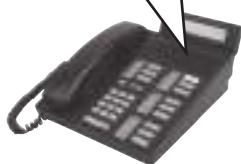
**Lunch time**

WE'RE HALFWAY  
DONE UPDATING THE  
USER MANUAL.



**Afternoon**

THE WEBSITE  
NEEDS NEW  
GRAPHICS.



This is Kate's job—writing status  
reports.

### Status Report

#### Programming

"We just finished testing, and the product should be  
ready to go to test on schedule."

#### Tech Writing

"We're halfway done updating the user manual."

#### Information Systems

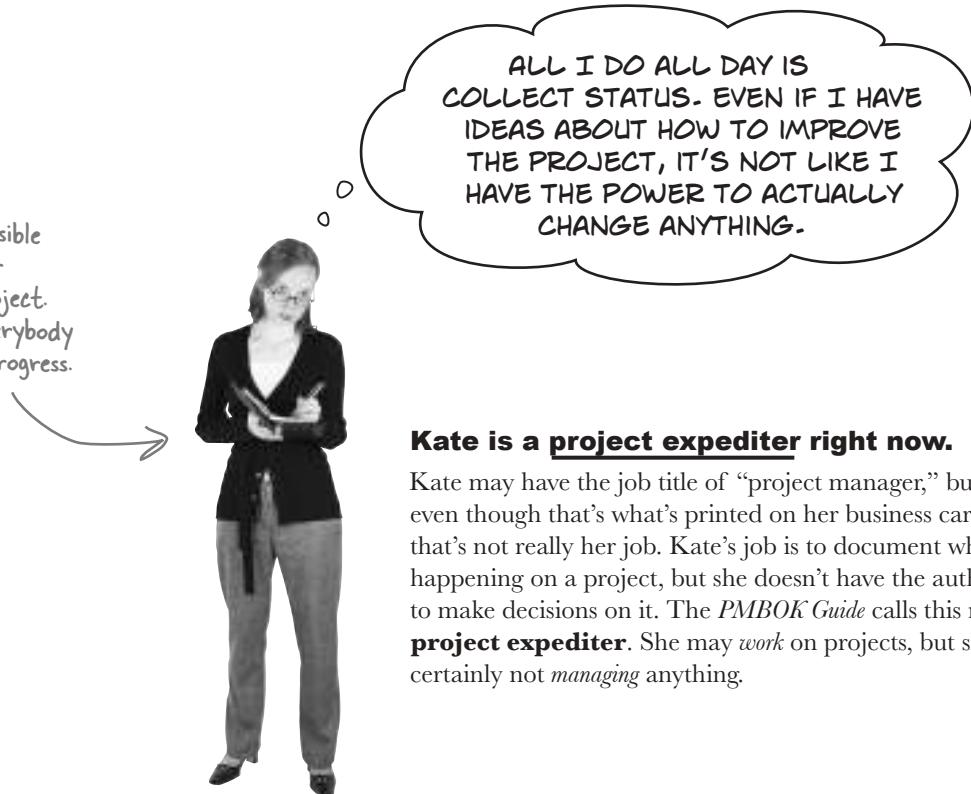
"The website needs new graphics."

All Kate does all day is document  
what people say in status meetings.

## Kate wants a new job

Now that she's working on getting her PMP certification, Kate's learning a whole load of new skills. And she's even started to look for a new job—one where she does more than write down what other people say all day...

Kate's not responsible  
for the success or  
failure of her project.  
She just keeps everybody  
informed of its progress.



### **Kate is a project expediter right now.**

Kate may have the job title of “project manager,” but even though that’s what’s printed on her business cards, that’s not really her job. Kate’s job is to document what’s happening on a project, but she doesn’t have the authority to make decisions on it. The *PMBOK Guide* calls this role a **project expediter**. She may *work* on projects, but she’s certainly not *managing* anything.



When Kate checks out Monster.com, what types of things do you think she should look for in a new organization?



Kate spilled a hot cup of Starbuzz half-caf nonfat latte on her job-hunting checklist. Can you match the notes she scribbled at the bottom of the page to what's covered up by coffee stains?

**Job Hunting Checklist**

- I should have \_\_\_\_\_ my projects
- I am allowed to \_\_\_\_\_ to people
- on my project team
- I am in control of my project's \_\_\_\_\_
- I focus on \_\_\_\_\_ projects, not \_\_\_\_\_ tasks
- I shouldn't spend my whole day \_\_\_\_\_
- I can assign \_\_\_\_\_ to my \_\_\_\_\_ without having to \_\_\_\_\_ with \_\_\_\_\_ their bosses.

filing stuff  
managing  
work authority over  
budget  
irrelevant

project team  
clear it  
assign work

→ Answers on page 62.



What would **you** look for in your perfect job? Does your wish list look anything like Kate's?



## Organization Magnets

In a **functional organization**, which is what Kate works in, project managers don't have the authority to make major decisions on projects. **Projectized organizations**, on the other hand, give all of the authority to the PM.

Can you work out which description goes with which organization type?

### Functional organization

1. ....

2. ....

3. ....

In a functional organization, the teams working on the project don't report directly to the PM. Instead, the teams are in departments, and the project manager needs to "borrow" them for the project.



### Projectized organization

1. ....

2. ....

3. ....

In this kind of company, the team reports to the project manager, who has a lot more authority.



Teams are organized around projects.

Project managers estimate and track budget and schedule.

PMs don't set the budget.

Project managers choose the team members, and release them when the project is over.

PMs spend half their time doing admin tasks.

Project managers need to clear major decisions with department managers.

→ Answers on page 63.

# There are different types of organizations

Kate's got three major options when looking at the kinds of organizations she can work for. **Functional organizations** are set up to give authority to functional managers, **projectized organizations** give it to the PM, and **matrix organizations** share responsibility and authority between the two.



## Functional

In this kind of organization, the project team members always report to a functional manager who calls all the shots.



- Project management decisions need to be cleared with functional managers.
- Project managers are assistants to the functional managers in getting the work done.
- Project managers spend a lot of time doing administrative tasks and often only work as PMs part of the time.
- You're likely to find project expediteres in functional organizations.



All of the project work typically happens within a particular department, and that department's manager is completely in charge of everything.

## Weak Matrix



- PMs have some authority, but they aren't in charge of the resources on a project.
- Major decisions still need to be made with the functional manager's cooperation or approval.
- Project expediteres (like Kate) and project coordinators can work in weak matrix organizations, too.



Project coordinators are like expediteres, except that coordinators typically report to higher-level managers and have some decision-making ability. Expediteres have no authority at all.

## Balanced Matrix

## Matrix organizations



- Project managers share authority with the functional managers.
- PMs run their people-management decisions by the functional manager, but the functional manager runs his project decisions by the PM, too.



Folks who work in a balanced matrix organization report to a project manager AND a functional manager equally.

# The project manager has the most authority and power in a projectized organization.



## Strong Matrix

For the PMP exam, most questions assume that you work in a matrix organization unless they say otherwise.

- Project managers have more authority than functional managers, but the team still reports to both managers.
- The team might be judged based on performance on their projects, as well as on their functional expertise. In a strong matrix, delivery of the project is most important.

## Projectized

If you've worked with a contractor or consulting company, they are usually organized like this.

Teams are organized around projects. When a project is done, the team is released, and the team members move on to another project.

The project manager makes all of the decisions about a project's budget, schedule, quality, and resources.

The PM is responsible for the success or failure of the project.

WAIT A  
SECOND. NOT ALL  
COMPANIES WILL FIT  
INTO ONE OF THESE FIVE  
CATEGORIES, WILL THEY?



### Good point.

Sometimes companies will use multiple organization types to get different kinds of projects done. Those organizations are called **composite organizations**.

## there are no Dumb Questions

**Q:** I'm still not clear on the difference between a project coordinator and a project expediter.

**A:** They're actually pretty similar. A project expediter is somebody who keeps track of status but has no decision-making authority on a project at all. A project coordinator is someone who does pretty much the same thing, but does get to make some of the minor decisions on the project without having to run them by the functional manager. Coordinators usually report to somebody who is pretty high up in the organization, while expeditors are more like assistants to the functional manager. Both of them usually exist in weak-matrix or functional organizations.

**Q:** What's the difference between the way teams are run in a functional organization and a projectized one?

**A:** Think of a major bookkeeping project being run by the Admin department. Usually the head of Admin is the one who is ultimately responsible for what happens to it. If a project manager is called in to help out, she's just there to keep things straight for the Admin department manager. The team is made up of people who already report to the Admin manager, so nobody questions his authority. That's an example of a functional organization.

Contrast that with the way the bookkeeping project would be run if a consulting company that specialized in bookkeeping were contracted to do it. The company would assemble a team of bookkeepers and

assign a project manager to lead them. When the project was over, the team would dissolve, and the team members would go join other teams working for other project managers. That's how a projectized organization works. The team is organized around a project and not around a job function.

**Q:** Can I be an effective PM in a functional organization?

**A:** Since project managers don't have much authority in a functional organization, it's hard to have as much impact in a functional organization as you would in a matrixed or projectized one.

Of course, you can be good at your job in any kind of organization. But, for your company to really get the most out of having project managers on staff, it really pays for it to look into changing the way it balances power. The project managers who are accountable for project success or failure should also have the chance to influence the team, budget, and schedule for those projects.

**Q:** Does the PMP exam favor any kind of organization?

**A:** When you're taking the PMP exam, if you see a question that mentions a PM, then you should assume that the question is asking about a matrix organization if it doesn't say up front which kind of organization is being described. Functional organizations are usually painted in a negative light because they tend to give less authority to project managers.



### BULLET POINTS: AIMING FOR THE EXAM

- Functional managers have all the power in a functional organization. Project managers have the power in a projectized organization.
- If a question on the exam doesn't state an organization type, assume it's referring to a matrix organization. That means the PM is responsible for making budgets, assigning tasks to resources, and resolving conflicts.
- Project coordinators and expeditors don't exist in a projectized organization.
- A project expediter keeps track of project status only. A project coordinator has some authority, and usually reports to someone higher up in the company. Neither role has as much power or authority as a real project manager, even though expeditors or coordinators may have "Project Manager" printed on their business cards.



Here are a few excerpts from some of Kate's job interviews. Can you figure out what kind of organization each interviewer is representing?

**Interviewer #1:** We're looking for someone who can work with our development manager to deliver our products on time. We have a good programming team; they just need a little encouragement to meet their deadlines. You'll be expected to keep really good status meeting notes. If you run into any trouble with the team, just kick it back to the Dev Manager, and she'll address the problem.

- Functional     Matrix     Projectized

**Interviewer #2:** We need someone who can manage the whole effort, start to finish. You'll need to work with the client to establish goals, choose the team, estimate time and cost, manage and track all of your decisions, and make sure you keep everybody in the loop on what's going on. We expect the project to last six months.

- Functional     Matrix     Projectized

**Interviewer #3:** We have a project coming up that's needed by our customer service team. The project is a real technical challenge for us, so we've assembled a team of top-notch programmers to come up with a good solution. We need a project manager to work with the programming manager on this one. You would be responsible for the schedule, the budget, and managing the deliverables. The programming manager would have the personnel responsibilities.

- Functional     Matrix     Projectized

**Interviewer #4:** Most of the work you'll be doing is contract work. You'll put together three different teams of software engineers, and you'll need to make sure that they build everything our customer needs. And don't forget: you've got to stay within budget, and it's got to be done on time! It's a big job, and it's your neck on the line if things go wrong. Can you handle that?

- Functional     Matrix     Projectized



Here are a few excerpts from some of Kate's job interviews. Can you figure out what kind of organization each interviewer is representing?

**Interviewer #1:** We're looking for someone who can work with our development manager to deliver our products on time. We have a good programming team; they just need a little encouragement to meet their deadlines. You'll be expected to keep really good status meeting notes. If you run into any trouble with the team, just kick it back to the Dev Manager, and she'll address the problem.

- Functional     Matrix     Projectized

This is just like the job Kate wants to leave. Just gathering status sounds pretty boring.

**Interviewer #2:** We need someone who can manage the whole effort, start to finish. You'll need to work with the client to establish goals, choose the team, estimate time and cost, manage and track all of your decisions, and make sure you keep everybody in the loop on what's going on. We expect the project to last six months.

- Functional     Matrix     Projectized

Everybody moves from project to project in this organization.

**Interviewer #3:** We have a project coming up that's needed by our customer service team. The project is a real technical challenge for us, so we've assembled a team of top-notch programmers to come up with a good solution. We need a project manager to work with the programming manager on this one. You would be responsible for the schedule, the budget, and managing the deliverables. The programming manager would have the personnel responsibilities.

- Functional     Matrix     Projectized

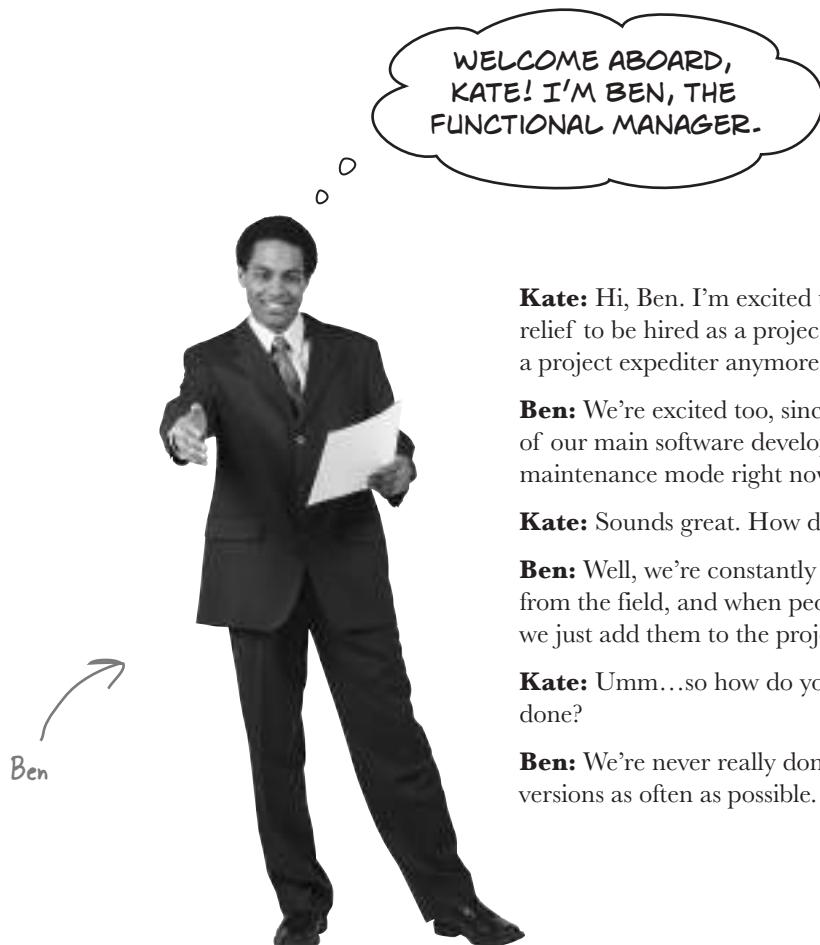
Shared authority between the PM and the functional manager.

**Interviewer #4:** Most of the work you'll be doing is contract work. You'll put together three different teams of software engineers, and you'll need to make sure that they build everything our customer needs. And don't forget: you've got to stay within budget, and it's got to be done on time! It's a big job, and it's your neck on the line if things go wrong. Can you handle that?

- Functional     Matrix     Projectized

Most contractors are projectized: the PM builds the team and makes sure the work gets done.

## Kate takes a new job



**Kate:** Hi, Ben. I'm excited to be here. It's such a relief to be hired as a project manager, and not just a project expeditor anymore.

**Ben:** We're excited too, since you'll be taking care of our main software development project. It's in maintenance mode right now.

**Kate:** Sounds great. How do we handle that here?

**Ben:** Well, we're constantly getting business reports from the field, and when people think of new ideas, we just add them to the project.

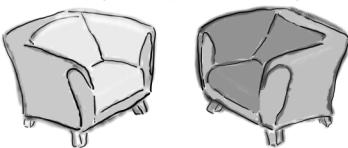
**Kate:** Umm...so how do you know when you're done?

**Ben:** We're never really done; we try to release new versions as often as possible.

## Kate's being asked to do operational work

Kate's spent a lot of time studying for the PMP exam, and the first thing she learned was that a project is temporary. When she sees ongoing work that doesn't really have a start or a finish, it's not a project at all. Ben asked Kate to do **operational work**, which has no beginning and no end. Since there's no way for Kate to know when she's done, it will be harder for her to be successful at her job. And that makes her nervous!

## Fireside Chats



Tonight's talk: **Operational Work and A Project** spar over who's more valuable.

### Operational Work

I've been meaning to sit down and talk to you for a while.

Hey, don't knock that day-to-day work! It's your bread and butter. If I weren't here keeping the lights on, there'd be no chance for you to go out and build all of the flashy stuff you do. It's thankless work keeping the business running, I'll give you that, but where would you be without me?

Don't patronize me. I know you think you're pretty hot because everybody wants to know when you'll be done and how much you'll cost. But remember, you're temporary. When you're done producing your product, you close down and I'll be left to maintain the systems you create. Not only are you nothing without me, you have an expiration date. Still feel like a star?

### A Project

Really? I thought you were too busy doing your day-to-day business to care too much about us projects.

There you go again...“thankless work.” Give me a break. Everybody knows that you represent all of the work the business does on an ongoing basis. You’re the work that keeps the computers running, and the paychecks flowing. You’re the systems upgrades and the maintenance...all of the work that has no definite beginning and end.

You make it possible for me to break new ground. You’re a great supporting player. You make it easy for me to be a star! While I’m out there expanding the business, you’re making sure we can take care of our old stuff. Er, I mean, you’re maintaining our **core** work.

I’m out there every day making progress, building new products, and changing the way that you do business. Yeah, I do feel like a star! I’m sorry you can’t see how important I am. I guess we’ll just never agree on this one.

# Stakeholders are impacted by your project

Anyone who will be affected by the outcome of your project is a **stakeholder**. It's usually pretty easy to come up with the first few people on the list of affected people.

The sponsor who's paying for the project, the team who's building it, and the people in management who gave the project the green light are all good examples. But it can get a little tricky as your project gets going. You might start with that core group of people and find that the number keeps growing as time goes on. It's your job as a project manager to find all of the stakeholders who are influential in your project and keep them updated on where your project is going. Making sure that their expectations are managed can be the difference between your project succeeding and failing.



## Negative stakeholders

Not all of the people you're working with are rooting for your project to succeed. Sometimes, the people you're working with think that your project might bring negative consequences for them. Ben's worried that bringing any kind of planning into his company will slow down his team. Kate's going to have to **manage his expectations** and work with him to set goals that make sense to him if she's going to bring him around to supporting her work. You need to know what's motivating all of your project stakeholders if you're going to understand the influence they'll have over your project.

It may sound like having a negative stakeholder is a really bad thing, but if Kate can turn Ben around then he'll be a great ally in the future.

## Identify stakeholders

One of the first things you'll do when you start a project is figure out who your stakeholders are and write down their goals and expectations in a **stakeholder register**. That's part of the Identify Stakeholders process that you'll learn more about in Chapter 13 of this book. Even though you do that work up front, you'll find that new stakeholders are always popping up, and you'll need to make changes to your stakeholder register to include them as you learn about them.

You'll learn more about how the Identify Stakeholders process helps you understand their goals and expectations in Chapter 13.

# More types of stakeholders

Take a minute to think about all of the stakeholders who've ever had something to do with the projects you've worked on in the past. Making sure that they are all informed and helping your project to succeed is the point of **Project Stakeholder Management**, one of the 10 knowledge areas that are covered in the *PMBOK Guide*. Let's take a look at some of the kinds of stakeholders that will impact your project.

Project Stakeholder Management is covered in depth in Chapter 13 of this book.

## Sponsor

The sponsor is the person who pays for the project. Without the sponsor's help, there's no way the project can be a success.

## Seller

You might license software or contract consultants to help you build your product. The companies you work with to help you deliver it are stakeholders in your project's success too.



## Business partner

Your company might contract a company to provide training or other materials that affect your project. They're important stakeholders of your project too.

## Consumers or users

Usually, you build a product or service so that someone can buy or use it. You have to make sure your project meets the customer's needs if you want to call it successful.

## Organizational Groups

You might not think about it at first, but there are many ways that groups outside your team can be affected by your project. Your sales team, your internal support teams, all kinds of groups inside your company will have a stake in your project's success

## Functional manager

If you're building an accounting software package, you're going to need accounting expertise to understand what you're building. Functional managers provide the subject matter expertise to make things run smoothly on your project.

# Your project team has lots of roles too

When you think about it, most of the roles we just talked about have a place on your project team too. When you think about your team, it's easy to focus on the PM and the project staff. But your team can be comprised of roles from many different stakeholder organizations. Think about all of the stakeholder organizations that might help you deliver the product of your project by actually assigning people to your project team.

Human Resource Management is covered in depth in Chapter 9 of this book.



Can you name the project team role from the list of stakeholder roles on the opposite page for each of the examples below?

1. The project was nearly complete and it was time to have it tested for acceptance by the people who would need to use it everyday.

**Project Team Role:**

.....

3. The company contracted an external vendor to build a big component of the product. The vendor met with the team everyday so that they could make sure there were no integration problems between the part they were building and the part the rest of the team was working on.

**Project Team Role:**

.....

2. The company had an external company come in and train all of the project staff on how to deploy the product of their project using a new software package.

**Project Team Role:**

.....

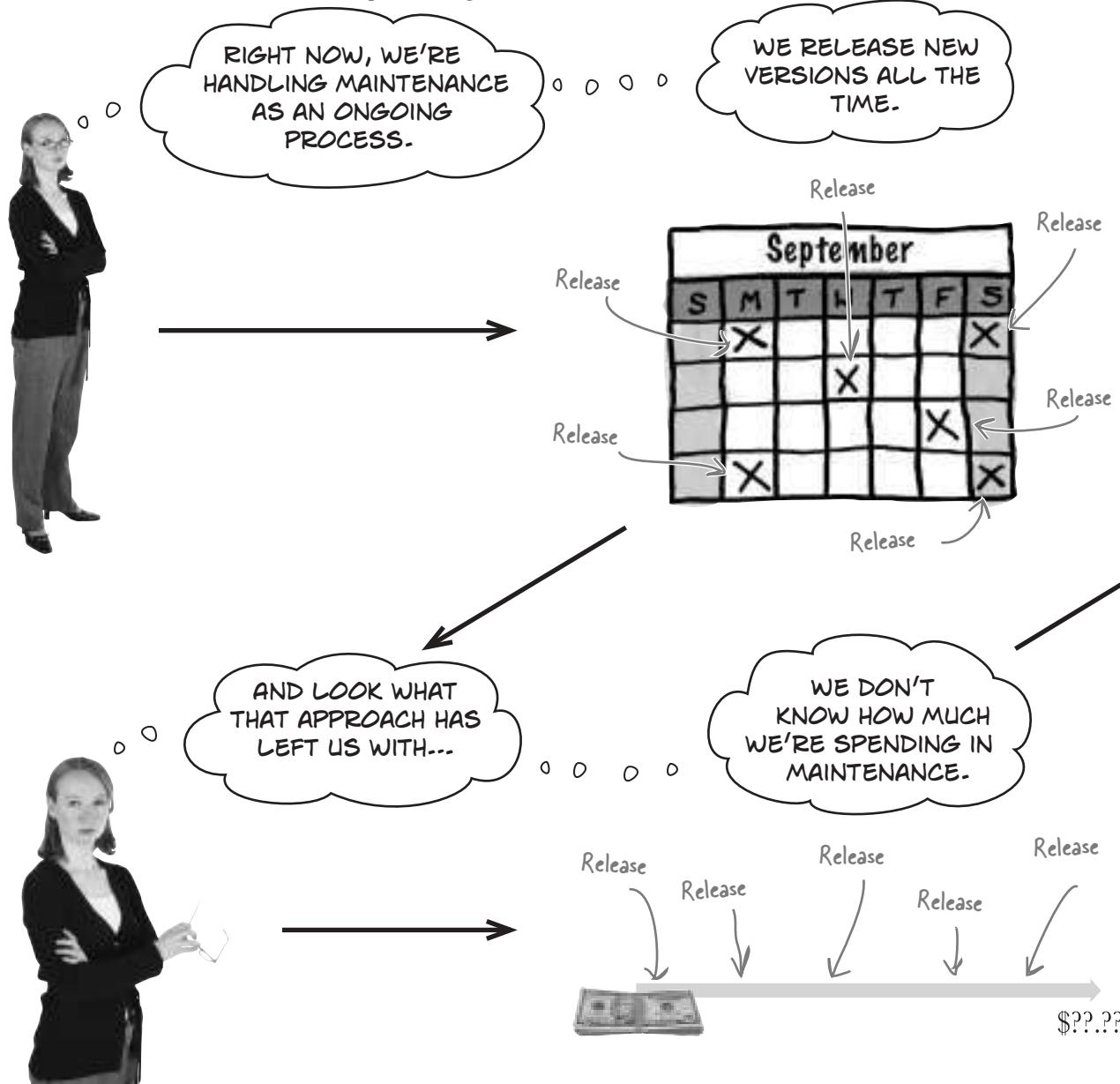
4. The company just purchased a new accounting software package. The company that makes the accounting software assigned a representative to answer any questions the team might have as they built the product.

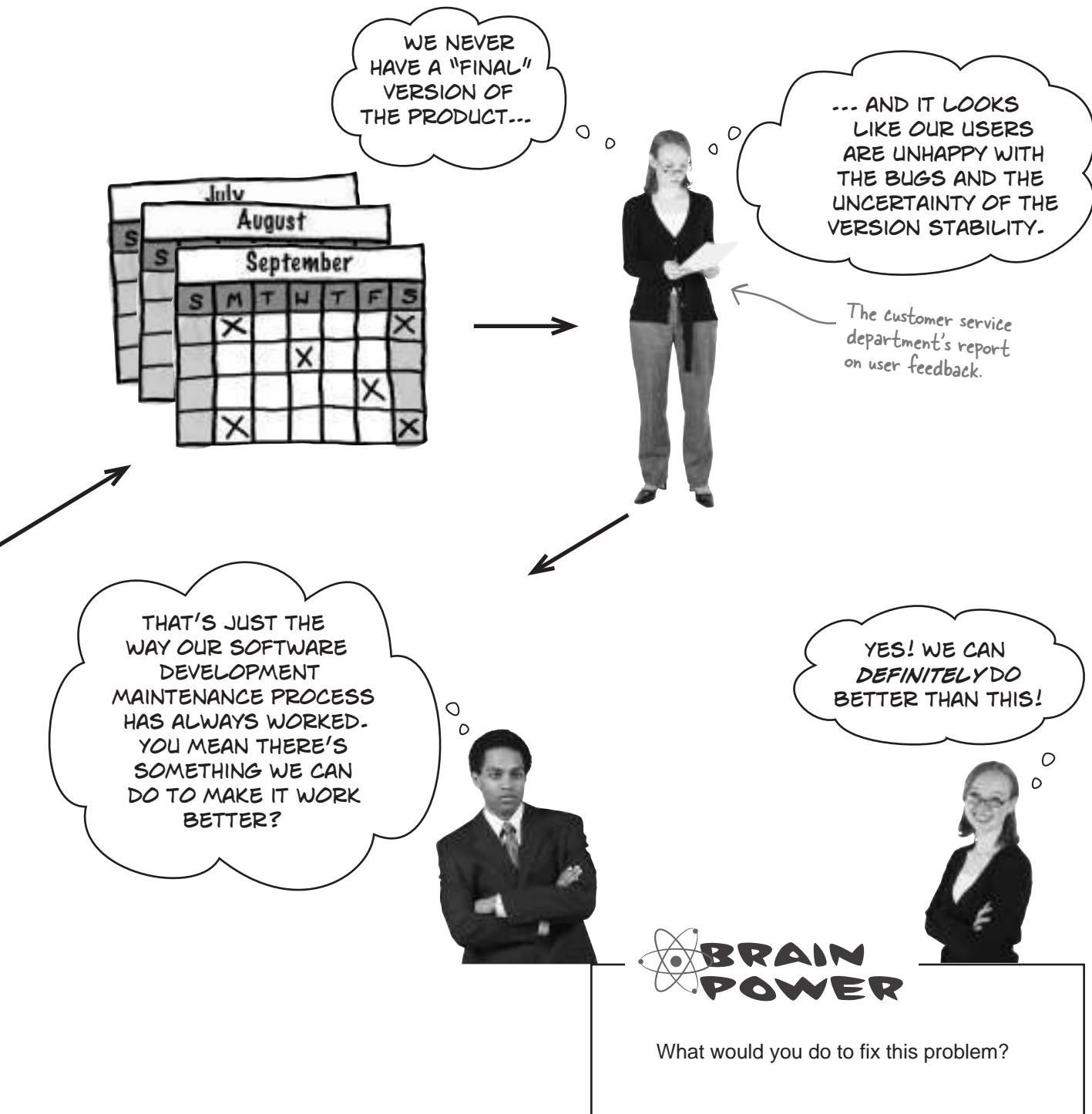
**Project Team Role:**

.....

## Back to Kate's maintenance nightmare

Let's figure out how things are working in Kate's new organization... and start to think about how we can improve things.





## Managing project constraints

When Kate thinks about solutions, she's going to have to deal with the project's constraints. Every project, regardless of what is being produced or who is doing the work, is affected by the **constraints** of time, scope, cost, quality, resources, and risk. These constraints have a special relationship with one another, because doing something to deal with one of the constraints always has an effect on the others.



If you don't manage all six constraints at the same time, you risk managing in favor of just one constraint.

For Kate's project to succeed, she needs to think about the project **constraints**. If she doesn't manage these six constraints at the same time, she'll find that her project is either late, over budget, or unacceptable to her customers.

**Any time your project changes, you'll need to know how that change affects all of the constraints.**



Can you figure out the constraint that's causing the biggest headache for the project manager in each of these scenarios?

The project was running late, so the project manager decided to release it on time even though it was missing some of its features.

**Constraint affected:**

The team wanted to add more testers to find defects, but the project manager overruled them.

**Constraint affected:**

A construction project manager assumed that the weather would cooperate with the plans to complete the job, but thunderstorms have derailed the project.

**Constraint affected:**

The company didn't have enough money to invest in the project, so they had to draft people from other departments to work part time to get the job done.

**Constraint affected:**

About halfway through the project, the PM realized that the money was running out faster than expected. She went through the schedule to try to find ways to move up the deadline.

**Constraint affected:**

The project manager didn't take software license fees into account, which caused the budget to balloon out of control.

**Constraint affected:**



Can you figure out the constraint that's causing the biggest headache for the project manager in each of these scenarios?

The project was running late, so the project manager decided to release it on time even though it was missing some of its features.

**Constraint affected:**

**scope**

The PM stuck to the original budget and schedule, but released a product that wasn't complete. That means the scope was affected.

The team wanted to add more testers to find defects, but the project manager overruled them.

**Constraint affected:**

**quality**

Any time you're talking about tests and defects, you're talking about quality.

A construction project manager assumed that the weather would cooperate with the plans to complete the job, but thunderstorms have derailed the project.

**Constraint affected:**

**risk**

Whenever you make assumptions about a project, you're introducing risk.

The company didn't have enough money to invest in the project, so they had to draft people from other departments to work part time to get the job done.

**Constraint affected:**

**resources**

Resources are people or materials that you need for your project, and when you cut corners you end up straining them.

About halfway through the project, the PM realized that the money was running out faster than expected. She went through the schedule to try to find ways to move up the deadline.

**Constraint affected:**

**time**

There are lots of ways to change how long it'll take to do your project, but sometimes there simply isn't enough time.

The project manager didn't take software license fees into account, which caused the budget to balloon out of control.

**Constraint affected:**

**cost**

### **These are the answers we thought fit best!**

Did you get different answers? That's okay! For this exercise, a good case can be made for almost any of the constraints. Don't worry about which answer is "right" for now – it's more important to get some practice thinking about projects in terms of constraints. And when you get to the actual exam questions, there will always be a clear, correct, BEST answer.

*there are no*  
**Dumb Questions**

**Q:** I've heard project constraints referred to as the triple constraint. But there are six of them here. What gives?

**A:** Some project managers focus on Cost, Scope, and Time as the main constraints of a project. But just thinking about those three constraints doesn't give a clear picture of all of the constraints you need to account for when planning a project. The important thing here is to understand that Cost, Time, Scope, Quality, Risk, and Resources are all related to each other. You need to pay attention to all of them and if you manage your project in favor of one of them, it will affect the others.

**Q:** I've heard of an old saying: "Faster, cheaper, better—pick two," but doesn't that mean that there are only two constraints that you can manage at any given time?

**A:** No, that's an old (and somewhat cynical) project management saying. When a project manager says it to a customer or stakeholder, what he is saying is that there's no way to reduce cost, shorten the schedule, and increase quality all at the same time. At least one of those things absolutely has to give... but the saying is a little disingenuous! We already know that all six of the constraints are related to each other, and there's almost never an easy, obvious trade-off where you can sacrifice one to improve the others.

**Q:** What if I know that a change will impact just scope, but not schedule or cost or any of the other constraints. Can I go ahead and make it?

**A:** Whenever you are making a change that affects the project constraints, you need to be sure that the change is acceptable to **your stakeholders**. They're the people who will be impacted by your project. The term applies to your team, your customer, your sponsor, and anybody else who is affected by the change.

A lot of project management is about evaluating what a change is going to do to your project constraints, and using that impact analysis to help stakeholders make choices about what to do when changes come up. Sometimes a change that affects the quality of your product is completely unacceptable to your stakeholders, and they would rather delay the project than sacrifice the product's quality.

**A stakeholder is anyone who is affected either positively or negatively by your project.**

**Q:** In my organization, we have some projects that would sound like they're functional and some that are fully projectized. Where does that kind of organization fit in?

**A:** Sometimes a company that mostly runs their projects in a functional way will create a special team that gives the project manager more authority. When a company manages using many different types of organizational structure, it's called a **composite organization**.

**Q:** I don't quite get this whole negative stakeholder thing. Why do I care about people who aren't helping me with my project?

**A:** Think of it this way: sometimes a project might have really good overall outcome for your company, but it might make some of the people who are impacted by it uncomfortable. (Here's a quick example: think about another project manager who won't get to use the resources he planned on because they're taken up by your project.) Change can be really hard for people to adapt to, and sometimes your stakeholders are not going to be happy about changes that your project is making. It's important to know how negative stakeholders feel, and understand why they're resistant to your project.

You need to identify and manage the expectations of all of the stakeholders who have influence over your project if you're going to succeed. So don't take it personally if there are people out there who aren't as enthusiastic about your project as you are. Use it as an opportunity to find out what your project can do to get buy-in from the negative stakeholders out there.

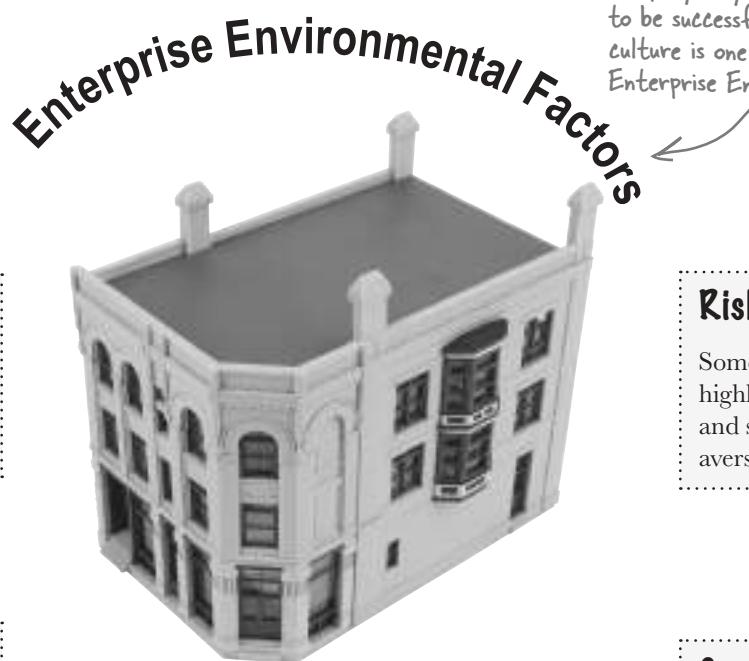
**Q:** You mentioned that it's possible to "turn around" a negative stakeholder. How does that work?

**A:** Today's negative stakeholders can become tomorrow's **advocates** if you make sure their needs are met. By listening to them, taking their needs into account, and making changes to your project so that those needs are satisfied, those previously negative stakeholders will feel good about what you're doing... and they'll often become your closest allies in the future.

# You can't manage your project in a vacuum

Even the best project managers can't control everything that affects their projects. The way your company is set up, the way people are managed, the processes your team needs to follow to do their jobs... they all can have a big impact on how you manage your project. On the exam, all of those things are called Enterprise Environmental Factors.

It's easy to fall into the trap of thinking that these factors only apply to big companies. In fact, they apply to all organizations of all sizes and types... and you need to understand them about **YOUR** company if you want your projects to be successful! Your company's culture is one of its most important Enterprise Environmental Factors.



## People

The skills and organizational culture where you work.

## Market

The way your company is performing in the market can affect the way you manage your project.

## Databases

Where your company stores its data can make a big difference in the decisions you make on your project.

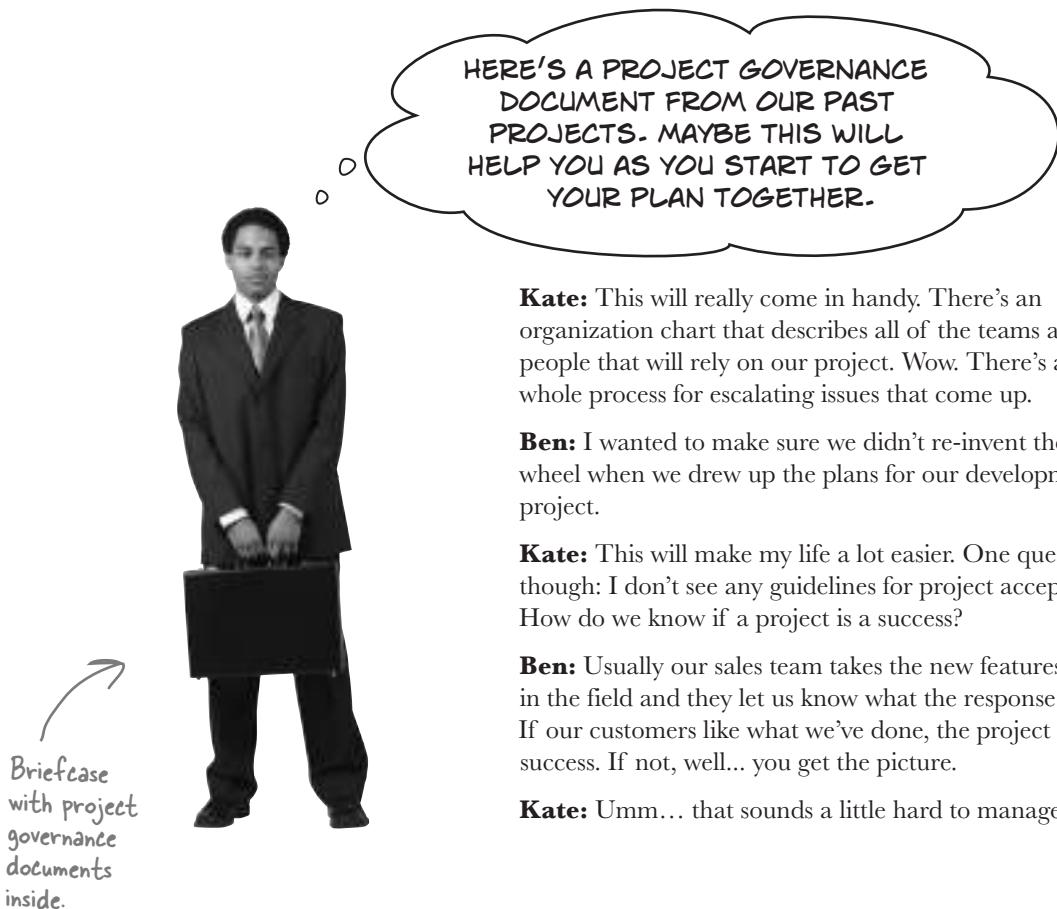
## Risk Tolerance

Some companies are highly tolerant of risk and some are really risk averse.

## Standards

Some companies depend on government standards to run their business and when they change, it can have a big impact

## Kate's project needs to follow company processes



**Kate:** This will really come in handy. There's an organization chart that describes all of the teams and people that will rely on our project. Wow. There's also a whole process for escalating issues that come up.

**Ben:** I wanted to make sure we didn't re-invent the wheel when we drew up the plans for our development project.

**Kate:** This will make my life a lot easier. One question though: I don't see any guidelines for project acceptance. How do we know if a project is a success?

**Ben:** Usually our sales team takes the new features out in the field and they let us know what the response is. If our customers like what we've done, the project is a success. If not, well... you get the picture.

**Kate:** Umm... that sounds a little hard to manage.

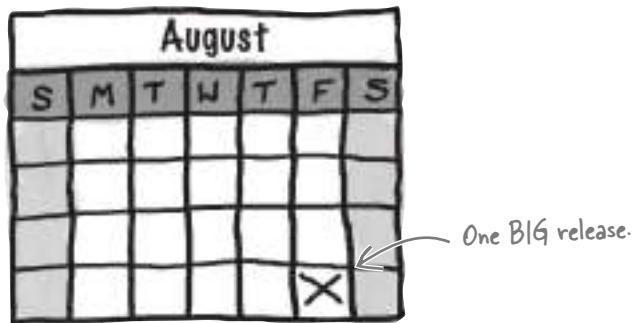
## Kate's project needs clear acceptance criteria

It's a lot harder for a project to be successful if the team doesn't have a clear goal in mind. Kate's project needs to follow all of the company governance guidelines, but she also needs to write down the goal her team is shooting for. That way, it will be clear that the project has met its goals when it completes. Most projects aim to finish within the constraints we talked about in the last chapter (time, cost, resources, quality, risk, and scope). It helps to write down concrete goals for those constraints as acceptance criteria up front. That way there are no surprises when the project ends.

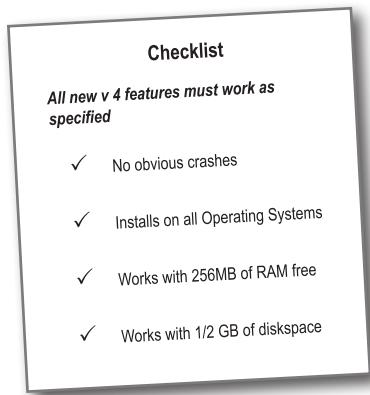
## Kate makes some changes...

- 1** She divides maintenance into releases, each with a well-defined start **and** a finish.

... and once Ben saw that  
Kate's careful planning made  
the project go faster, not  
slower, he stopped being a  
negative stakeholder and  
started being a project  
advocate!

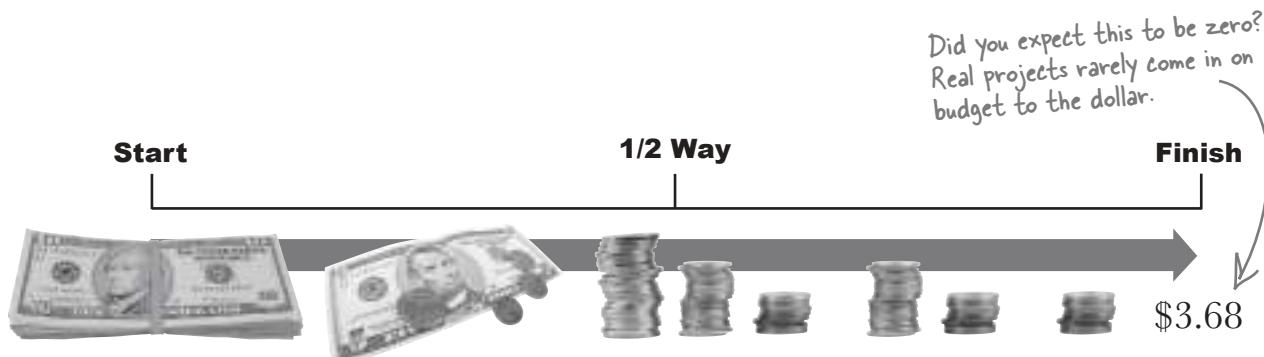


- 2** She follows the company's project governance guidelines and works with stakeholders to set scope goals that each release must meet.



All these acceptance criteria  
must be completed before the  
project can end.

- 3** She manages the budget for each release and keeps the costs contained.



## **...and her project is a success!**

Now the company knows when their products will be done, how much they will cost, and that the products will satisfy their customers...



## **...and that earns Kate and Ben big bonuses!**



Kate spilled a hot cup of Starbuzz half-caf nonfat latte on her job-hunting checklist. Can you match the notes she scribbled at the bottom of the page to what's covered up by coffee stains?

### Job Hunting Checklist

- I should have authority over my projects
- I am allowed to assign work to people on my project team
- I am in control of my project's budget
- I focus on managing projects, not irrelevant tasks
- I shouldn't spend my whole day filing stuff
- I can assign work to my project team without having to clear it with their bosses.



## Organization Magnets Solutions

In a functional organization, which is what Kate works in, project managers don't have the authority to make major decisions on projects. Projectized organizations give all of the authority to the PM.

Can you work out which description goes with which organization type?

### Functional Organization

1. ....  
Project managers need to clear major decisions with department managers.
2. ....  
PMs don't set the budget.
3. ....  
PMs spend half their time doing admin tasks.

In a functional organization, the teams working on the project don't report directly to the PM. Instead, the teams are in departments, and the project manager needs to "borrow" them for the project.

In this kind of company, the team reports to the project manager, who has a lot more authority.

### Projectized Organization

1. ....  
Teams are organized around projects.
2. ....  
Project managers choose the team members, and release them when the project is over.
3. ....  
Project managers estimate and track budget and schedule.

## Exam Questions

1. Which of the following is NOT a Project Constraint?

- A. Quality
- B. Scale
- C. Time
- D. Cost

2. A project manager is running a data center installation project. He finds that his stakeholder is angry because he's run over his budget because the staff turned out to be more expensive than planned. The stakeholder's unhappy that when the project is over, the servers won't have as much drive space as he needs. Which of the following constraints was not affected by this problem?

- A. Quality
- B. Resource
- C. Time
- D. Cost

3. Which of the following is NOT an example of operational work?

- A. Building a purchase order system for accounts payable
- B. Submitting weekly purchase orders through a purchase order system
- C. Deploying weekly anti-virus software updates
- D. Yearly staff performance evaluations

4. You're managing a project to build a new accounting system. One of the accountants in another department really likes the current system and is refusing to be trained on the new one. What is the BEST way to handle this situation?

- A. Refuse to work with him because he's being difficult
- B. Appeal to the accountant's manager and ask to have him required to take training
- C. Get a special dispensation so that the accountant doesn't have to go to the training
- D. Work with him to understand his concerns and do what you can to help alleviate them without compromising your project

5. Which of the following is used for identifying people who are impacted by the project?

- A. Resource List
- B. Stakeholder Register
- C. Enterprise Environmental Factors
- D. Project Plan

## Exam Questions

6. Your manager asks you where to find a list of projects that should be managed together. What is the BEST place to find this information?

- A. Project Plan
- B. Project Charter
- C. Portfolio Charter
- D. Program Charter

7. You want to know specifically which business goal a group of projects and programs are going to accomplish. Which is the best place to look for this information?

- A. Project Plan
- B. Project Charter
- C. Portfolio Charter
- D. Program Charter

8. A project coordinator is having trouble securing programmers for her project. Every time she asks her boss to give a resource to the project he says that they are too busy to help out with her project. Which type of organization is she working in?

- A. Functional
- B. Weak Matrix
- C. Strong Matrix
- D. Projectized

9. A project manager is having trouble securing programmers for her project. Every time she asks the programming manager for resources for her project, he says they're all assigned to other work. So she is constantly having to go over his head to overrule him. Which type of organization is she working for?

- A. Functional
- B. Weak Matrix
- C. Strong Matrix
- D. Projectized

10. The project manager for a construction project discovers that a new water line is being created in the neighborhood where he's managing a project. Company policy requires that a series of forms for city environmental changes need to be filled out before his team can continue work on the project. This is an example of:

- A. A portfolio
- B. A program
- C. An enterprise environmental factor
- D. A project

# Exam Questions

## 1. Answer: B

Scale is not a project constraint. The constraints are Scope, Time, Cost, Quality, Resource, and Risk.

## 2. Answer: C

There is no mention of the project being late or missing its deadlines in the example. The project was over budget, which affects the project's cost. The project won't meet the stakeholder's requirements, which is a quality problem. And the staff was more expensive than planned, which is another cost problem.

## 3. Answer: A

Building a purchase order system for accounts payable is a project. It's a temporary effort that has a unique result.

## 4. Answer: D

When a stakeholder is negatively impacted by your project, you need to manage his expectations and help him to buy into your project.

## 5. Answer: B

The stakeholder register is where you identify all of the people who are impacted by your project.

## 6. Answer: D

A program is a group of projects that should be managed together because of interdependencies. A program charter fits the description in this question.

Usually there's some benefit to  
the company by managing them  
together.

## 7. Answer: C

A portfolio charter will give the business goal that a group of projects and programs will accomplish as part of a portfolio.

*Answers*

## ~~Exam Questions~~

### **8. Answer: A**

Since the project manager has to ask permission from the functional manager and can't overrule him, she's working in a functional organization.

### **9. Answer: C**

The Project Manager in this scenario can overrule the functional manager, so she's working in a Strong Matrix organization. If it were a projectized organization, she wouldn't have to get permission from the functional manager at all because she'd be the person with authority to assign resources to projects.

### **10. Answer: C**

Since the project manager is filling out the form because of a company policy. This is a good example of an enterprise environmental factor.



### 3 The process framework

## *It all fits together*



**All of the work you do on a project is made up of processes.**

Once you know how all the processes in your project fit together, it's easy to remember everything you need to know for the PMP exam. **There's a pattern** to all of the work that gets done on your project. First you plan it, and then you get to work. While you are doing the work, you are always comparing your project to your original plan. When things start to get off-plan, it's your job to make corrections and put everything back on track. And the **process framework**—the **process groups** and **knowledge areas**—is the key to all of this happening smoothly.

## Cooking up a project

When you cook something from a recipe for the first time, there are certain steps you always follow:

- ➊ First figure out what you're going to make.

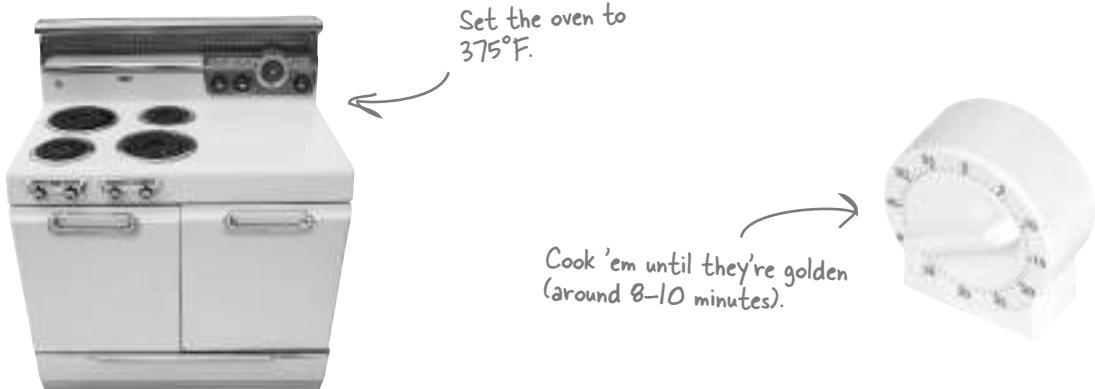


- ➋ Then make all your plans.

Make a shopping list of everything you need.



- ❸ Next, it's time to start cooking!

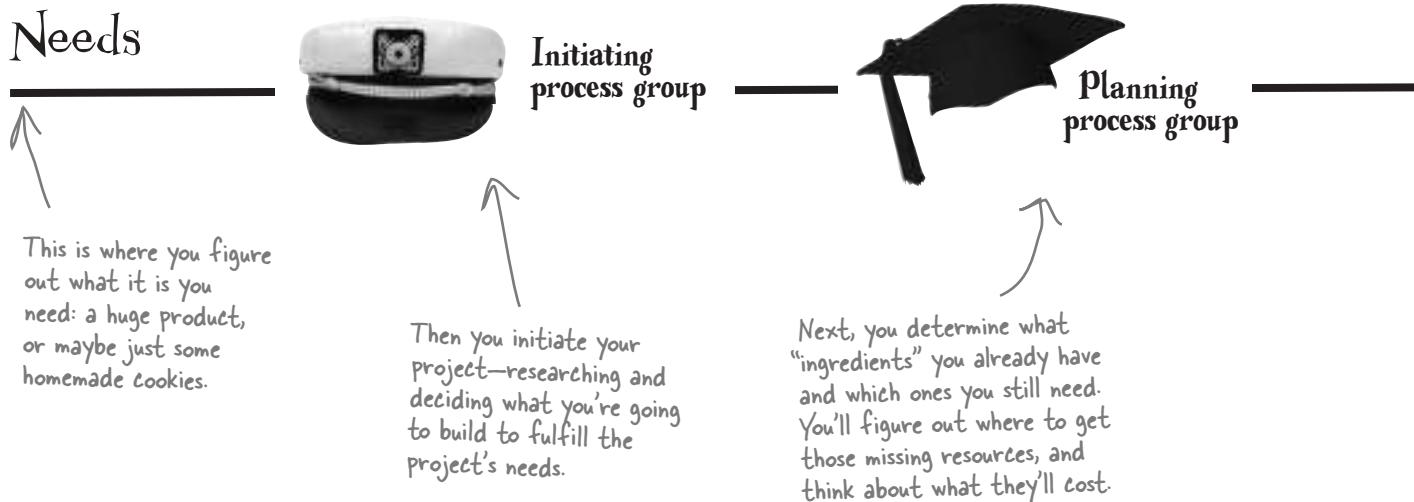


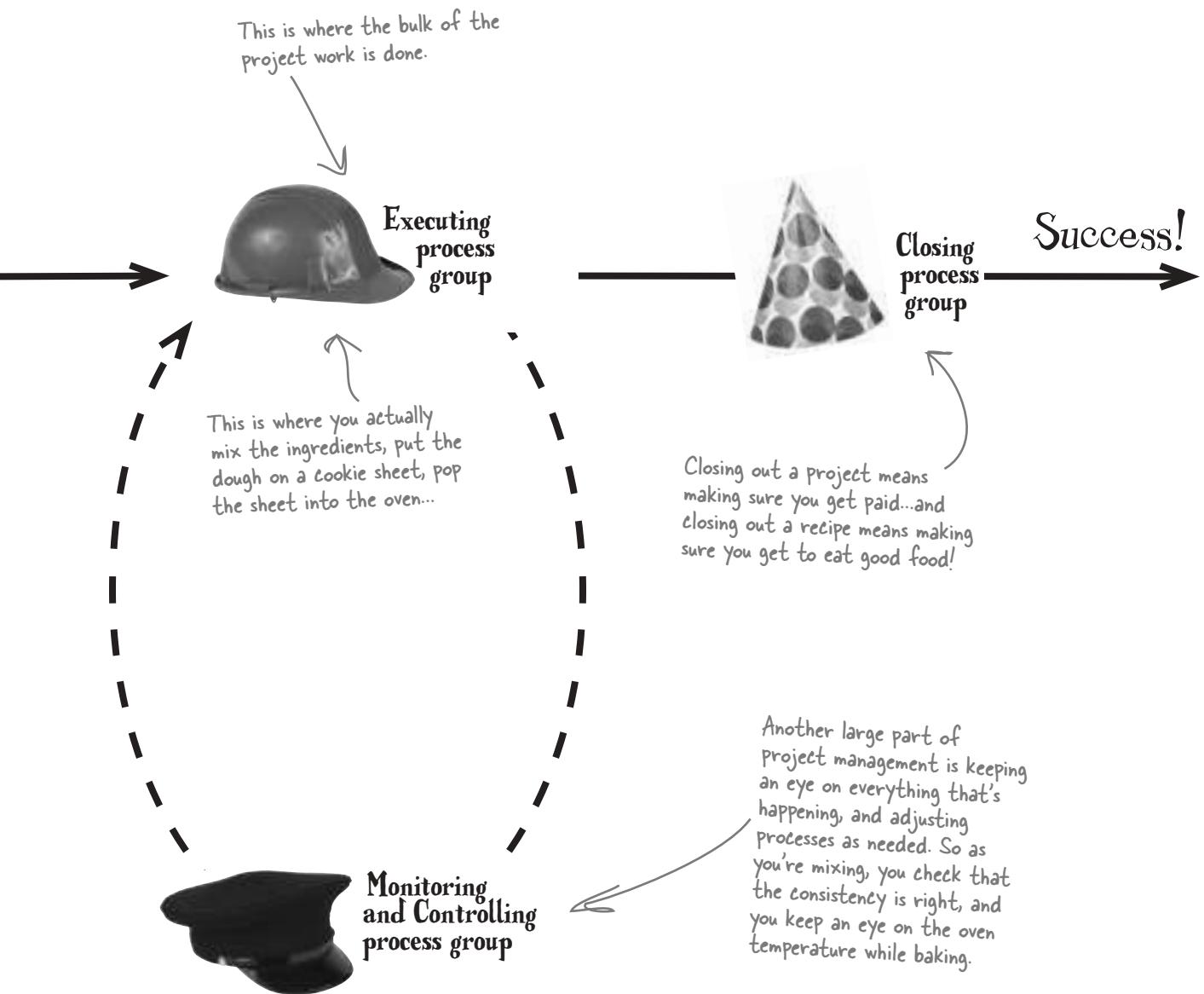
- ❹ Finally, you can give the cookies to a loved one.



## Projects are like recipes

All projects, no matter how big or small, break down into process groups. **Process groups** are like the steps you use when following a recipe.

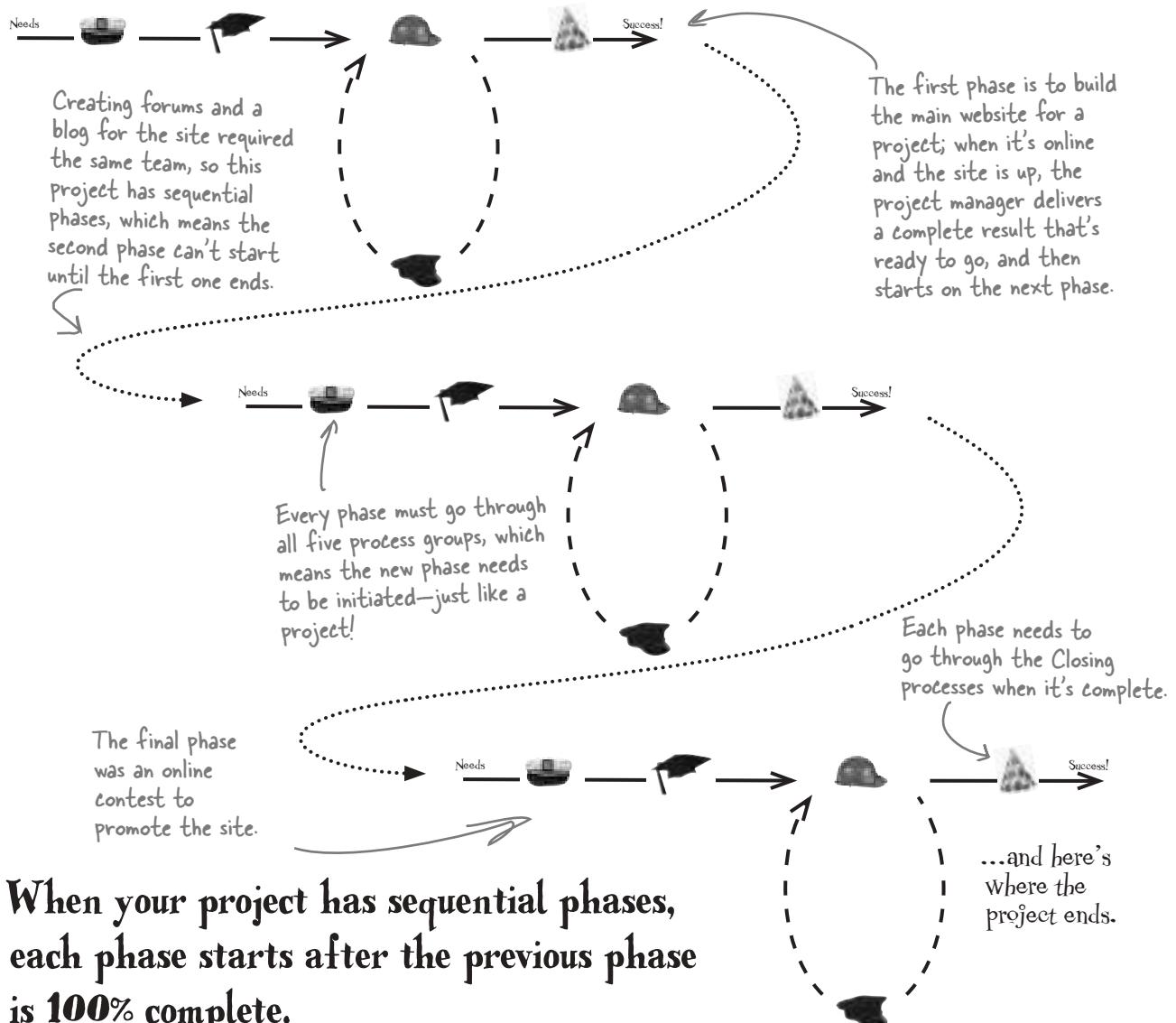




## If your project's really big, you can manage it in phases

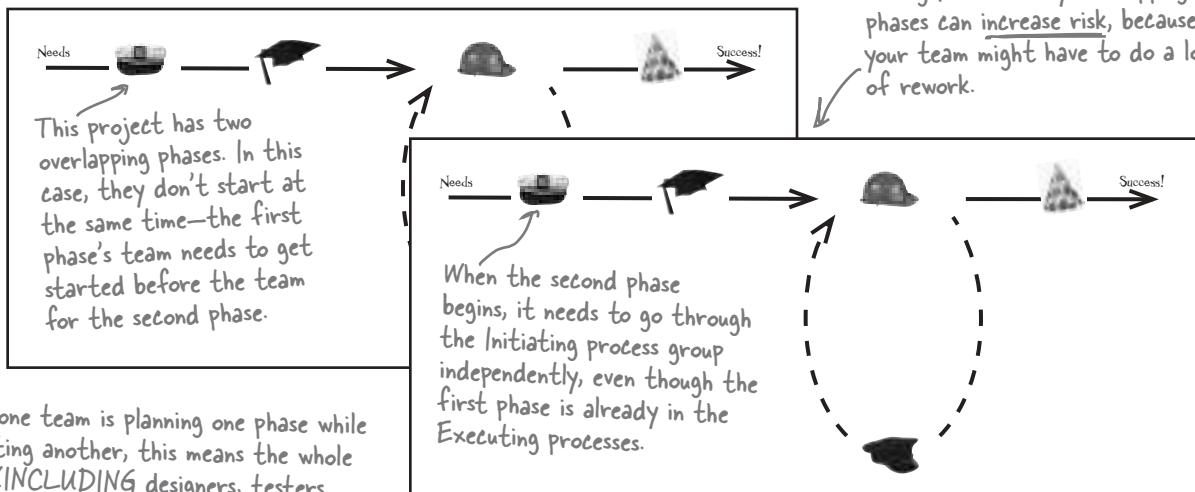
A lot of project managers manage projects that are big or complex, or simply need to be done in stages because of external constraints, and that's when it's useful to approach your project in **phases**. Each phase of the project *goes through all five process groups*, all the way from Initiating to Closing. The end of a phase is typically a natural point where you want to assess the work that's been done so that you can hand it off to the next phase. When your project has phases that happen one after another and don't overlap, that's called a **sequential relationship** between the phases.

You're managing a large web development project...



# Phases can also overlap

Sometimes you need teams to work independently on different parts of the project, so that one team delivers their results while another team is still working. That's when you'll make sure that your phases have an **overlapping relationship**. But even though the phases overlap, and may not even start at the same time, they still need to go through all five process groups.



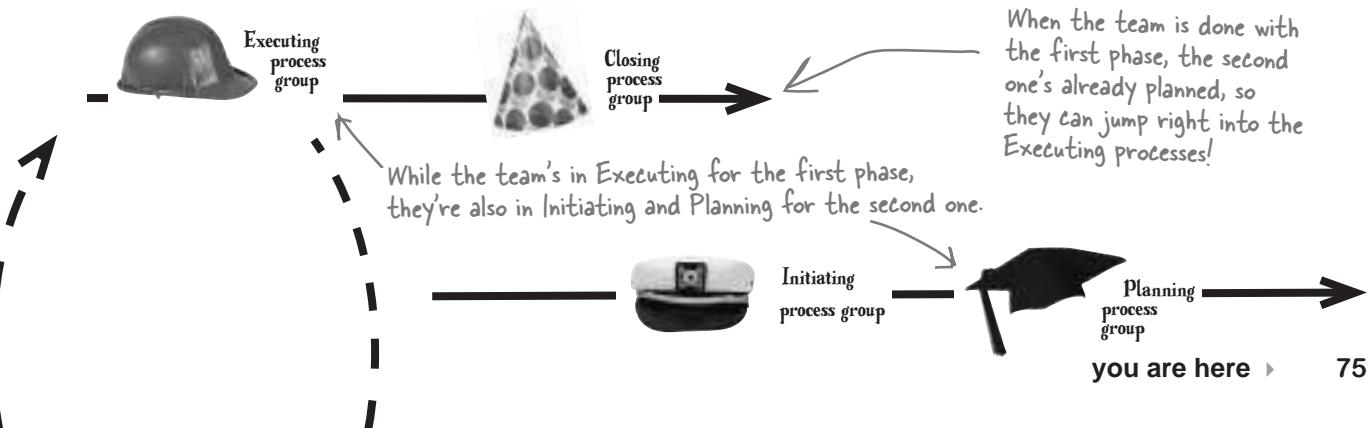
Since one team is planning one phase while executing another, this means the whole team (INCLUDING designers, testers, etc.) is usually working at the same time.

## Iteration means executing one phase while planning the next

There's a third approach to phased projects that's partway between sequential and overlapping. When your phases have an **iterative relationship**, it means that you've got a single team that's performing the Initiating and Planning processes for one phase of the project while also doing the Executing processes for the previous phase. That way, when the processes in the Executing and Closing process groups are finished, the team can jump straight into the next phase's Executing processes.

Iteration is a really effective way to run certain kinds of software projects. **Agile software development** is an approach to managing and running software projects that's based on the idea of iterative phases.

This is a really good way to deal with an environment that's very uncertain, or where there's a lot of rapid change. Does this sound like any of the projects you've worked on?



## Break it down

Within each process group are several individual **processes**, which is how you actually do the work on your project. The *PMBOK Guide* breaks every project down into 47 processes—that sounds like a lot to know, but don’t start looking for the panic button! In your day-to-day working life, you actually use most of them already...and by the time you’ve worked your way through this book, you’ll know all of them.



### Taking a vacation is simple, even though there are several steps.

Forty-seven processes might seem like a lot to remember, but once you’ve been using them for a while, they’ll be second nature—just like all the things you do without thinking when you go on a trip.

Stuff you do when you  
take a vacation

Simultaneous

- ➊ Figure out how much time you have off, how much money you can spend, and where you want to go.
- ➋ Find your flights and hotel information and put together an itinerary using a travel website.
- ➌ Take your flight, stay in the hotel, see the sights. Enjoy yourself.
- ➍ Make sure you get the seat you want on the plane, your hotel room is clean, and the sightseeing tours are worth your money. If not, complain, correct any problems that come up, and try to get better service.
- ➎ Come home, pay all the bills, and write up your reviews of the trip for the hotel feedback website.

The PMBOK Guide  
processes that those steps  
correspond to

- ➊ Develop Project Charter.
- ➋ Develop Project Management Plan.
- ➌ Direct and Manage Project Work.
- ➍ Monitor and Control Project Work.
- ➎ Close Project.

Don't worry about  
memorizing these  
process names now...  
you'll see a lot more  
of each of them  
throughout the book.



# Process Magnets

Below are several of the 47 processes. Try to guess which process group each process belongs to just from the name. We've done the first two for you.



Initiating process group



Planning process group



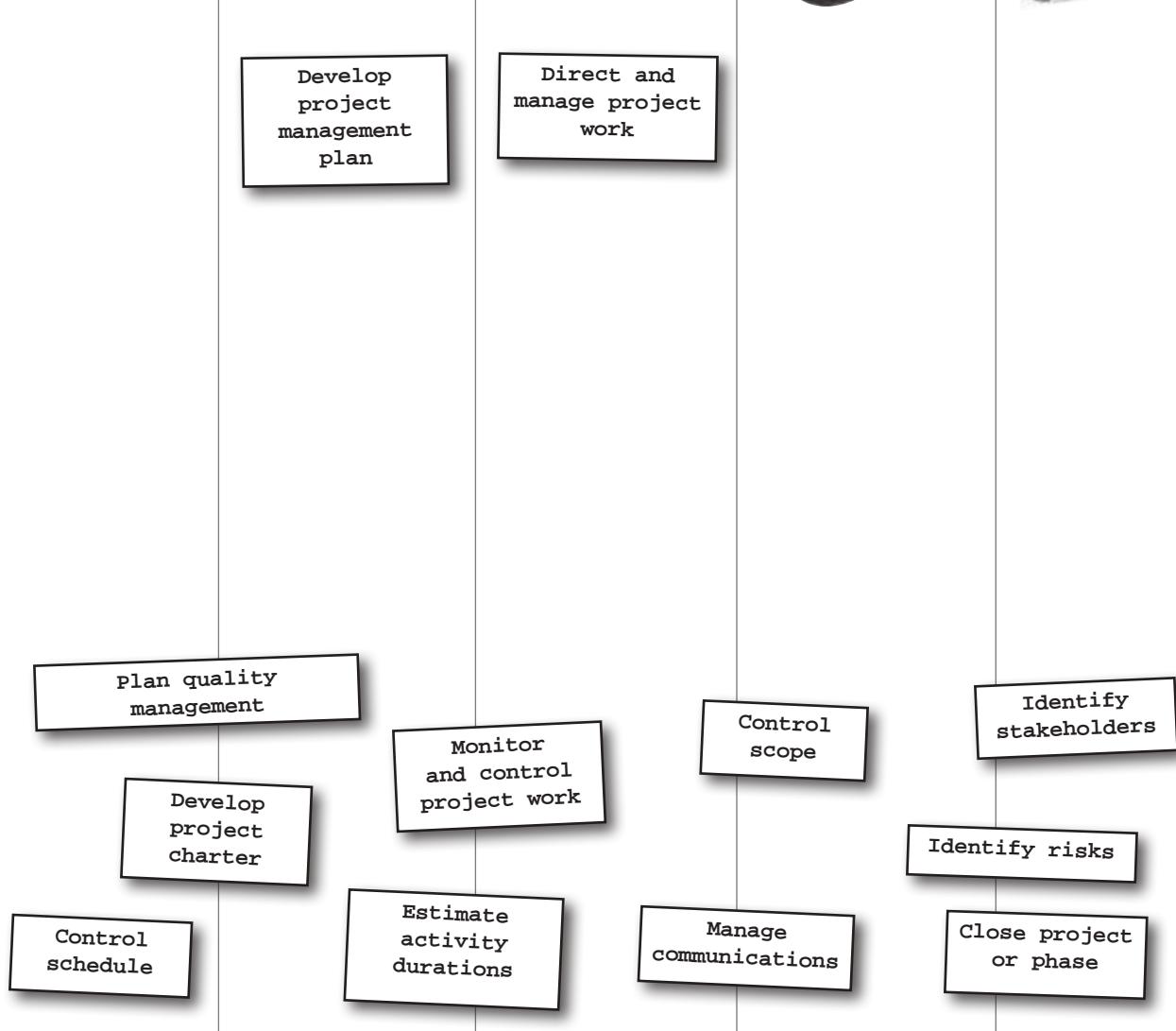
Executing process group



Monitoring & Controlling process group



Closing process group





# Process Magnets

Below are several of the 47 processes. Try to guess which process group each process belongs to just from the name!



Initiating process group



Planning process group



Executing process group



Monitoring & Controlling process group



Closing process group

Develop project charter

Identify stakeholders

Develop project management plan

Identify risks

Plan quality management

Estimate activity durations

Direct and manage project work

Manage communications

Control scope

Monitor and control project work

Control schedule

There are only two processes in the entire Initiating process group!

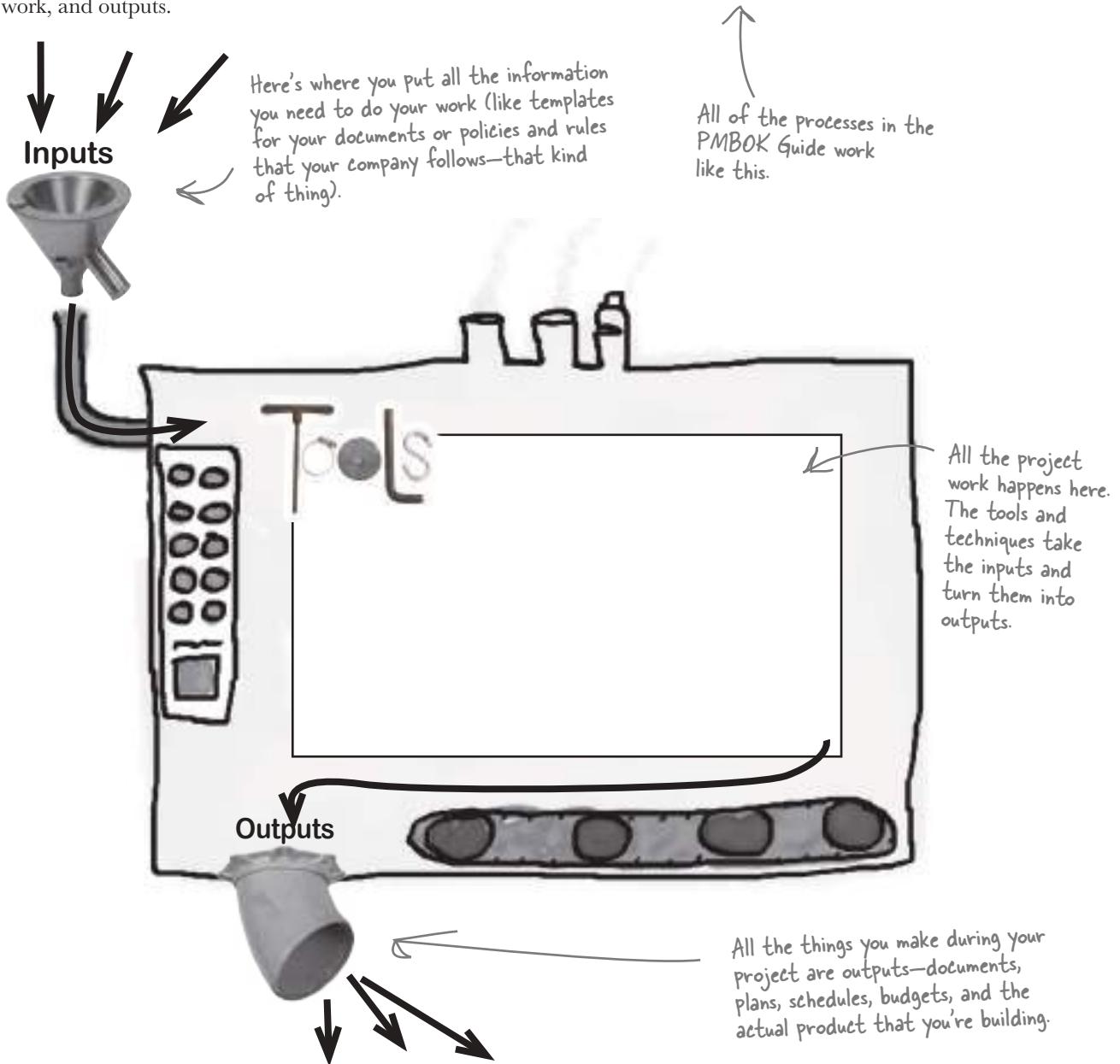
This one was a little tricky, but if you keep in mind that the Executing process is where you do your work, it makes more sense.

When a process starts with "control," it's part of the Monitoring and Controlling group.

Some of these exercises are hard—and it's OK to get some answers wrong! Making mistakes actually helps you remember.

# Anatomy of a process

You can think of each process as a little machine. It takes the **inputs**—information you use in your project—and turns them into **outputs**: documents, deliverables, and decisions. The outputs help your project come in on time, within budget, and with high quality. Every single process has inputs, **tools and techniques** that are used to do the work, and outputs.





Think of the vacation we talked about on page 76 as a project, and each of its steps as a process. Here are some inputs, tools, and outputs that could be used in each of the vacation steps. Can you look at each of the underlined words and figure out if the words represent an input, tool, or output? (Here's a hint: some of them are an output from one process and an input for another.)

Look at each of these underlined things, and figure out if it's an input, output, and/or tool.



1. You log in and check your company's vacation calendar to see how much vacation time you have for your trip.

Input       Tool       Output

2. You create an itinerary on a travel website. You'll use the itinerary when you board your flight.

Input       Tool       Output

3. You have some hotel reservation documents you created on the travel website, too. You'll use those when you check in to your hotel.

Input       Tool       Output

4. You use a travel website to book the plane, hotel, and sights you'll see on your trip.

Input       Tool       Output

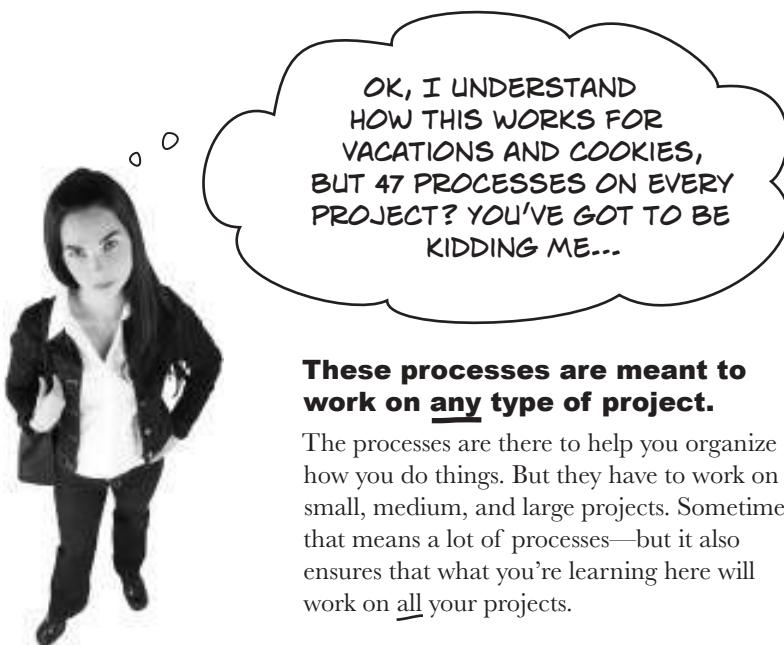
5. You verify your bank account balance to make sure you have enough money to pay for everything.

Input       Tool       Output

6. You use a hotel feedback website to review your stay in the hotel once you get back home.

Input       Tool       Output

→ Answers on page 90.



**These processes are meant to work on any type of project.**

The processes are there to help you organize how you do things. But they have to work on small, medium, and large projects. Sometimes that means a lot of processes—but it also ensures that what you’re learning here will work on all your projects.

---

there are no  
**Dumb Questions**

---

**Q:** Can a process be part of more than one process group?

**A:** No, each process belongs to only one process group. The best way to figure out which group a process belongs to is to remember what that process does. If the process is about defining high-level goals of the project, it’s in Initiating. If it’s about planning the work, it’s in Planning. If you are actually doing the work, it’s in Executing. If you’re tracking the work and finding problems, it’s in Monitoring and Controlling. And if you’re finishing stuff off after you’ve delivered the product, that’s Closing.

**Q:** Do you do all of the processes in every project?

**A:** Not always. Some of the processes apply only to projectized organizations or subcontracted work, so if your company doesn’t do that kind of thing, then you won’t need those processes. But if you want to make your projects come out well, then it *really does make sense* to use the processes. Even a small project can benefit from taking the time to plan out the way you’ll handle all of the knowledge areas. If you do your homework and pay attention to all of the processes, you can avoid most of the big problems that cause projects to run into trouble!

**Q:** Can you use the same input in more than one process?

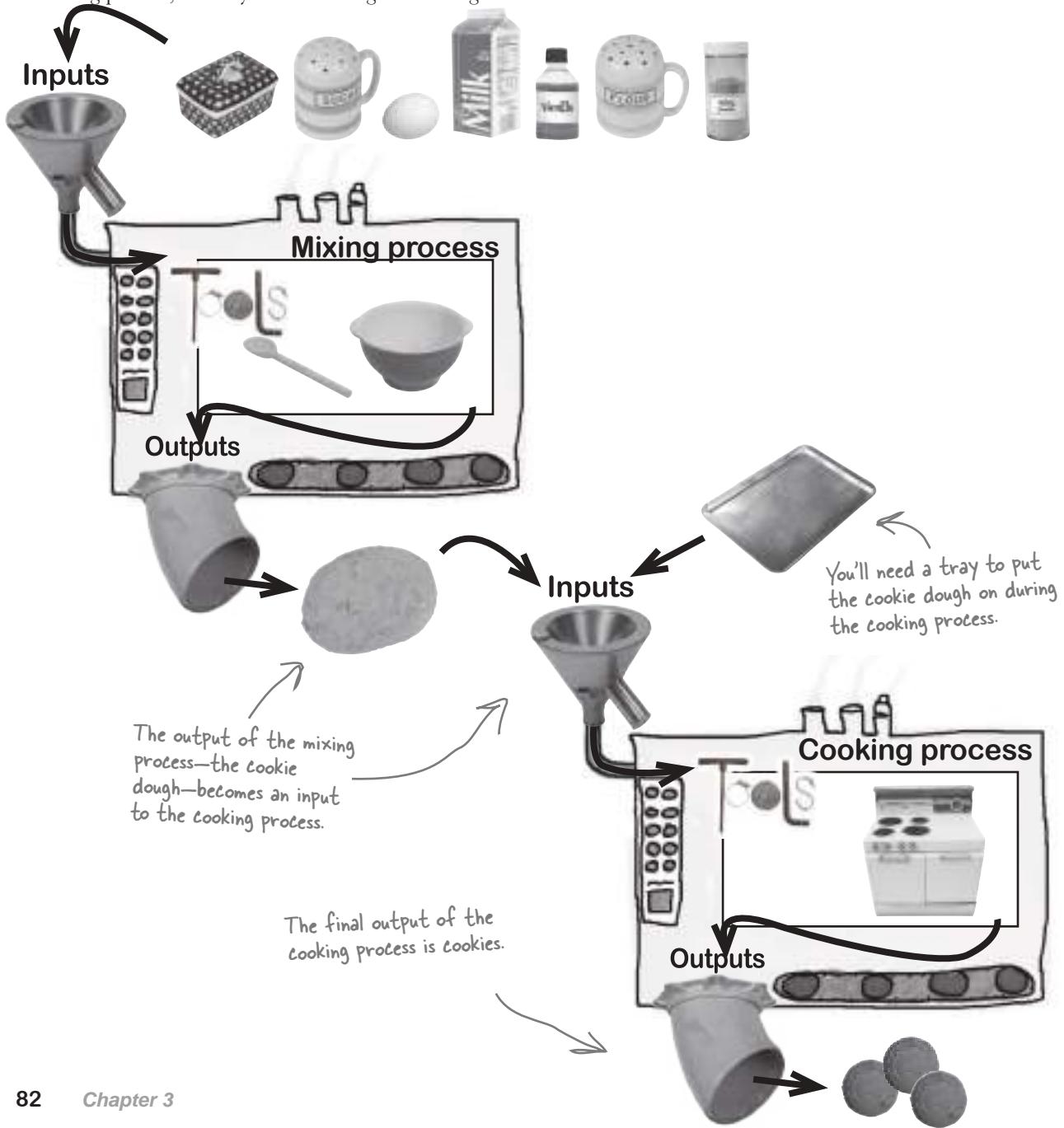
**A:** Yes. There are a lot of inputs that show up in multiple processes. For example, think about a schedule that you’d make for your project. You’ll need to use that schedule to build a budget, but also to do the work! So that schedule is an input to at least two processes. That’s why it’s really important that you write down exactly how you use each process, so you know what its inputs and outputs are.

Your company should have records of all of these process documents, and the stuff the PMs learned from doing their projects. We call these things “organizational process assets,” and you’ll see a lot of them in the next chapter.

*outputs can also be inputs*

## Combine processes to complete your project

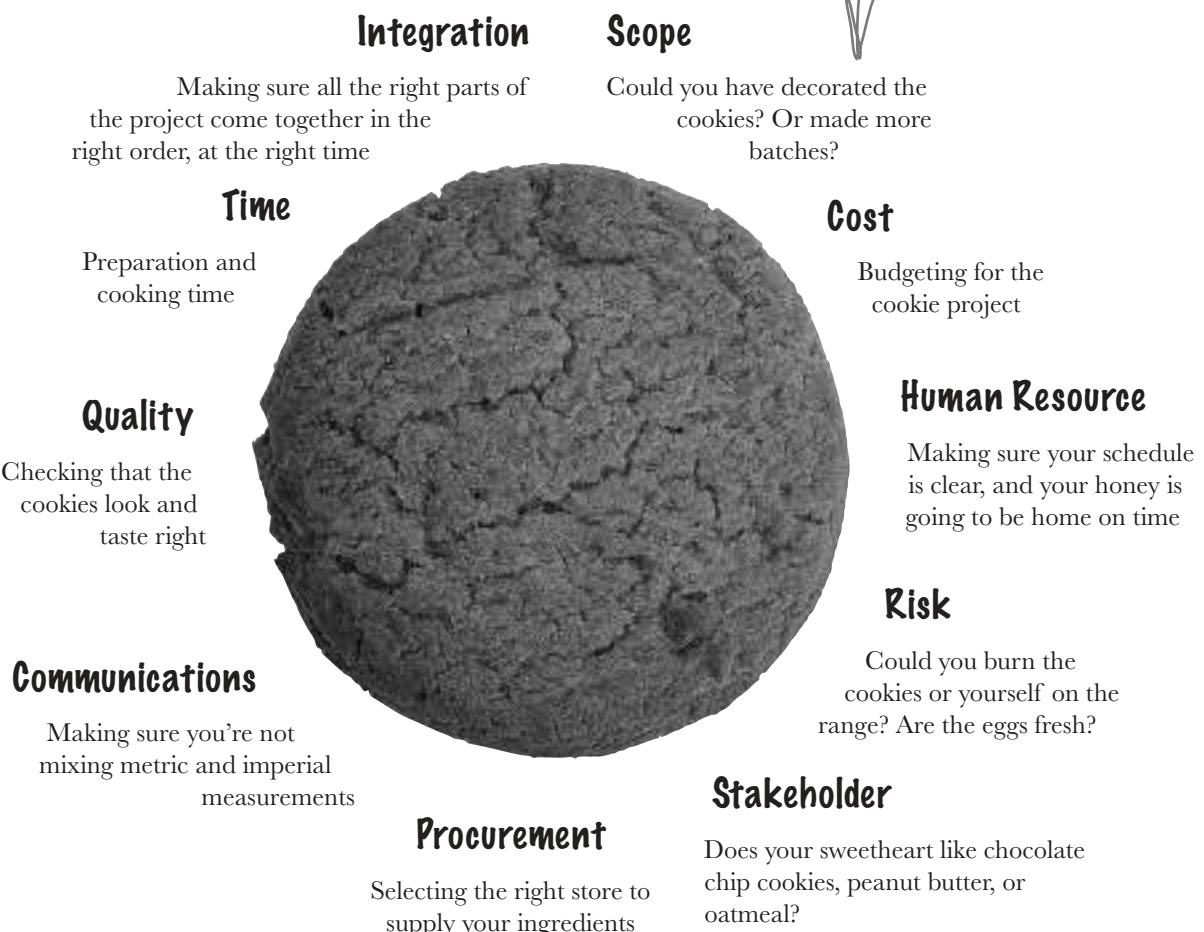
Sometimes the output of one process becomes an input of the next process. In the cookie project, the raw ingredients from the store are the outputs of the planning process, but they become the inputs for the executing process, where you mix the ingredients together and bake them:



# Knowledge areas organize the processes

The **process groups** help you organize the processes by the *kind of work* you do. The **knowledge areas** help you organize by the *subject matter* you're dealing with. The following 10 elements of the cookie process are the *PMBOK Guide* knowledge areas.

The processes are organized in two ways—the process groups are about how you do the work, and the knowledge areas are there to help you categorize them and help you learn.





# Knowledge Area Magnets

Match the knowledge areas to each description. We've filled in a couple for you.

Time  
Management

---

Coordinating all of the work so that it happens correctly. Making sure changes are approved before they happen.

Figuring out what work needs to be done for your project. Making sure your end product has everything you said it would.

Figuring out the time it will take to do your work and the order you need to do it in. Tracking your schedule and making sure everything gets done on time.

Knowing how much you're able to invest in the project and making sure you spend it right.

Making sure you work as efficiently as you can and don't add defects into the product.

Risk  
Management

Procurement  
Management

Human Resource  
Management

Quality  
Management

### Communications Management

Getting the people to work on the team and helping them stay motivated. Rewarding them for a job well done and resolving conflicts that come up.

Making sure that everybody knows what they need to know to do their job right. Tracking how people talk to each other and dealing with misunderstandings or miscommunications if they happen.

Figuring out how to protect your project from anything that could happen to it. Dealing with the unexpected when it does happen.

Finding contractors to help you do the work. Setting the ground rules for their relationships with your company.

Identifying the group of people who might have an impact on your project or who your project will affect. Understanding what they need and making sure your project delivers it.

### Scope Management

### Stakeholder Management

### Integration Management

### Cost Management



## Knowledge Area Magnets Solutions

Match the knowledge areas to each description.

This knowledge area includes processes to direct and manage project work as well as monitor and control it.

**Integration Management**

**Scope Management**

**Time Management**

**Cost Management**

**Quality Management**

Coordinating all of the work so that it happens correctly. Making sure changes are approved before they happen.

Figuring out what work needs to be done for your project. Making sure your end product has everything you said it would.

Figuring out the time it will take to do your work and the order you need to do it in. Tracking your schedule and making sure everything gets done on time.

Knowing how much you're able to invest in the project and making sure you spend it right.

Making sure you work as efficiently as you can and don't add defects into the product.

If you nail down your scope in the beginning, you have a much better chance of success in the end.

A lot of people think that this is all a project manager does, but it's only one of the 10 knowledge areas!

Quality is about preventing defects and working efficiently.



How well you keep to your budget can be the difference between success and failure for your project.

Since the PMBOK Guide covers projectized organizations, it talks about actually acquiring your team as a process, too. People in most organizations don't get a chance to do that. The team is often determined by the time you get assigned to it.

This one is another area that a lot of PMs don't have much experience with. It's all about selecting suppliers, contractors, and vendors, and setting up contracts with them.

**Human Resource Management**

**Communications Management**

**Risk Management**

**Procurement Management**

**Stakeholder Management**

Getting the people to work on the team and helping them stay motivated. Rewarding them for a job well done and resolving conflicts that come up.

Making sure that everybody knows what they need to know to do their job right. Tracking how people talk to each other and dealing with misunderstandings or miscommunications if they happen.

Figuring out how to protect your project from anything that could happen to it. Dealing with the unexpected when it does happen.

Finding contractors to help you do the work. Setting the ground rules for their relationships with your company.

Identifying the group of people who might have an impact on your project or who your project will affect. Understanding what they need and making sure your project delivers it.

Communication is a really important part of the project manager's job.

Risk Management can also be about making sure that you are in the right position to take advantage of the opportunities that come your way.

Once you know who your stakeholders are, you can keep a constant check on how well your project is meeting their expectations.



**Watch it!**

**Even though all of these knowledge areas are important throughout your project, the PMBOK Guide covers them in the order above.**

All of the knowledge areas are used throughout every project to keep your project on track.

there are no  
**Dumb Questions**

**Q:** So what's the difference between process groups and knowledge areas?

**A:** The process groups divide up the processes by function. The knowledge areas divide up the same processes by subject matter. Think of the process groups as being about the *actions* you take on your project, and the knowledge areas as the things you need to *understand*.

In other words, the knowledge areas are more about helping you understand the *PMBOK Guide* material than about running your project. But that doesn't mean that every knowledge area has a process in every process group! For example, the Initiating process group has only two processes. The Risk Management knowledge area has only Planning and Monitoring and Controlling processes. So the process groups and the knowledge areas are two different ways to think about all of the processes, but they don't really overlap.

**Q:** Is every knowledge area in only one process group?

**A:** Every process belongs to exactly one process group, and every process is in exactly one knowledge area. But a knowledge area has lots of processes in it, and they can span some, or all, of the groups. Think of the processes as the core information in the *PMBOK Guide*, and the process groups and knowledge areas as two different ways of grouping these processes.

**Q:** It seems like the Initiating and Planning process groups would be the same. How are they different?

**A:** Initiating is everything you do when you first start a project. You start by writing down (at a very high level) what the project is going to produce, who's in charge of it, and what tools are needed to do the work. In a lot of companies, the project manager isn't even involved in much of this. Planning just means going into more detail about all of that as you learn more about it, and writing down specifically how you're going to do the work. The Planning processes are where the project manager is really in control and does most of the work.

**Process groups and knowledge areas are two different ways to organize the processes...but they don't really overlap each other! Don't get caught up trying to make them fit together.**

## The benefits of successful project management



**Take a moment to digest all this new knowledge, because you're going to start putting it all into practice when we take a look at Project Integration Management in Chapter 4.**

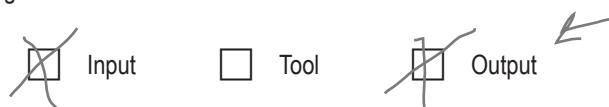
## Sharpen your pencil Solution

Think of the vacation we talked about on page 70 as a project, and each of its steps as a process. Here are some inputs, tools, and outputs that could be used in each of the vacation steps. Can you look at each of the underlined words and figure out if the words represent an input, tool, or output? (Here's a hint: some of them are an output from one process and an input for another.)

1. You log in and check your company's vacation calendar to see how much vacation time you have for your trip.



2. You create an itinerary on a travel website. You'll use the itinerary when you board your flight.

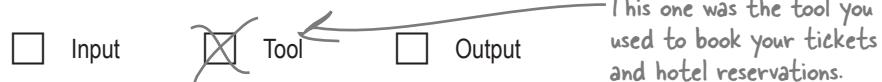


The itinerary was an output of the Develop Project Management Plan process but an input to the Direct and Manage Project Work process.

3. You have some hotel reservation documents you created on the travel website, too. You'll use those when you check in to your hotel.

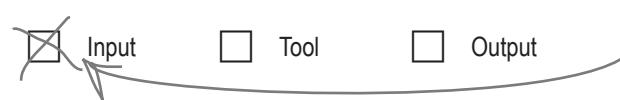


4. You use a travel website to book the plane, hotel, and sights you'll see on your trip.



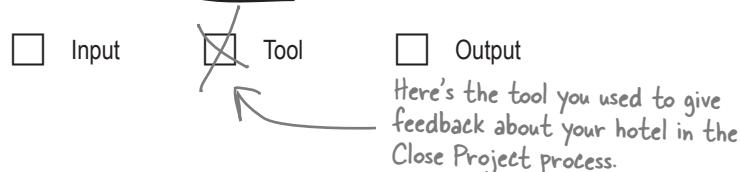
This one was the tool you used to book your tickets and hotel reservations.

5. You verify your bank account balance to make sure you have enough money to pay for everything.



You had to know this to know how much you could spend on your trip. It's an input.

6. You use a hotel feedback website to review your stay in the hotel once you get back home.



Here's the tool you used to give feedback about your hotel in the Close Project process.

## Exam Questions

1. You're a project manager working on a software engineering project. The programmers have started building the software, and the testers have started to create the test environment. Which process group includes these activities?

- A. Initiating
- B. Planning
- C. Executing
- D. Closing

2. Which of the following is not a stakeholder?

- A. The project manager who is responsible for building the project
- B. A project team member who will work on the project
- C. A customer who will use the final product
- D. A competitor whose company will lose business because of the product

3. A project manager runs into a problem with her project's contractors, and she isn't sure if they're abiding by the terms of the contract. Which knowledge area is the BEST source of processes to help her deal with this problem?

- A. Cost Management
- B. Risk Management
- C. Procurement Management
- D. Communications Management

4. You're a project manager for a construction project. You've just finished creating a list of all of the people who will be directly affected by the project. What process group are you in?

- A. Initiating
- B. Planning
- C. Executing
- D. Monitoring and Controlling

5. You're a project manager working in a weak matrix organization. Which of the following is NOT true?

- A. Your team members report to functional managers.
- B. You are not directly in charge of resources.
- C. Functional managers make decisions that can affect your projects.
- D. You have sole responsibility for the success or failure of the project.

## Exam Questions

6. Which of the following is NOT a project?

- A. Repairing a car
- B. Building a highway overpass
- C. Running an IT support department
- D. Filming a motion picture

7. A project manager is running a software project that is supposed to be delivered in phases. She was planning on dividing the resources into two separate teams to do the work for two phases at the same time, but one of her senior developers suggested that she use an agile methodology instead, and she agrees. Which of the following BEST describes the relationship between her project's phases?

- A. Sequential relationship
- B. Iterative relationship
- C. Constrained relationship
- D. Overlapping relationship

8. Which of the following is NOT true about overlapping phases?

- A. Each phase is typically done by a separate team.
- B. There's an increased risk of delays when a later phase can't start until an earlier one ends.
- C. There's an increased risk to the project due to potential for rework.
- D. Every phase must go through all five process groups.

9. You're the project manager for an industrial design project. Your team members report to you, and you're responsible for creating the budget, building the schedule, and assigning the tasks. When the project is complete, you release the team so they can work on other projects for the company. What kind of organization do you work in?

- A. Functional
- B. Weak matrix
- C. Strong matrix
- D. Projectized

10. Which process group contains the Develop Project Charter process and the Identify Stakeholders process?

- A. Initiating
- B. Executing
- C. Monitoring and Controlling
- D. Closing

# Answers

## Exam Questions

### 1. Answer: C

The Executing process group is the one where the team does all the work. You'll get a good feel for the process groups pretty quickly!

### 2. Answer: D

One of the hardest things that a project manager has to do on a project is figure out who all the stakeholders are. The project manager, the team, the sponsor (or client), the customers and people who will use the software, the senior managers at the company—they're all stakeholders. Competitors aren't stakeholders, because even though they're affected by the project, they don't actually have any direct influence over it.

### 3. Answer: C

The Procurement Management knowledge area deals with contracts, contractors, buyers, and sellers. If you've got a question about a type of contract or how to deal with contract problems, you're being asked about a Procurement Management process.

### 4. Answer: A

People who will be directly affected by the project are stakeholders, and when you're creating a list of them you're performing the Identify Stakeholders process. That's one of the two processes in the Initiating process group.

### 5. Answer: D

In a weak matrix, project managers have very limited authority. They have to share a lot of responsibility with functional managers, and those functional managers have a lot of leeway to make decisions about how the team members are managed. In an organization like that, the project manager isn't given a lot of responsibility.

That's why you're likely to find a project expediter in a weak matrix.

## Answers

# ~~Exam Questions~~

### 6. Answer: C

The work of an IT support department doesn't have an end date—it's not temporary. That's why it's not a project. Now, if that support team had to work over the weekend to move the data center to a new location, then that would be a project!



### 7. Answer: B

Agile development is a really good example of an iterative approach to project phases. In an agile project, the team will typically break down the project into phases, where they work on the current phase while planning out the next one.

# Answers

## ~~Exam Questions~~

### 8. Answer: B

If there's an increased risk of a project because one phase can't start until another one ends, that means your project phases aren't overlapping. When you've got overlapping phases, that means that you typically have multiple teams that start their phases independently of one another.

Also, take another look at answer C, because it's an important point about overlapping phases. When your phases have an overlapping relationship, there's an increased risk of rework. This typically happens when one team delivers the results of their project, but made assumptions about what another team is doing as part of their phase. When that other team delivers their work, it turns out that the results that both teams produced aren't quite compatible with each other, and now both teams have to go back and rework their designs. This happens a lot when your phases overlap, which is why overlapping phases have an increased risk of rework.

### 9. Answer: D

In a projectized organization, the project manager has the power to assign tasks, manage the budget, and release the team.

### 10. Answer: A

The first things that are created on a project are the charter (which you create in the Develop Project Charter process) and the stakeholder register (which you create in the Identify Stakeholders process). You do those things when you're initiating the project.



## 4 Project integration management

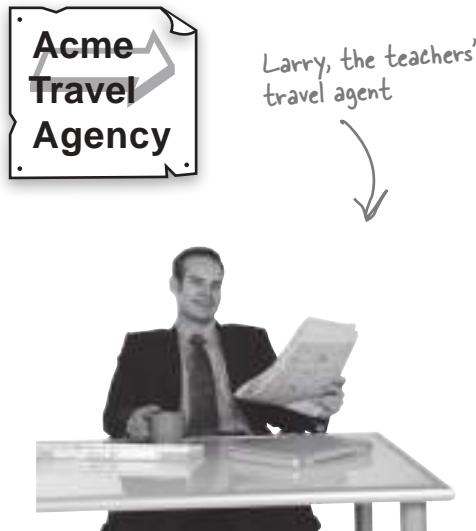
# Getting the job done



**Want to make success look easy?** It's not as hard as you think. In this chapter, you'll learn about **a few processes** you can use in your projects every day. Put these into place, and your **sponsors** and **stakeholders** will be happier than ever. Get ready for **Integration Management**.

## Time to book a trip

Everyone in the Midwestern Teachers' Association has gotten together and planned a trip—a tour of Asia and Europe, starting with Mumbai, India, and ending up in Paris, France.



## Larry's cutting corners

Larry wants to dive into the project and make his clients happy. When he sees an opportunity to save them money, he takes it! But sometimes the cheapest way to do things isn't the way that will end up satisfying everyone.



# The teachers are thrilled...for now

Larry convinces the teachers to travel in June because of the great price he got on tickets. But he's not really planning for the results of that decision—and neither are the teachers.

One of the keys of project management is thinking a project through *before* starting the work, so problems that could arise down the line are anticipated ahead of time. That's why so much of project management is spent **planning**.

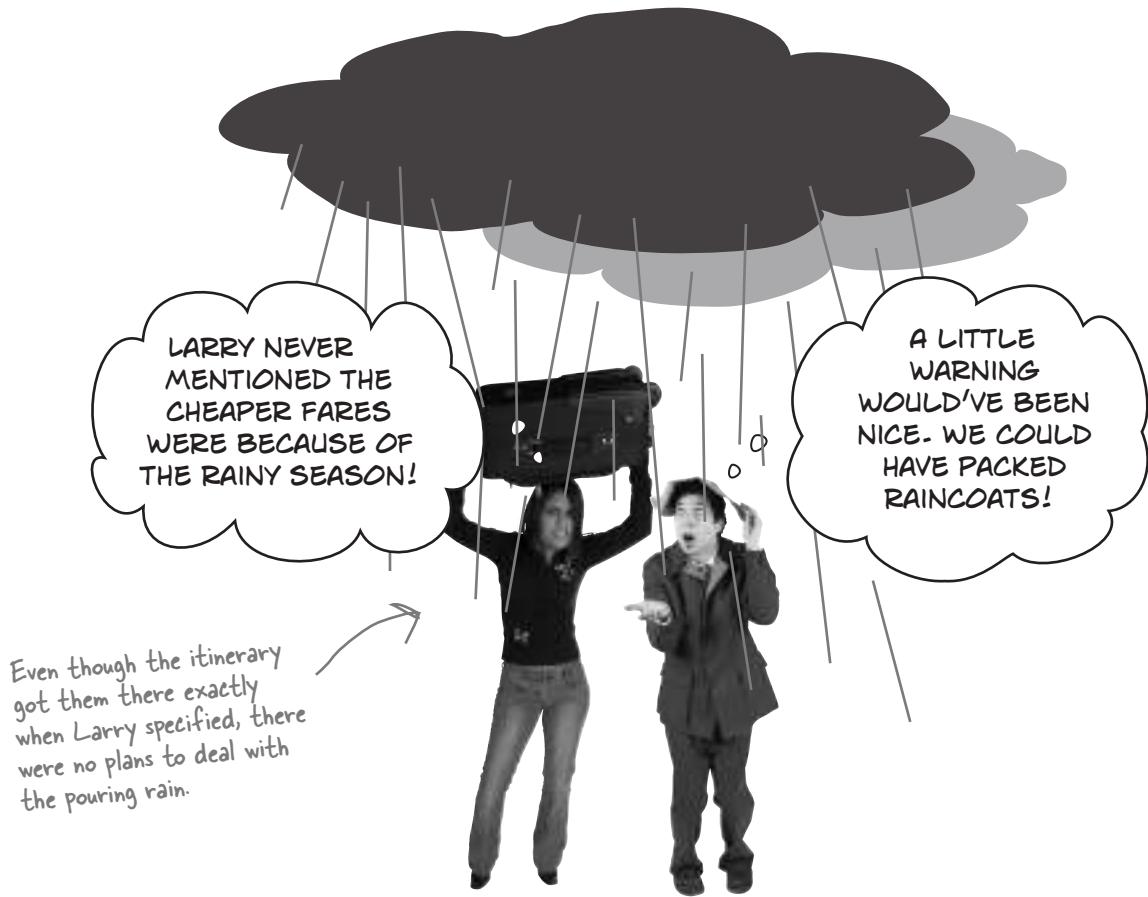
Larry may think this itinerary is a plan, but it doesn't detail any of the problems that could arise on the teachers' vacation.

TRAVEL ITINERARY FOR MIDWESTERN TEACHERS ASSN.			
Record Locator	HF184-Z	Agent ID	Larry
Trip ID	189435163	Acme Travel	
<b>Travel Details</b>			
<b>Flight Information</b>			
<b>Leg 1</b>	Econo Airlines	Departing	1:45PM
Airline	8614	Arriving	1:00AM
Flight	St. Paul, MN	Terminal	1
Origin	Mumbai, INDIA	Arriving	June 13
Destination	17 hours 45 Minutes	Distance	7942mi
Est Time			

Larry changed the date to June, and now the project's coming in way under budget.

## These clients are definitely not satisfied

When the clients arrived in Mumbai, they found out why the fare was so low: June is monsoon season in India! Larry may have saved them a bundle, but it didn't keep him from soaking his clients.



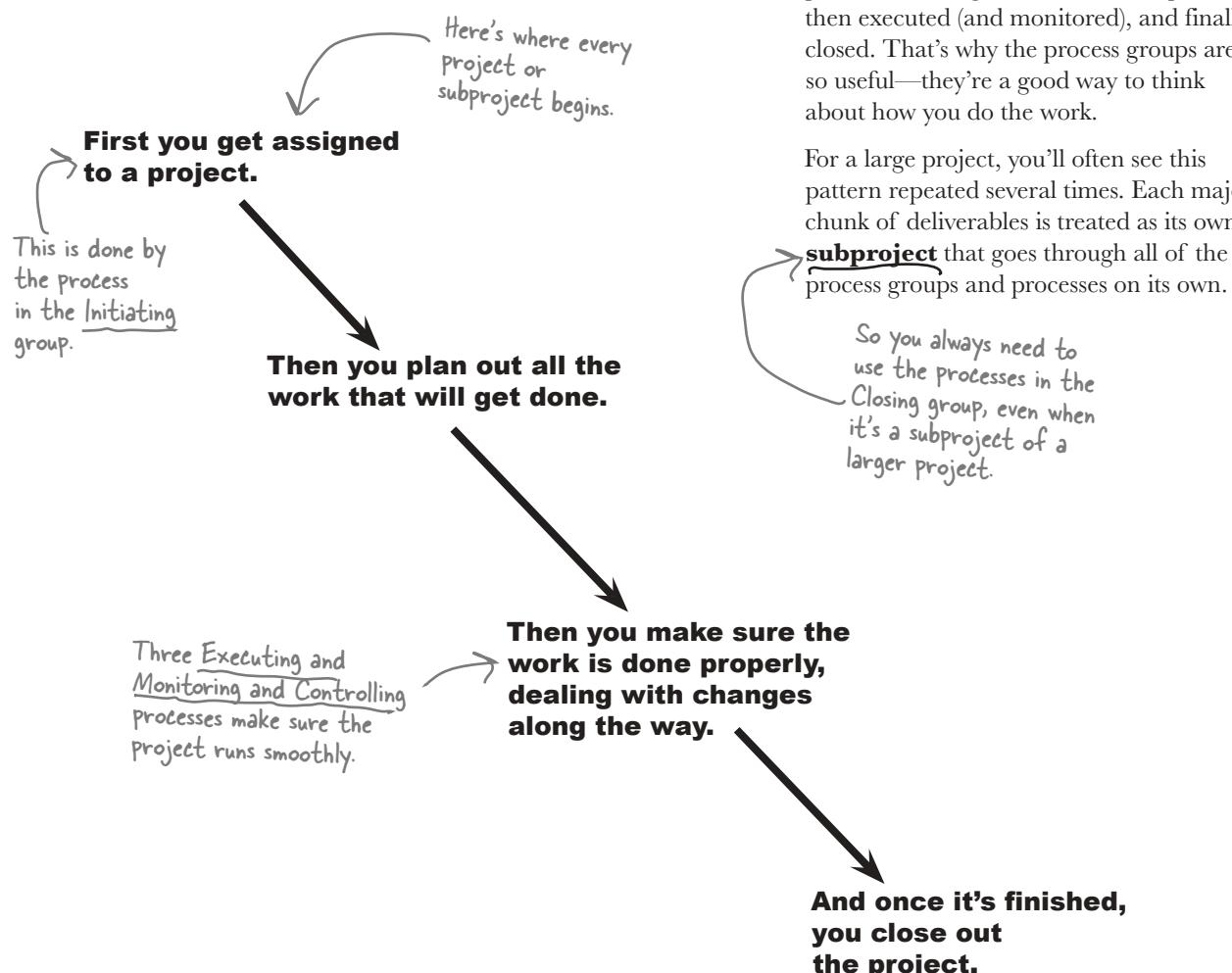
## Larry's been let go

From the minute they got off the plane, the clients were extremely unhappy. The senior managers at Acme Travel don't want to lose the teachers' business...so they've appointed YOU as the new travel agent.

It's your job to finish planning the trip, and make sure that the teachers leave their vacation satisfied.

# The day-to-day work of a project manager

Project managers make projects run well. They plan for what's going to happen on the project. A big part of the job is watching closely to make sure the plan is followed, and when things go wrong, making sure they're fixed. And sometimes the plan itself turns out to be inadequate! Project managers look for those kinds of problems, and fix them too. That day-to-day work is what the **Integration Management** processes are all about.



## A bird's-eye view of a project

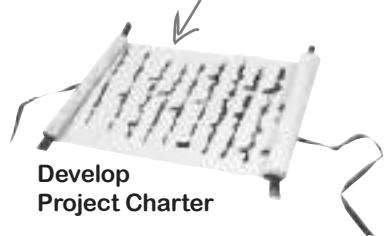
Every project follows the same kind of pattern. First it gets initiated, then planned, then executed (and monitored), and finally closed. That's why the process groups are so useful—they're a good way to think about how you do the work.

For a large project, you'll often see this pattern repeated several times. Each major chunk of deliverables is treated as its own **subproject** that goes through all of the process groups and processes on its own.

# The six Integration Management processes

The *PMBOK Guide* divides Integration Management into six processes that you need to understand for the exam. They're what people usually think of as a project manager's "core" responsibilities.

Without the project charter, you don't have the authority to tell your team what to do and when to do it.



## 1 Develop Project Charter

The very first thing that's done on a new project is the development of the project charter. That's the document that authorizes you to do your work. But you're not always involved in making it—oftentimes it's handed to you by the sponsor.

The sponsor is the person who pays for the project.

## 2 Develop Project Management Plan

The Project Management plan is the most important document in the entire *PMBOK Guide* because it guides everything that happens on the project. It spans all of the knowledge areas.

Develop Project Management Plan



A big part of the Project Management plan is that it tells you how to handle changes when problems come up.

## 3 Direct and Manage Project Work

After you're done planning, it's time to do the work. Your job is to make sure that everybody is doing what they should be doing, and that the products or services your project creates meet the needs of the stakeholders.

Here's where the work gets done. It's where all of the planning you'll do in all of the other knowledge areas comes together so that you can actually make stuff. It's the day-to-day work that you help your team do, and make sure gets done.

## ④ Monitor and Control Project Work

A good project manager is constantly monitoring every single thing that goes on in the project. Remember, the later you find a problem, the harder and more expensive it usually is to fix.

Keep everyone satisfied by catching problems as early as possible.

## ⑤ Perform Integrated Change Control

Once you've found problems on your project, you've got to work with your stakeholders and sponsors to figure out how to deal with those problems. You should also update your Project Management plan to reflect any extra steps you'll need to take to complete the project. Updating the Project Management plan also makes sure everyone working on the project stays on the same page.

Once you catch problems, this is where you figure out how to fix them—or if they should be fixed at all.

## ⑥ Close Project or Phase

The last thing you do on the project is close it out. Make sure you document everything...especially the lessons you and your team have learned along the way. You can never tell when these lessons may help you out on your *next* project.

Keep an eye out for potential changes. Part of your job is helping the people around you anticipate changes, and maybe even prevent them.



## Sharpen your pencil

Here are a few of the things you might have to deal with in working on the teachers' vacation trip. Figure out which of the six Integration Management processes you'd use in each situation, and write down the process name in the blank.

- 1 It turns out that one of the teachers is a vegetarian, so some of the restaurant reservations will need to be canceled, and new reservations will need to be made at restaurants that can accommodate him.
- 

- 2 You come up with a detailed description of everything that you plan to do to get the teachers where they want to be.
- 

- 3 The CEO of Acme Travel sends you a document that assigns you to the project.
- 

- 4 You check in with the teachers at each destination to make sure everything is going according to plan.
- 

- 5 When the teachers get back, you write up everything you learned while handling the trip so other travel agents can learn from your experience.
- 

- 6 You book the tickets and hotel accommodations.
- 

**Develop Project Charter**

**Develop Project Management Plan**

**Direct and Manage Project Work**

**Monitor and Control Project Work**

**Perform Integrated Change Control**

**Close Project or Phase**

→ Answers on page 147.

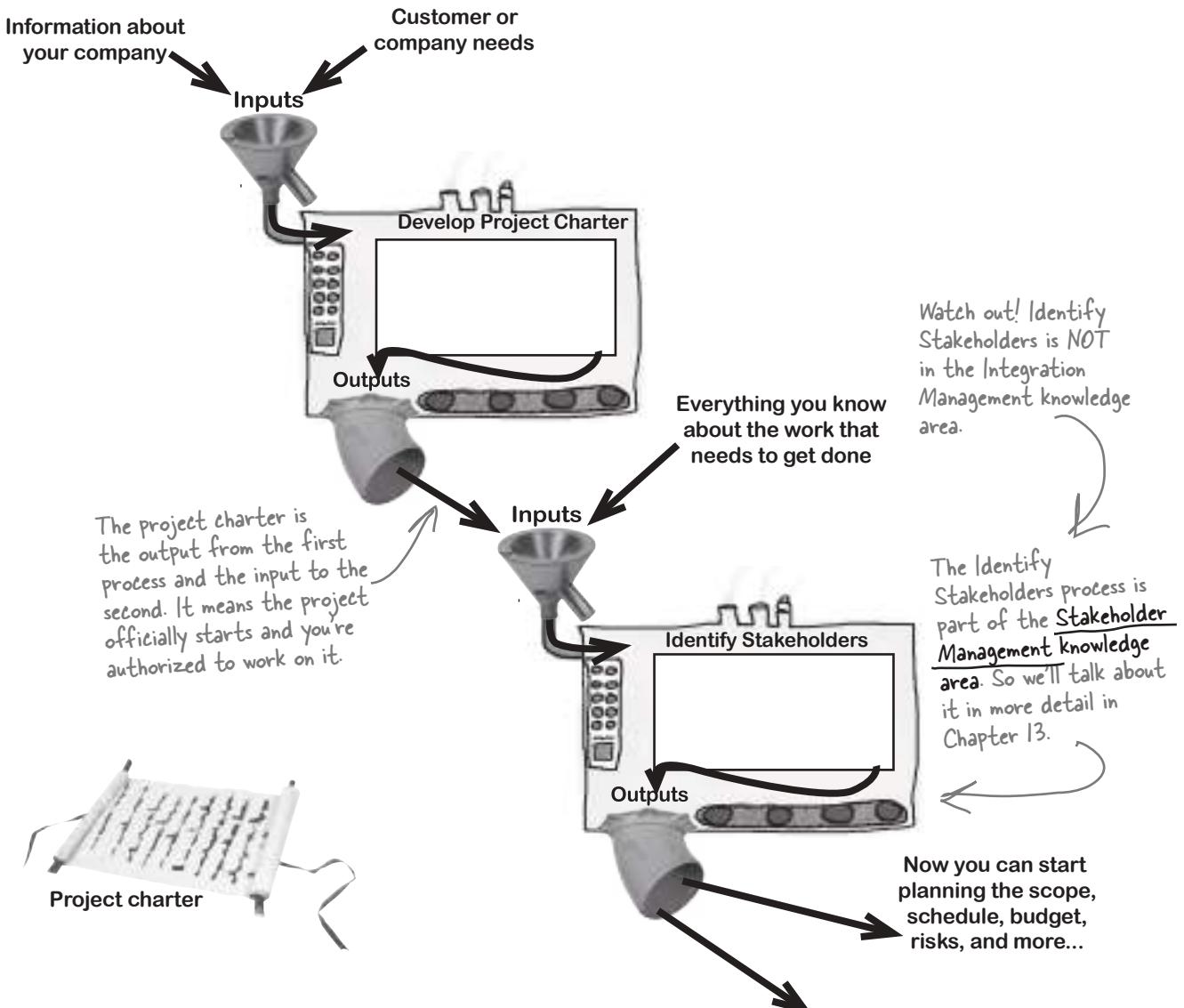
# Start your project with the Initiating processes

All you need to get your project started are the only two processes in the Initiating process group. First, the **Develop Project Charter** process tells everyone in the company why the project is needed, and gives you the authority you need to make it happen. Then you use the **Identify Stakeholders** process to figure out who is affected by the project and how to communicate with them.

These are the only two processes in the Initiating process group.

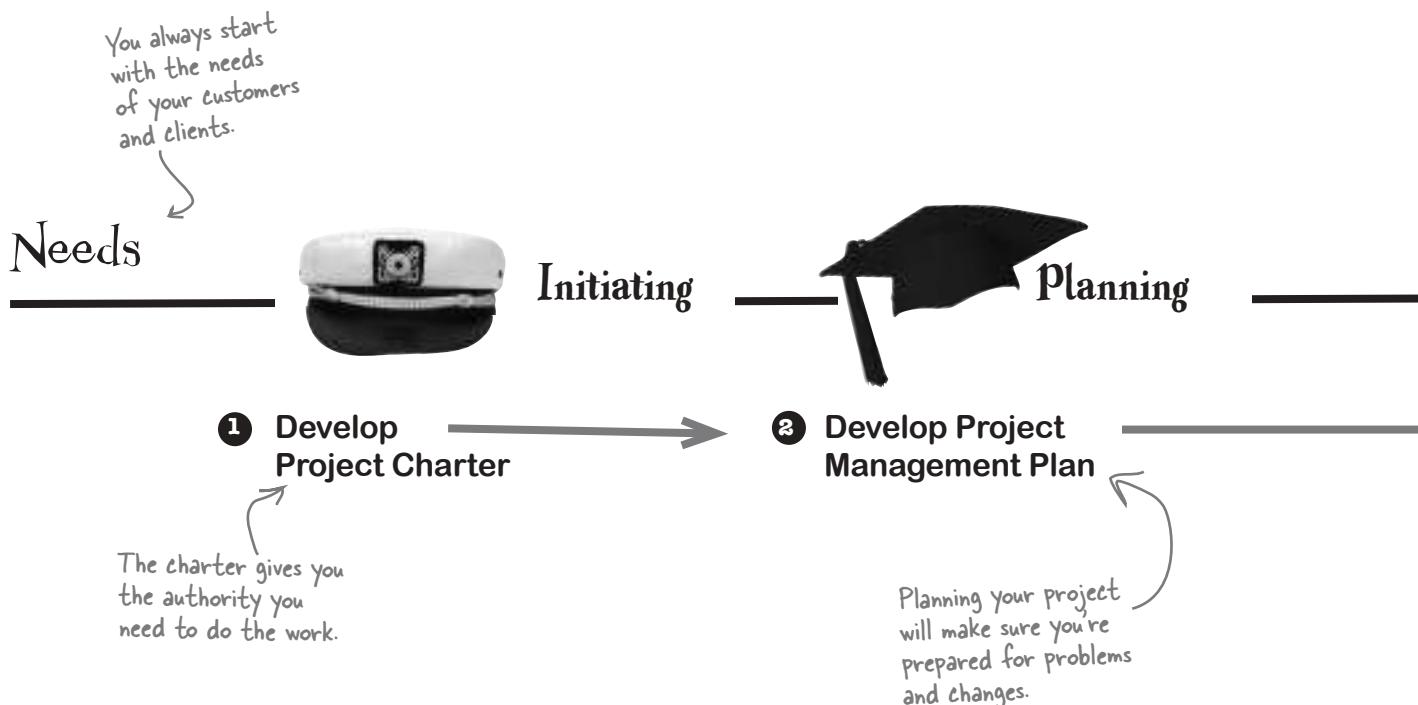


Initiating process group



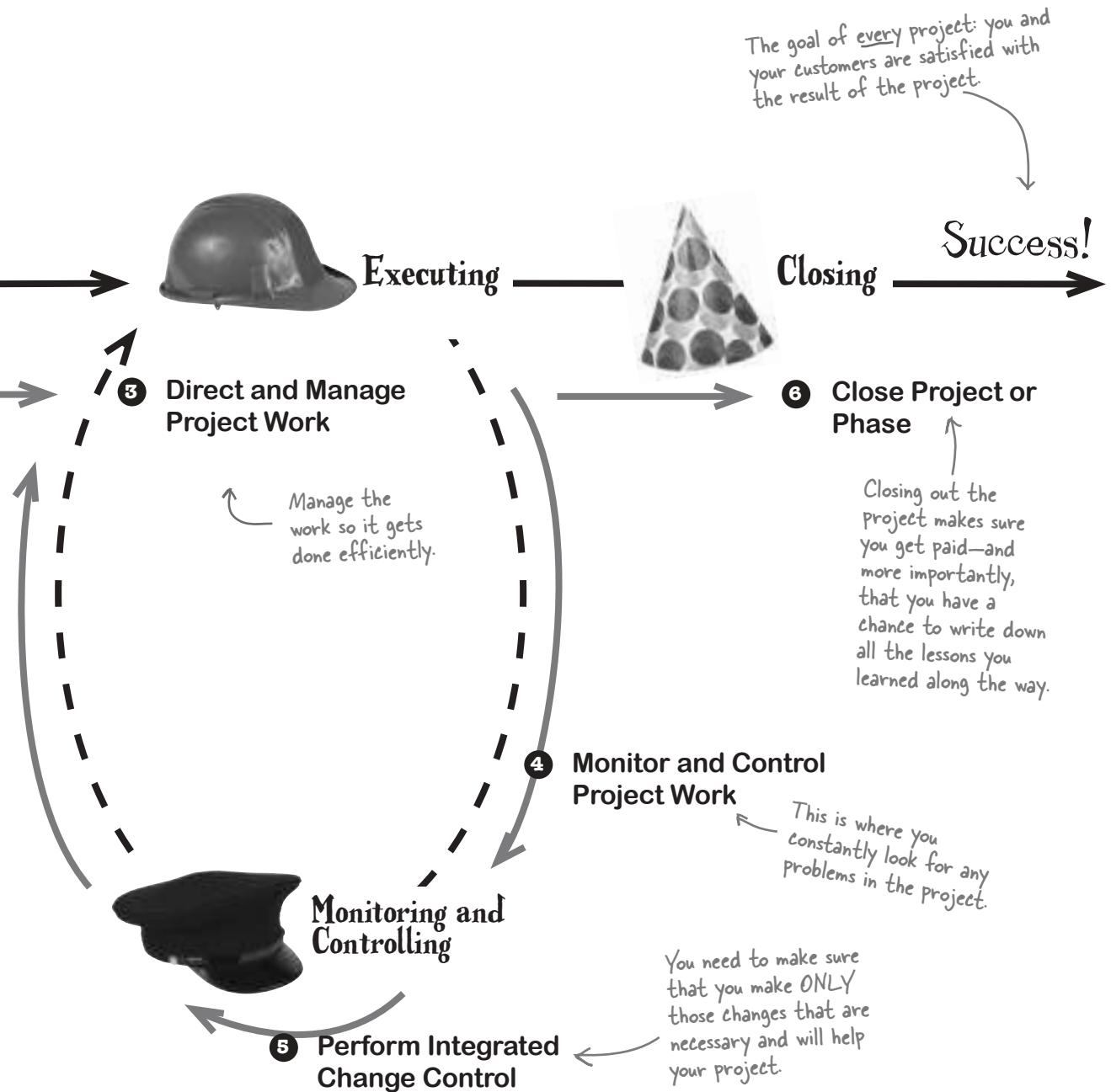
# Integration Management and the process groups

Here is how the process groups all fit into this whole Integration Management thing. The process groups show you the order in which these things happen, and how the processes interact.



The Integration Management knowledge area brings all of the process groups together. A project manager has to integrate the work of everyone on the team through all of these major activities to keep the project on track:

1. Being authorized by the project charter to control the budget and assign resources
2. Planning all of the work that's going to happen throughout the project
3. Directing the work once it gets started
4. Monitoring the way the work progresses and looking for potential problems
5. Looking out for changes, understanding their impacts, and making sure they don't derail the project
6. Closing out the project and making sure that there are no loose ends when it's over



# The Develop Project Charter process

If you work in a matrix organization, then your team doesn't report to you. They report to functional managers, and might have other work to do. But when they're on your project, you're effectively their boss. So how do you make that happen? Well, you need some sort of **authorization**, and that's what the project charter is for. It says exactly what you're authorized to do on the project (like assign work to the team members and use the company's resources), and why you've been assigned to it. But the charter isn't just important for matrix companies. In any kind of company, it's really important to know who's in charge, and what resources you have available to you when you manage a project.

The teachers' contract said that they needed to go to Asia and Europe for \$7,500 per person. You'd better make sure that shows up on the charter.



Initiating process group

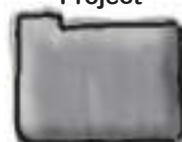
This is a description of the business need, the scope, and how the project fits into the strategic plan.



Agreements



Business case



Project

Statement of work



Enterprise environmental factors



Organizational process assets

Since this project will be done at Acme Travel, Acme's work culture will affect it. At Acme, everyone gets a two-hour lunch every day, so the schedule will need to take that into account.

Inputs



While he was writing the charter, the CEO looked at lessons learned from past trips to be sure that Acme got the best airline and hotel accommodations for the teachers' trip.



# Make the case for your project

The Midwestern Teachers' Association contract wasn't the only one that Acme could have taken. The company's got more work than it can handle right now, and occasionally it needs to turn away a client. That's where a **business case** comes in handy. If a project is too risky, won't make enough money, isn't strategic, or isn't likely to succeed, then the senior managers at Acme could choose to pass on it.

But to figure all that out, you need to do some thinking about what makes taking on this project a good idea for Acme Travel. Preparing a business case means thinking about the value of the project to business. Is there a big market for world travel packages that Acme can break into if it does this project? Should Acme do it just because the customer requested it? Will it help the company in other ways?

**BUSINESS CASE DOCUMENT**

**Midwestern Teachers' Association World Tour**

**Project Description:** A group of teachers from Minnesota wants to take a trip around the world, starting with Mumbai, India, and ending somewhere in Europe.

**Strategic Analysis:** Taking on this project would give Acme Travel Agency an edge over most of the other travel agencies in town that don't offer travel packages to southeast Asia. The only travel agencies in the area that offer this kind of package charge about \$500 more for the package than our clients are willing to pay. By offering the package at the cost the Teachers' Association has suggested, we'll make around \$700 profit on the trip and still be able to undercut the closest competition.

**Intangible Benefits:** The agents who work on this trip will gain experience booking travel in Asia, and that will help us with some other prospects that have expressed interest in similar trips.

**Related Projects:** This project is similar to the 2007 Handbell Enthusiasts European Tour we managed. If all goes well, we should be able to use the outcome of this project as leverage to win the travel planning job for the Midwestern High School Horticulture Club World Tour that's coming up in 2011.

**Conclusion:** It's in Acme's best interest to do this project.



This project will make the company money.

Acme needs more Asia Travel specialists. This project will help train them.

Doing this project will not only profit the company, but also might win it further business.

A business case document says why it's worth it to spend money on the project.

## Use expert judgment and facilitation techniques to write your project charter



When you think about it, a lot of different people's opinions can help your company come to a good decision about whether or not to start a project. Sometimes project sponsors will call on experts to help them decide which projects to do. At Acme Travel, the CEO called a meeting with the VP of Asia Travel to make sure that the teachers' trip was worth doing. The VP of Asia Travel had set up trips like this one before and he knew where things could go wrong in planning them. Together, they looked at all of the project documentation to make sure that this project looked like it would make Acme enough money to be worth doing.



You use expert judgment any time you bring in an expert from outside your project to offer advice or lend expertise.

Your company might need to talk to subject matter experts from a bunch of different departments to decide if a project will be beneficial to it. It might rely on outside consultants or industry groups to tell it how other companies have solved the same problem. All of those different opinions are called **expert judgment**.

If the experts agree that the project's business case, contract, and statement of work all add up to a product that's going to do good things for your company, they'll usually give the green light to write the charter.



## Facilitation techniques help everyone understand the goal of your project

When you sit down to write your project charter, you'll need to get your stakeholders on the same page about what your project team will do. You might set up meetings with your stakeholders to brainstorm project goals or work with them to resolve conflicts around how your project will run. All of the approaches you take to get everybody on the same page are called **facilitation techniques**.



Here are a bunch of ways Acme evaluated the inputs for the Develop Project Charter process. Try to figure out which ones involve expert judgment and which are facilitation techniques.

**1. Acme Travel creates a committee to review all of the business case documents that have been submitted for possible projects and compare them to figure out which projects should be funded in the next quarter.**

- A. Expert judgment      B. Facilitation technique

**2. Acme hires an outside consultant to help it figure out whether or not its current strategic goals are the right ones for the company.**

- A. Expert judgment      B. Facilitation technique

**3. Acme asks the VP of Asia Travel to review the business case for the Midwest Teachers' Association trip and decide whether or not the projected costs and schedule look right.**

- A. Expert judgment      B. Facilitation technique

**4. Acme has a big meeting with all of the project stakeholders to help it evaluate all of its project proposals and decide which ones are most likely to benefit the company.**

- A. Expert judgment      B. Facilitation technique

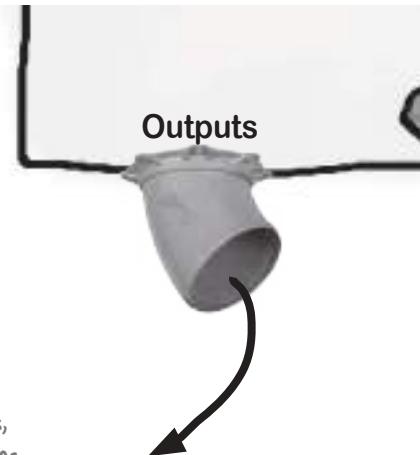
**5. The travel agent who is assigned to the project holds a brainstorming session with all of the other travel agents to propose a new goal for the project.**

- A. Expert judgment      B. Facilitation technique

—————→ Answers on page 108.

## A closer look at the project charter

The charter is the **only output** of the Develop Project Charter process. We know that it makes sense to do the project—that's what we did with the business case. And we know that it assigns authority so that you can do your job. But what else does a charter have in it?



**Project Charter**

**Acme Travel**

**Project Description:** World vacation in 4 weeks  
A group of teachers from Minnesota wants to take a trip around the world, starting with Mumbai, India, and ending somewhere in Europe. They have contracted Acme Travel Agency to make their dream a reality.

**Project Requirements:**

- Trip should be planned to coincide with good weather.
- Need to see famous monuments at each point of destination.
- Restaurant recommendations and nightlife information on request.
- Need assistance for missed flights, lost luggage, and other issues in transit.

**Assigned Project Manager and Authority Level:**  
You have the authority to use dedicated money and resources to accomplish this goal.

**Summary Milestone Schedule**

June 13–20—Mumbai	June 20–23—Hong Kong
June 24–29—Shanghai	June 30–July 4—Rome
July 5–8—Barcelona	July 9–14—Paris

**Business Case:**  
This project will be a sound investment for Acme. Provided it is planned and executed properly, we should receive around \$700 per person in profit.

SIGNED,

\_\_\_\_\_  
CEO, Acme Travel

*The charter assigns you the authority to use resources, like people on your team, computers, office equipment, conference rooms—the things you need to get the job done.*

*Larry should have paid attention to this information.*

*As the project charter officially assigns the PM, it can be written before the PM is even involved.*

*This is just a summary of the important points of the business case that were used to decide to pursue the project.*

*This project has one sponsor, but it's OK if a project has more than one.*



Take a look at the charter for the teachers' trip, and write down what you think each of the following sections of a typical project charter is used for.

Project Description:

Project Requirements:

Assigned Project Manager and Authority Level:

Summary Milestone Schedule:

Business Case:

## Sharpen your pencil Solution

Take a look at the charter for the teachers' trip, and write down what you think each of the following sections of a typical project charter is used for.

Project Description:

**The purpose of the project**

This is a high-level description of the goals of your project. It's usually a few sentences that describe the project's main purpose.

Project Requirements:

**Describes the product your project has to make**

Anything you know that the customer, stakeholder, or sponsor expects to get out of the project should go here.

Assigned Project Manager and Authority Level:

**Who the project manager is and what he has to do**

This is where you're assigned to the project. If it's known who is going to be the project manager, the name of that person is noted. Otherwise, you may just have a department listed that you know the PM will come from. This is also where any specific decision-making authority you might need can be described.

Summary Milestone Schedule:

**A list of dates that your project needs to meet**

This section lists the reasons why it makes sense for your business to do this project. You might note the return on investment, building infrastructure, goodwill with clients, or anything else that will help people understand why this project is important.

Business Case:

**Why your company has decided to do this project**



## Exercise

Here are a bunch of ways Acme evaluated the inputs for the Develop Project Charter process. Try to figure out which ones involve expert judgment and which are facilitation techniques.

Expert judgment always refers to people using their experience to make decisions on your project.

1. A. Expert judgment

B. Facilitation technique

2. A. Expert judgment

B. Facilitation technique

3. A. Expert judgment

B. Facilitation technique

4. A. Expert judgment

B. Facilitation technique

5. A. Expert judgment

B. Facilitation technique

Facilitation techniques are the meetings and sessions that are used to get everybody to agree on major project decisions.

## Two things you'll see over and over and over...

There are two inputs that you'll see repeatedly for a bunch of different processes throughout the rest of the book. **Enterprise environmental factors** are anything that you need to know about how your company does business. And **organizational process assets** have information about your projects: how people in your company are supposed to perform them, and how past projects have gone.



Enterprise environmental factors

### **Enterprise environmental factors tell you about how your company does business.**

There's a lot of information about your company that will be really useful to you when you're planning your project. You need to know how each of the different departments operates, the market conditions you're working in, the company's overall strategy, any policies you need to work with, your company's culture, and all about the people who work at the company.

One of the enterprise environmental factors you'll use in the Integration Management processes is **the work authorization system**, which determines how your company assigns work to people and ensures that tasks are done properly and in the right order.



Organizational process assets

### **Organizational process assets tell you about how your company normally runs its projects.**

Every company has standards for how to run its projects. There are guidelines and instructions for managing projects, procedures you need to follow, categories for various things you need to keep track of, and templates for all of the various documents that you need to create. These things are usually stored in some sort of library.

One of the most important organizational process assets is called **lessons learned**, which is how you keep track of valuable historical information about your project. At the end of every project, you sit down with the project team and write down everything you learned about the project. This includes both positive and negative things. That way, when you or another project manager in your company plans the next project, you can take advantage of the lessons you learned on this one.



Can you think of how these would be useful for starting and planning your project?

## there are no Dumb Questions

**Q:** I've never had a project charter. Is it really necessary?

**A:** Yes, definitely. Have you ever been on a project where you didn't feel like you had enough authority to do your job? The project charter gives you the authority to manage your project. Every project should have a charter, and writing the charter is the first thing that should happen on any project.

**Q:** Wait a minute! How can I be the one writing the charter, when it's what gives me all of my authority and I might not even be assigned to the project yet?

**A:** Right, you're not usually going to write a charter. The charter is usually handed to you. The project sponsor usually writes the charter. And it's always easy to tell who the project sponsor is: the sponsor is the person who pays for the project, and comes up with the project's overall goals.

**Q:** I'm still not sure I get the idea behind a business case document. How's that different from the project charter?

**A:** The business case is a description of what your company is trying to get out of the project—like how much money you're planning on making from the project, how it will benefit parts of your organization, and future business you might gain from the project.

The project charter is a high-level description of your project. It tells you—and anyone else who needs to know about your project—what you'll be delivering, including a really high-level description of what it is that you'll build.

A really important difference between them is that the project charter is what authorizes the project manager to do the work, while the business case helps give justification for the project. You can think of the business case as the background research that had to be done in order to make sure the project was worth doing, and the project charter as the thing that formally announces the decision to do it.

**Q:** I'm still not clear on who the sponsor is. How's that different than the customer?

**A:** The sponsor is the person (or people) paying for the project. The customer is the person who uses the product of the project. Sometimes the customer is the same person as a sponsor. This is often true in consulting companies. For the teachers' project, the two sponsors are the CEO and VP of Asia Travel, and the customers are the teachers. But it's possible that in another travel agency, the teachers themselves would be the sponsors. This happens a lot in contracted work.

For the exam, you'll need to be careful about this. Sometimes you'll see the word *customer* in a question that's asking you about the sponsor. You might even see the word *client*—a word that appears in the *PMBOK Guide* only four times! (It's usually used when you're talking about procurement.) When you see this, you should assume that the question is asking you about a consulting situation, where the sponsor, customer, and client are all the same person.

The CEO and VP of Asia Travel are paying for this project in the sense that they're providing funding for the project team at the travel agency and cutting checks to the airlines, hotels, tour groups, etc. The customers are definitely paying Acme Travel, but they're not paying out the budget for the specific work that has to be done to complete the project.

**Q:** Hold on. My project sponsors are really important people in my company. I can't imagine them actually typing up a project charter.

**A:** Good point. That's why the project sponsor will often delegate the actual creation of the charter to the project manager. For the exam, though, keep in mind that the sponsor is ultimately responsible.

**The sponsor of a project is responsible for creating the project charter.**

**The sponsor of a project pays for the project. The PM manages the project.**

## BULLET POINTS: AIMING FOR THE EXAM

- The **project charter** officially sanctions the project. Without a charter, the project cannot begin.
- The **sponsor** is the person (or people) responsible for paying for the project and is part of all important project decisions.
- **Develop Project Charter** is the very first process performed in a project.
- The project charter gives the project manager authority to **do the project work**, and to **assign work** or take control of project resources for the duration of the project. It also gives the project manager authority to **spend money** and **use other company resources**.
- **Facilitation techniques** (like brainstorming) are ways to get all of your stakeholders on the same page about your project goals and your approach to meeting them.
- The **business case** tells everyone why the company should do the project. It's an input to building the **project charter** that tells everyone that the project actually started, explains what it's going to deliver, and authorizes the project manager to do the work.
- The project charter does not include details about what will be produced or how. Instead, it contains the **summary milestone schedule**.
- Two additional inputs to Develop Project Charter are the **agreements** and the **statement of work**. The contract is what you agreed to do, although not all projects have a contract. The statement of work lists all of the **deliverables** that you and your team need to produce.
- **Enterprise environmental factors** tell you how your company does business. An important one is the **project management information system**, which determines how work is assigned, and makes sure that tasks are done in the right order.
- **Organizational process assets** tell you how your company normally runs projects. One of the most important assets is **lessons learned**, which is where you write down all of the valuable historical information that you learn throughout the project to be used later.

At Acme, the CEO and VP of Asia Travel were the sponsors. But at another travel agency, Frank and Joanne could just as easily sponsor the project, since they're the customers.



**When you're taking the PMP exam, be careful when you see a question that asks you about the customer or client.**

*There's a good chance that the question is asking you about a consulting or procurement situation where the customer or client is also the sponsor.*

In matrix organizations, your team doesn't report to you, so the charter gives you the authority to put them to work.

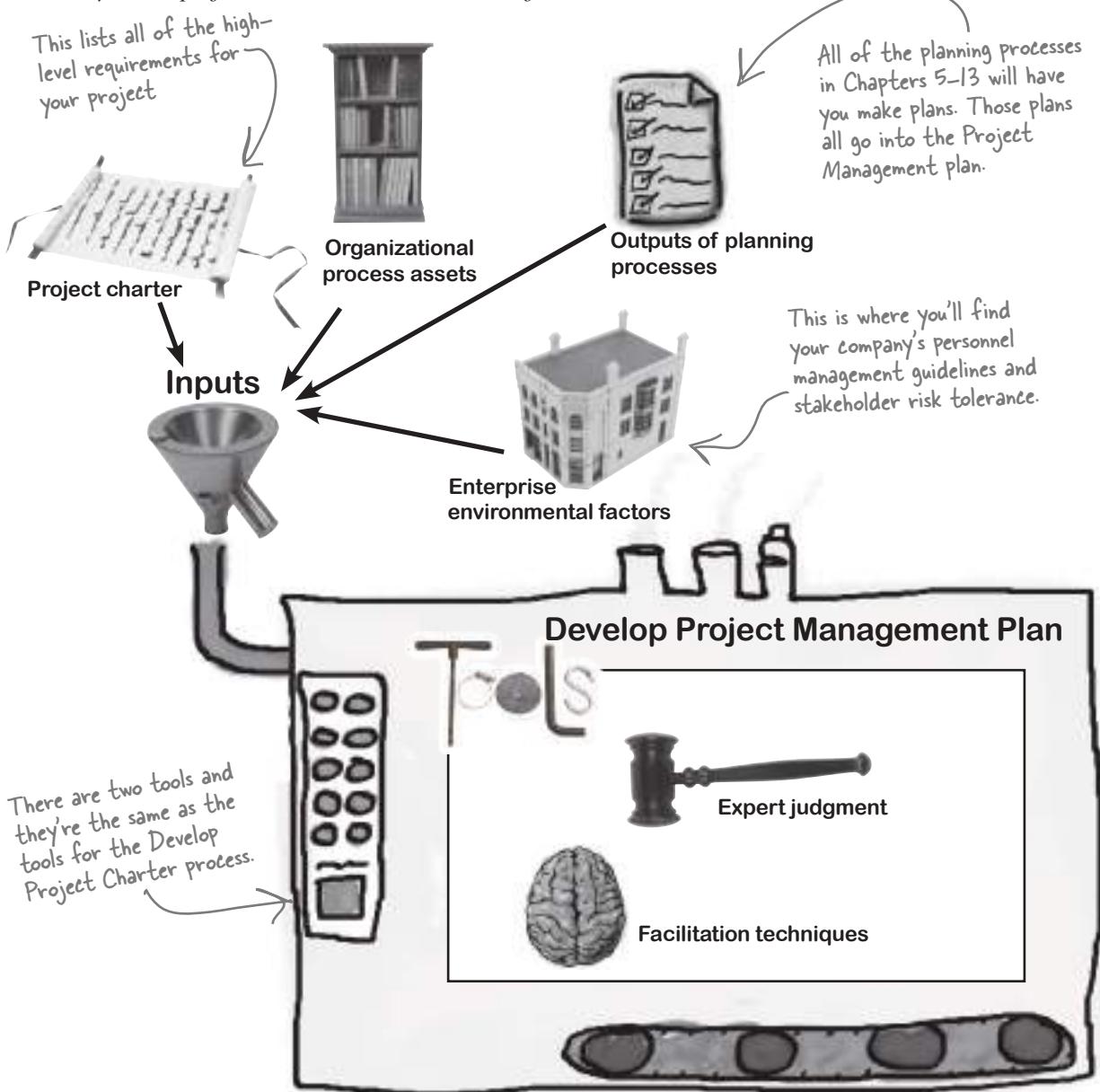
The project charter shouldn't be too detailed. You shouldn't have to update the charter every time you change something about your project for it to stay accurate.

Agreements are sometimes referred to as contracts on the exam.

# Plan your project!



Planning the project is when you really take control. You write a plan that says exactly how you're going to handle everything that goes on in the project. The **Develop Project Management Plan** process is where you organize all of the information about your project into one place, so everyone knows exactly what needs to happen when they do the project work—no matter what their jobs are.



# The Project Management plan lets you plan ahead for problems

The **Planning** process group is where you figure out how you're going to do the project—because you need to come up with a plan before you bring the team in to do the work. This is where you think about everything that will happen on your project, and try to plot a course to completing it with as few errors as possible.

And it's where you figure out how you'll handle changes—because every project has plenty of problems, but not all of those problems mean that you need to change course. If you plan well, your project will make only the right changes.

## The Project Management plan is a collection of other plans

The Project Management plan is a single document, but it's broken into a bunch of pieces called **subsidiary plans**. There's one subsidiary plan for each of the other knowledge areas: Scope Management, Time Management, Cost Management, Quality Management, Human Resource Management, Communications Management, Risk Management, Procurement Management, and Stakeholder Management.

### Outputs



The Project Management plan is the only output of the Develop Project Management Plan process.

The Project Management plan is all about planning for problems, and having the information you need to correct those problems when they occur.



Project Management plan

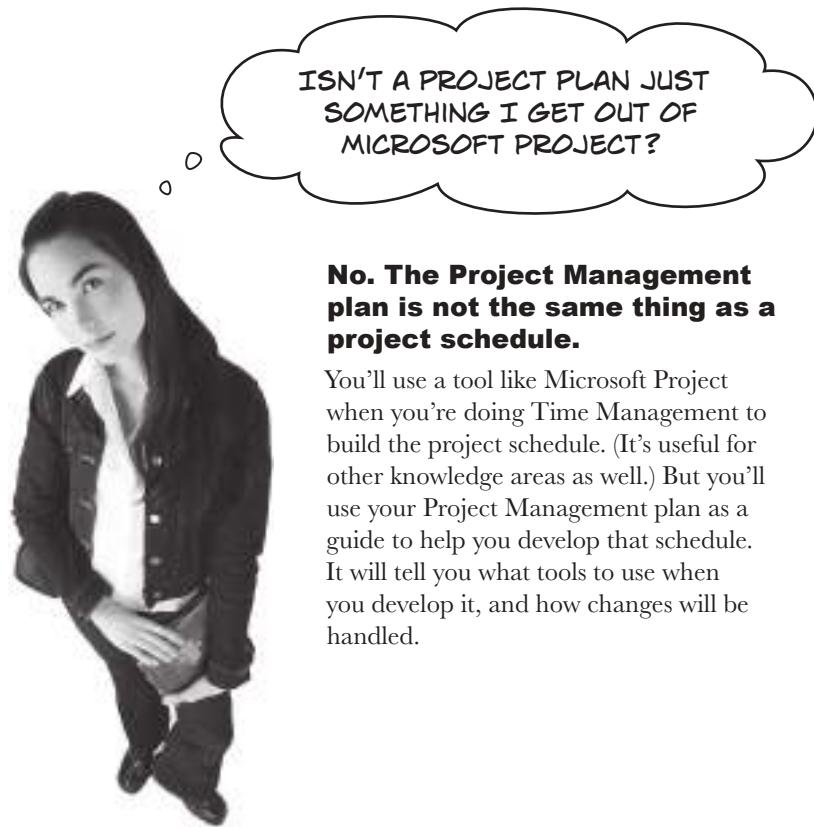
The Project Management plan is actually a whole bunch of documents called "subsidiary plans," each dedicated to a knowledge area and the problems that could happen related to that area.

Communications Management is another knowledge area. In that plan, we've got important numbers for the trip.

If you take over a project that's already under way, but there isn't a Project Management plan or it's out of date, the first thing you need to do is get a current, accurate plan written up.

There's a subplan for Risk Management. We used it when we took out traveler's insurance for the teachers' trip. That means if bags or cash are stolen, we'll have a plan for dealing with it.

The Project Management plan also has baselines. A baseline is a snapshot of the scope, schedule, or budget that you can use for planning. You'll learn all about baselines in the next three chapters!



**No. The Project Management plan is not the same thing as a project schedule.**

You'll use a tool like Microsoft Project when you're doing Time Management to build the project schedule. (It's useful for other knowledge areas as well.) But you'll use your Project Management plan as a guide to help you develop that schedule. It will tell you what tools to use when you develop it, and how changes will be handled.



**Don't worry about memorizing all of the subsidiary plans.**

You're going to learn about all of the knowledge areas throughout the book, so don't worry about memorizing all of these subsidiary plans right now. Just know that the Project Management plan has plans within it that map to each of the knowledge areas.

# A quick look at all those subsidiary plans

You'll be learning about each of the knowledge areas throughout this book, and you'll learn all about the subsidiary plan that goes with each area. But let's take a quick look at what each subsidiary plan focuses on.

## Project Management Plan—Subsidiary Plans and Baselines

The **Scope Management plan** describes how scope changes are handled—like what to do when someone needs to add or remove a feature for a service or product your project produces.

The **Requirements Management plan** describes how you'll gather, document, and manage the stakeholders' needs, and how you'll meet those needs with the project deliverables.

The **Schedule Management plan** shows you how to deal with changes to the schedule, like updated deadlines or milestones.

The **Cost Management plan** tells you how you'll create the budget, and what to do when your project runs into money problems.

The **Quality Management plan** deals with problems that could arise when a product doesn't live up to the customer or client's standards. The **Process Improvement plan** tells you how you can change the processes you're using to build your product to make them better.

You use the **Human Resource Management plan** to deal with changes in your staff, and to identify and handle any additional staffing needs and constraints you might have in your specific project.

The **Communications Management plan** lists all of the ways that you communicate with your project's team, stakeholders, sponsors, and important contacts related to the project.

The **Risk Management plan** is about detailing all the bad things that might happen and coming up with a plan to address each risk when and if it occurs.

The **Procurement Management plan** focuses on dealing with vendors outside of your company.

The **Stakeholder Management plan** focuses on managing the expectations of all of the people who are affected by the project.

There are three **baselines** in the Project Management plan. The **scope baseline** is a snapshot of the scope, which helps you keep track of changes to the work that you'll be doing and the planned deliverables you'll be building. The **schedule baseline** does the same for the project schedule, and the **cost performance baseline** does the same for the budget.

**The Project Management plan is the core of Integration Management. It's your main tool for running a project.**



Below is a whole crop of problems that the teachers are running into. Write down which subsidiary plan you'd look in to get some help. If you're not sure, just reread the descriptions of each subsidiary plan on the previous page, and take your best guess.

1. The teachers want to go Bali, but Acme Travel doesn't book flights there so you need to subcontract one leg of the travel to another travel agency.
- 

2. The teachers are having so much fun that they want to stay at a better hotel. They tell you to increase their budget by 15% to do that.
- 

3. Just as you're about to mail off the teachers' tickets, you notice they've been printed incorrectly.
- 

4. The teachers might run into more bad weather, and you've got to figure out what contingencies you can put into place if that happens.
- 

5. The teachers are concerned that they won't be able to get in touch with you when they're away.
- 

6. One of the teachers realizes that he needs to come back earlier, and you want to make sure the budget reflects his lessened costs.
- 

7. You find out that you need to get the tickets out earlier than expected, because the teachers' contract requires that all trips be preapproved by the superintendent of their school district.
- 

→ Answers on page 149.

*there are no*  
**Dumb Questions**

**Q:** How far should I go when trying to anticipate every possible problem and list it in the Project Management plan?

**A:** It's really important to think about what could go wrong on your project, so that you can have plans for what to do when problems crop up. An unexpected change can sometimes derail a project, and doing some planning up front can keep issues like that to a minimum. Planning can help you avoid problems in the first place, which is a lot better for everyone than reacting to them when they happen. So think of everything you can; the extra time you spend planning could be what keeps your project a success.

**Q:** Does the project manager create the Project Management plan all by himself?

**A:** No, it should be a group effort between the PM and the stakeholders. Everyone on the project team and all of the stakeholders need to agree that the plan is acceptable.

**Q:** What about things that I don't think about? And sometimes, I know there could be problems in a certain area, but I'm not sure what they'll be until the project gets going.

**A:** You're never going to think of everything that could go wrong. To help keep your plan flexible, you should add an Open Issues section to the plan. You can write down any open issues or concerns in this section, and deal with them as they come down the line. However, you have to have all your project requirements complete before starting the project—you should never have any requirements in your Open Issues section.

**Q:** I still don't get what enterprise environmental factors are.

**A:** Your company's enterprise environmental factors are all of the information you have about its policies, processes, departments, and people. You need to know how your company does business in order to do a project. For example, you need to know about the different departments in your company if you're managing a project that will be used by people in them.

### BULLET POINTS: AIMING FOR THE EXAM

- Remember that the Project Management plan is **formal**—which means that it's **written down** and **distributed** to your team.
- You may get a question on the exam that asks what to do when you encounter a change. You **always** begin dealing with change by **consulting the Project Management plan**.
- The **project management information system** is a part of your company's enterprise environmental factors, and it's generally part of any change control system. It defines how **work is assigned to people**.
- The Project Management plan includes **baselines**: snapshots of the scope, schedule, and budget that you can use to keep track of them as they change.

## Question Clinic: The “just-the-facts-ma’am” question

A great way to prepare for the exam is to learn about the different kinds of questions, and then try writing your own. Each of these Question Clinics will look at a different type of question, and give you practice writing one yourself.

Take a little time out of the chapter for this Question Clinic. It's here to let your brain have a break and think about something different.

A LOT OF QUESTIONS ON THE EXAM  
ARE PRETTY STRAIGHTFORWARD—BUT IT'S THE  
ANSWERS TO THOSE QUESTIONS THAT CAN REALLY  
HANG YOU UP. HERE, TAKE A LOOK:



27. Which of the following can be found in the project charter?

- A. Business case document

Some answers will clearly be wrong. The business case document is one of the inputs to the Develop Project Charter process.

- B. Expert judgment

Some answers are a little misleading! This is part of the Develop Project Charter process—but it's from the tools and techniques, not a part of the project charter itself.

- C. Authorization for the project manager

Here's the right answer! The project manager's authorization is included in the project charter.

- D. Project management information system

You haven't seen this one yet—it's part of enterprise environmental factors, an input to the Develop Project Charter process, but not in the charter itself.

WHEN YOU SEE A “JUST-THE-FACTS-MA’AM” QUESTION, READ THE QUESTION REALLY CAREFULLY! IF YOU DON’T, IT’S EASY FOR A WRONG ANSWER TO LOOK RIGHT.



# HEAD LIBS

Fill in the blanks to come up with your own “just-the-facts-ma’am” question.

You are managing a \_\_\_\_\_ project. You are using  
(an industry) and \_\_\_\_\_  
to create a \_\_\_\_\_ . What process are you performing?  
(an input) (an output)

- A. \_\_\_\_\_  
(the name of the wrong process)
- B. \_\_\_\_\_  
(the name of the right process)
- C. \_\_\_\_\_  
(a made-up process that sounds like a real process)
- D. \_\_\_\_\_  
(the name of a tool and technique from the right process)

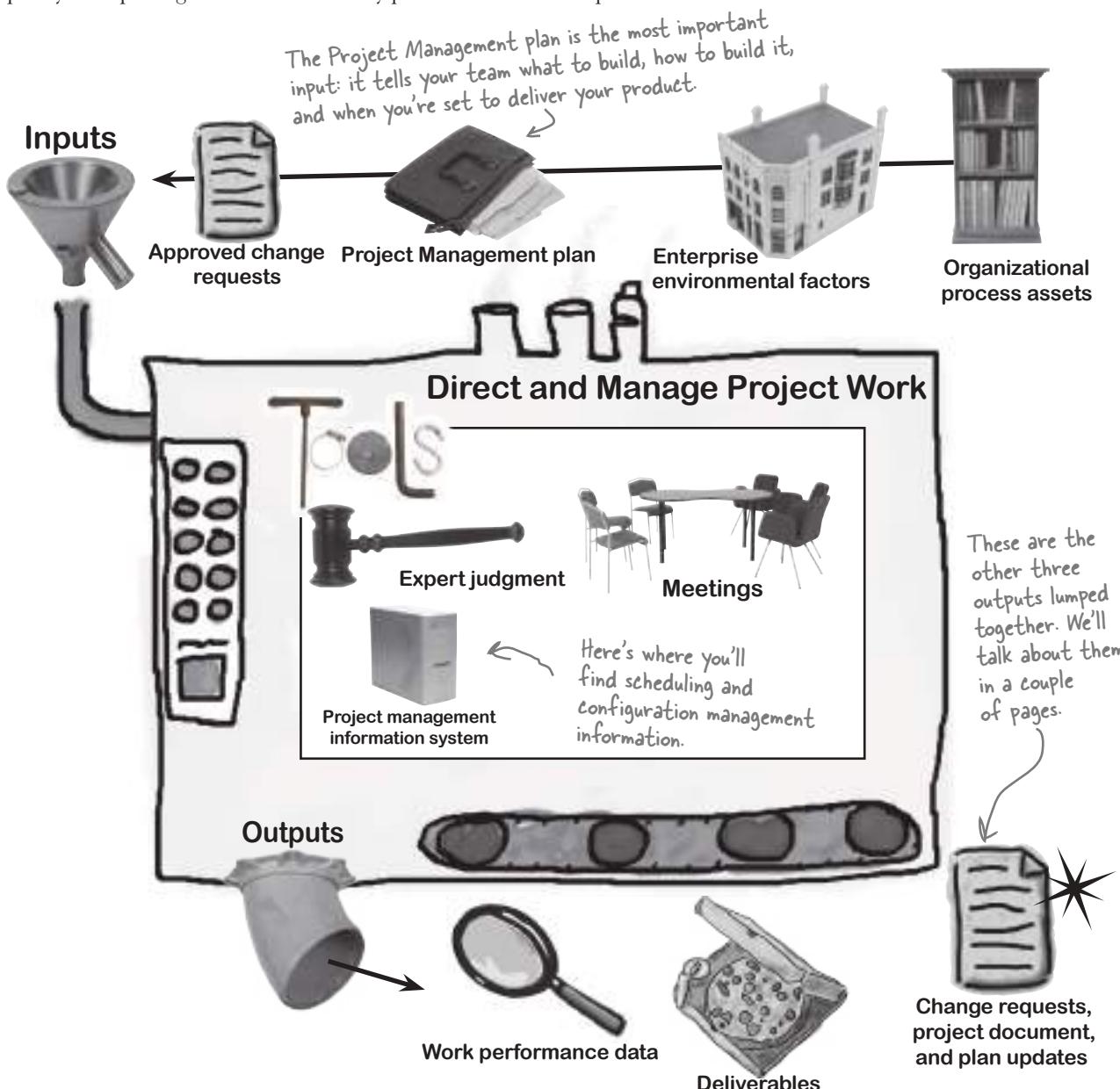
LADIES AND GENTLEMEN,  
WE NOW RETURN YOU  
TO CHAPTER FOUR



# The Direct and Manage Project Work process



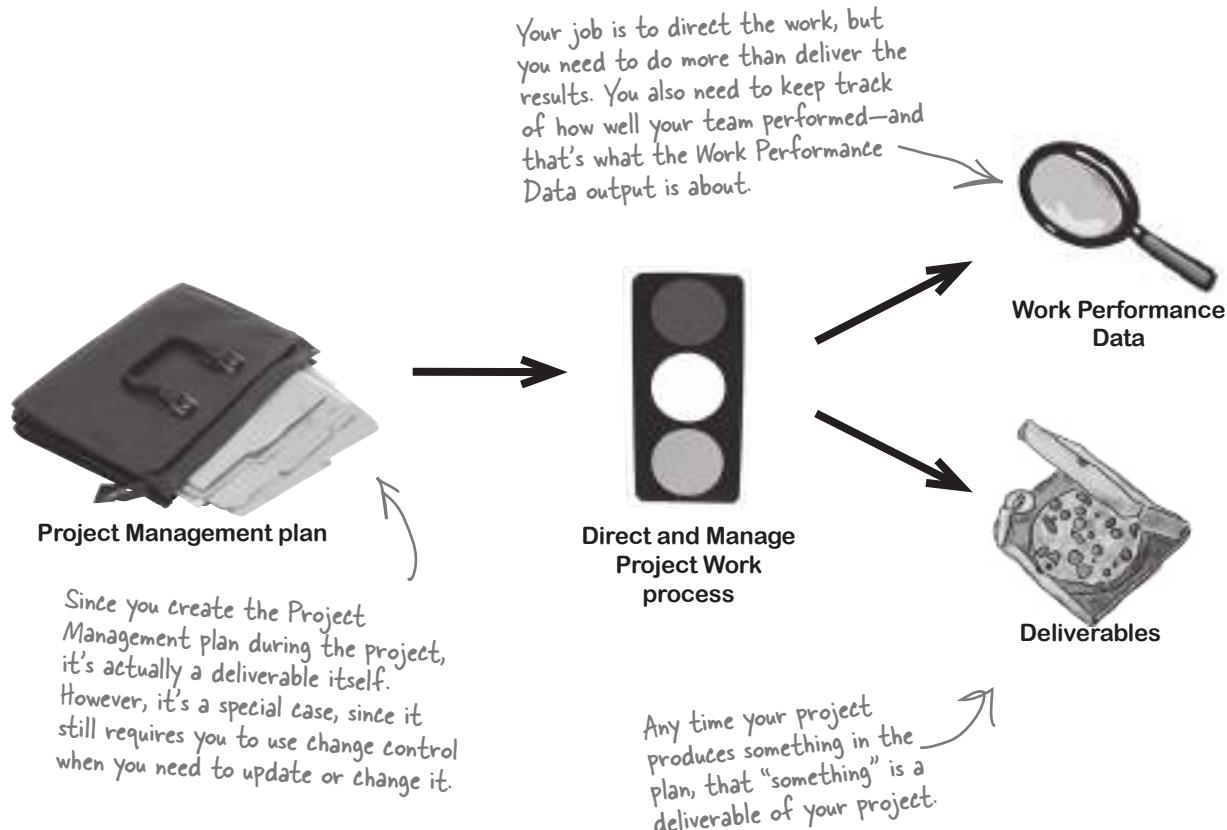
Once you have a Project Management plan, your project is ready to begin. And as the project unfolds, it's your job to direct and manage each activity on the project, every step of the way. That's what happens in the **Direct and Manage Project Work** process: you simply follow the plan you've put together and handle any problems that come up.



## The project team creates deliverables

The work you're doing on the teachers' project creates lots of things: airline reservations, hotel reservations, invoices, defect reports, and customer comments (to name a few). These things are all your **deliverables**, and they are one of the *five* outputs of the **Direct and Manage Project Work** process.

Another output is **Work Performance Data**, and that's what we call the reports Acme's running on the project. These reports track how many negative versus positive customer comments the project gets, and how well the project is doing at meeting its cost estimates. In fact, a project manager should figure out a way to use the work performance data that is generated from each knowledge area during the Direct and Manage Work process to understand how well the processes are being performed.



You create work performance data by measuring how the processes from each knowledge area are being performed.

## Executing the project includes repairing defects

The Direct and Manage Project Work process has a bunch of inputs and outputs—but most of them have to do with implementing changes, repairs, and corrective action. If there's a defect repair that's been approved, this is where it happens. Once the **defect** is repaired, the result is an **implemented defect repair**. The same is true for changes and corrective actions; once they're approved, they become process inputs, and then they can be implemented and become process outputs.

Any time you have to correct a mistake or make a repair in a deliverable, you're fixing a defect.

### The three components of the Direct and Manage Project Work process:



1. Use the plan to create deliverables.
2. Repair defects in deliverables.
3. As the project plan changes, make sure those changes are reflected in the deliverables.

Deliverables are anything you produce in the course of doing your project activities.

Your Quality Management plan focuses on catching defects as you go, so you can repair them as soon as possible.

This is different from fixing defects. A defect means that the plan was right, but your deliverable was built wrong.

**Deliverables include everything that you and your team produce for the project**

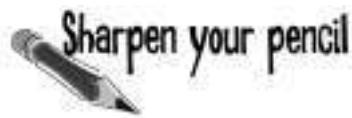
The word **deliverable** is pretty self-explanatory. It means anything that your project **delivers**. The deliverables for your project include all of the products or services that you and your team are performing for the client, customer, or sponsor.

But deliverables include more than that. They also include every single document, plan, schedule, budget, blueprint, and anything else that gets made along the way...including all of the project management documents that you put together.

Deliverables can be either internal to your company or to the customer.



**The Direct and Manage Project Work process is where you and your team actually do the work to produce the deliverables.**



Here's a list of things produced by some typical projects. Some of them are deliverables, and others are work performance data produced by running reports. There's also a list of changes, some of which affect the Project Management plan, and some of which just affect the project deliverables. It's up to you to figure out which is which.

**1. The software project team builds software.**

Deliverable

Work performance data

**2. A builder hangs a door.**

Deliverable

Work performance data

**3. A wedding photographer sends the photo proofs to the client.**

Deliverable

Work performance data

**4. The cable repair technicians take an average of four hours per job.**

Deliverable

Work performance data

Sometimes  
something  
that looks like  
a defect in a  
deliverable is  
really a change  
that you need  
to make to  
the plan.

**5. The construction crew worked 46 hours of overtime in March.**

Deliverable

Work performance data

**6. The construction crew built the six houses required by the plan.**

Deliverable

Work performance data

**7. A software test team finds bugs in the software.**

Defect in deliverable

Change to Project Management plan

**8. A bride asks the photographer to stop asking her mother for permission to make changes.**

Defect in deliverable

Change to Project Management plan

**9. A construction crew used the wrong kind of lumber in a house.**

Defect in deliverable

Change to Project Management plan

**10. A photographer's prints are grainy.**

Defect in deliverable

Change to Project Management plan

Answers on page 150.

## Eventually, things WILL go wrong...

Even if you work through all the processes you've seen so far, things can still go wrong on your project. In fact, the teachers are already letting you know about some issues they're having.



...but if you keep an eye out for problems, you can stay on top of them!

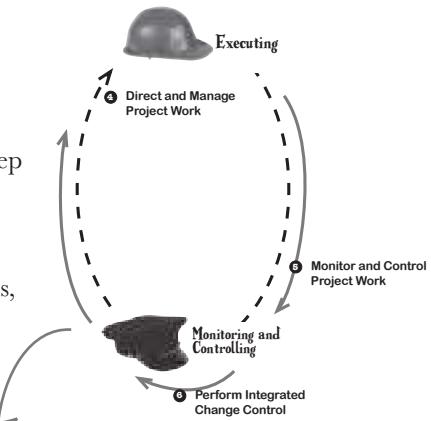
It's a good thing you've been monitoring the project. Otherwise, you might not have found out about their problems in time to help.



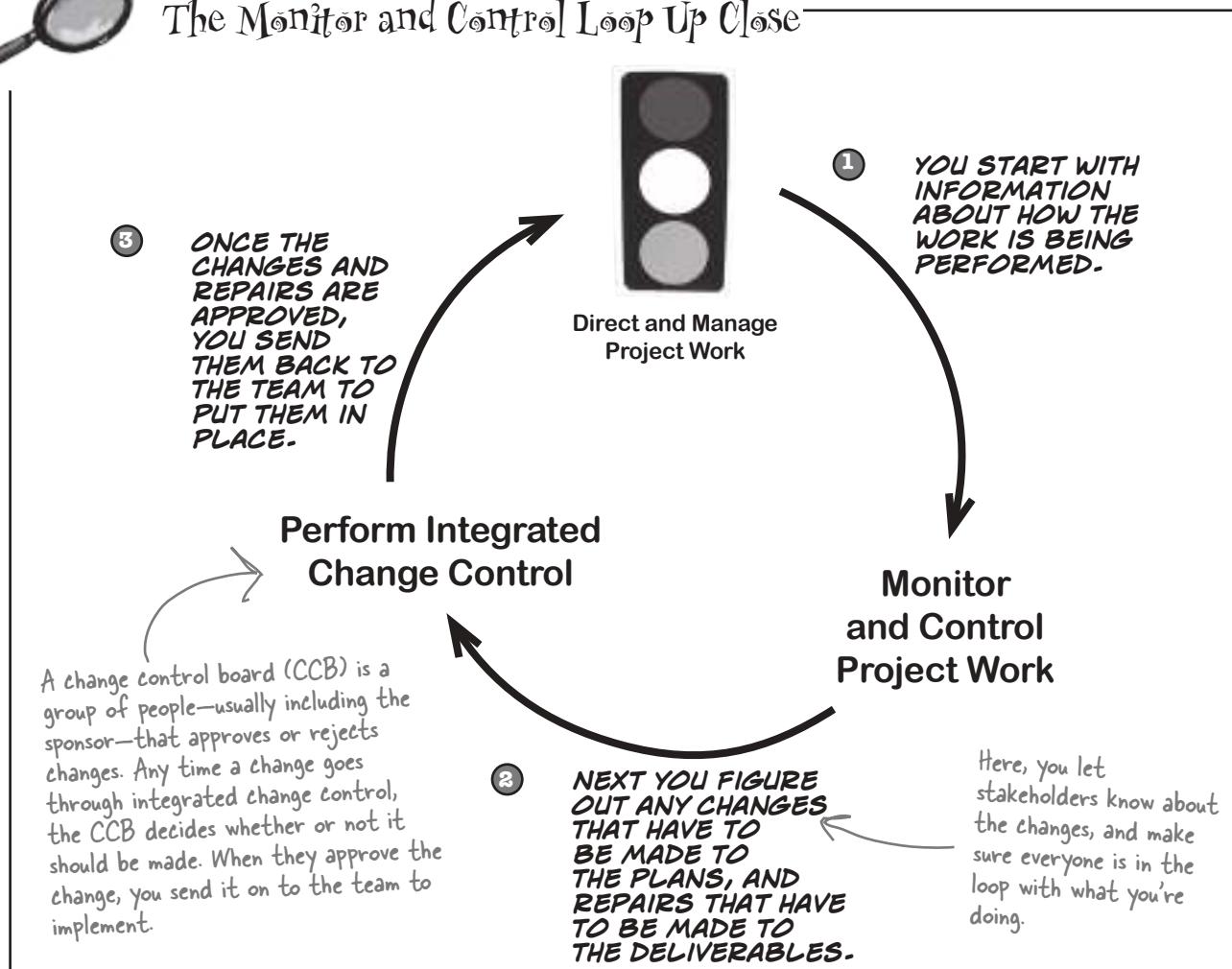
YOU CALLED JUST IN TIME! WE'VE RUN INTO SOME SERIOUS PROBLEMS. YOU CAN HELP US, RIGHT?

# Sometimes you need to change your plans

Take a minute and flip back to page 107. Notice how there's a loop between the Executing and the Monitoring and Controlling processes? That's because when your team is executing the plan and working on the deliverables, you need to keep a constant lookout for any potential problems. That's what the **Monitor and Control Project Work** process is for. When you find a problem, you can't just make a change...because what if it's too expensive, or will take too long? You need to look at how it affects the project constraints—time, cost, scope, resources, risks, and quality—and figure out if it's worth making the change. That's what you do in the **Perform Integrated Change Control** process.

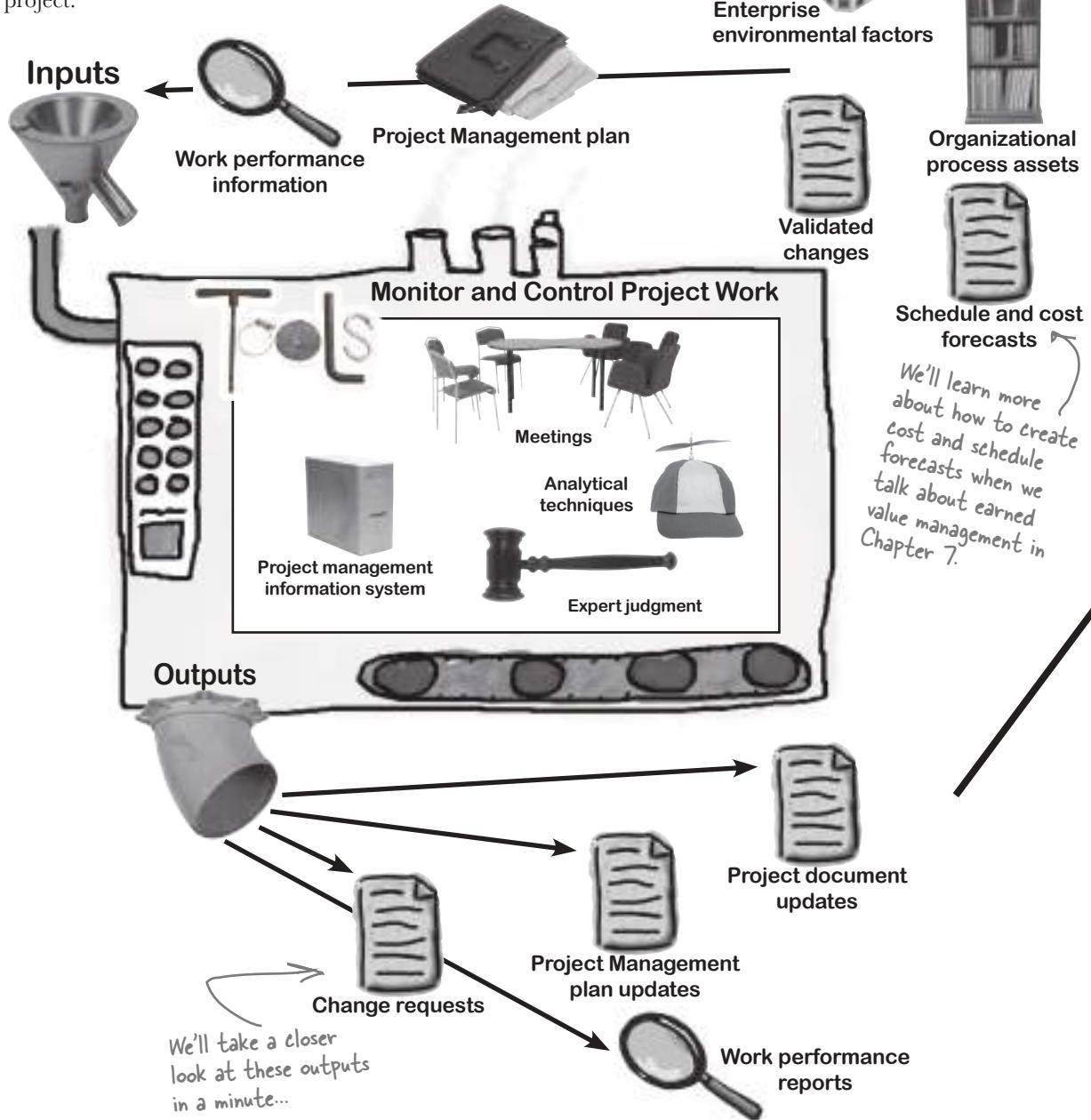


## The Monitor and Control Loop Up Close



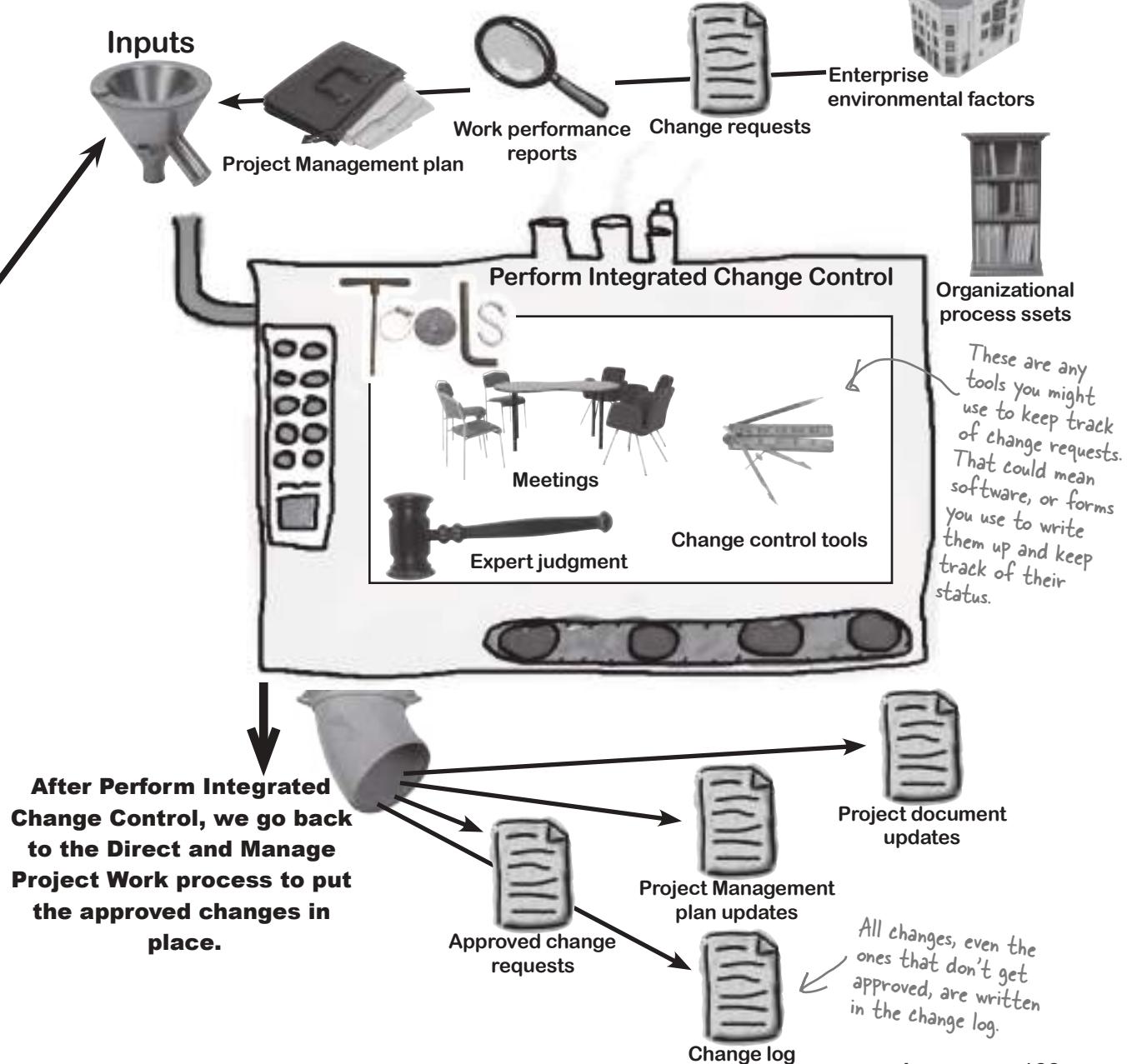
# Look for changes and deal with them

You need to stay on top of any possible changes that happen throughout your project, and that's what the **Monitor and Control Project Work** process is for. Usually the work is progressing just fine. But sometimes you find out that you need to change something, and that's when you use the **Perform Integrated Change Control** process to see if the change is worth the impact it will have on your project.



# Make only the changes that are right for your project

The Monitor and Control Project Work process is where you find the changes that you may want to make. The **Perform Integrated Change Control** process is where you decide whether or not to make them. But you're not the one actually making that decision—a big part of Perform Integrated Change Control is that you **need to get your changes approved by the change control board**.



## Changes, defects, and corrections

You've already seen how a project can change as it goes along. When the teachers asked for their hotel to be upgraded, you took the request through the **change control** process at Acme, and when the change control board approved the change, you directed the agents to make the booking for the group.

But sometimes, things go wrong with what you intended to have happen in the first place. When your quality department told you that you had booked the teachers on the flight to Rome without putting them in the same row, you quickly fixed the reservation. But you intended for the teachers to sit together in the first place, so that's not a change, it's a **defect**.

In the process, you realized that your team wasn't reading your documentation carefully, which is why they screwed up the airline reservations. To fix the way your team is working, you need to take corrective action. That's when you need to change the way you're doing the work on your project. Got all that?

When the team is repairing defects to deliverables, they still need to go through change control.

## Decide your changes in change control meetings



Sometimes a change you make will have a direct impact on other teams and projects, and it's a good idea to be sure that everybody who will be impacted knows that it's coming and thinks that it's worth it before you make the change. You can't always know everything that might happen as a result of a change, and that's why it's a good idea to get buy-in from key people in your company before you go through with it. And that's what a change control meeting is all about!

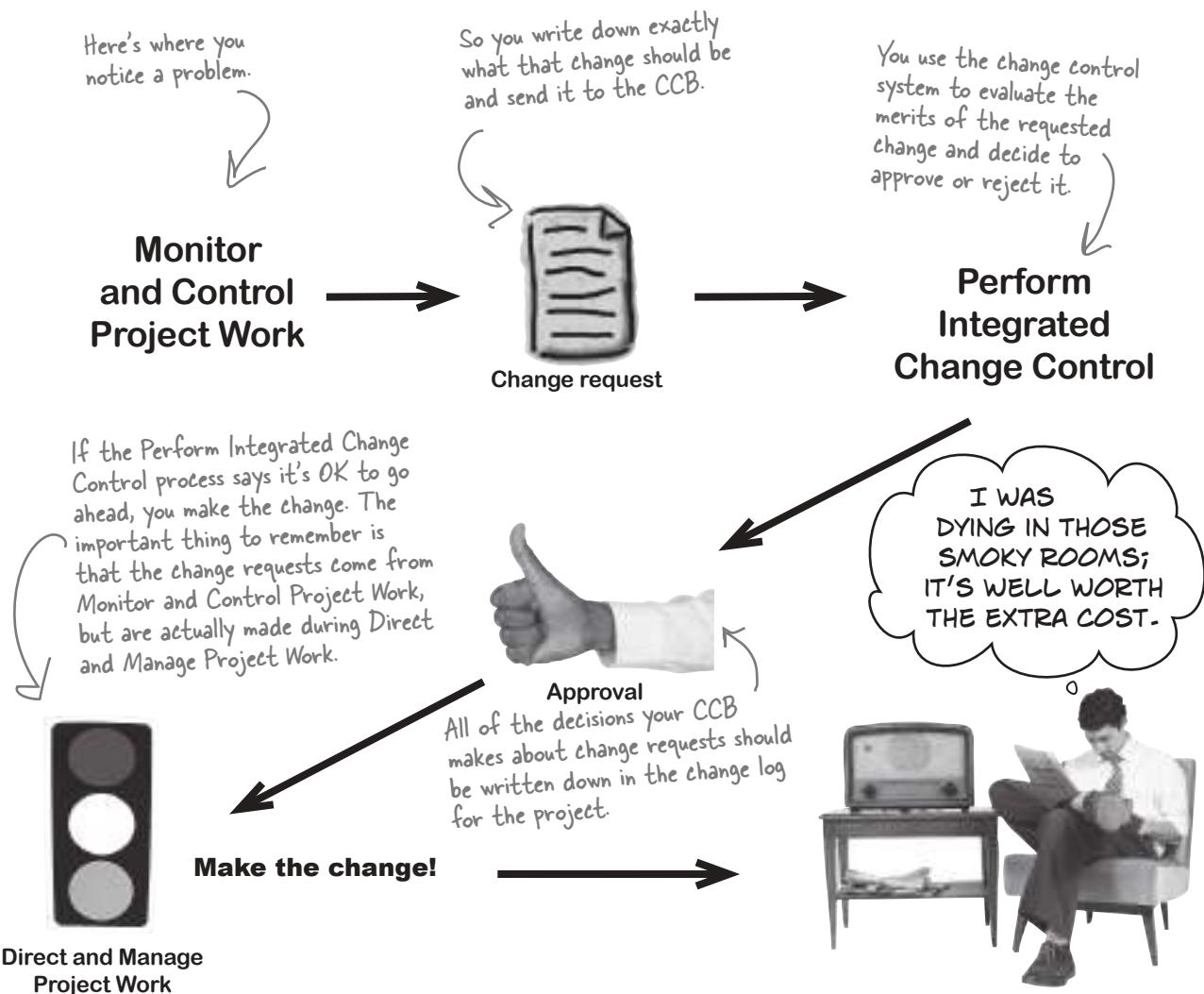
Usually, a change control meeting will be a regularly scheduled thing, where people representing the affected areas of the company will get together to review proposed changes and decide whether or not to make them. A change control board is never made up of just the people on your team. A change control meeting is all about getting people with different perspectives together to talk about the pros and cons of changes before deciding whether to approve or reject them.

It's your job as a project manager to know the impact of requested changes to your project and prioritize them for the change control board. Once you've done that, the change control board can make informed decisions about whether or not to approve them.

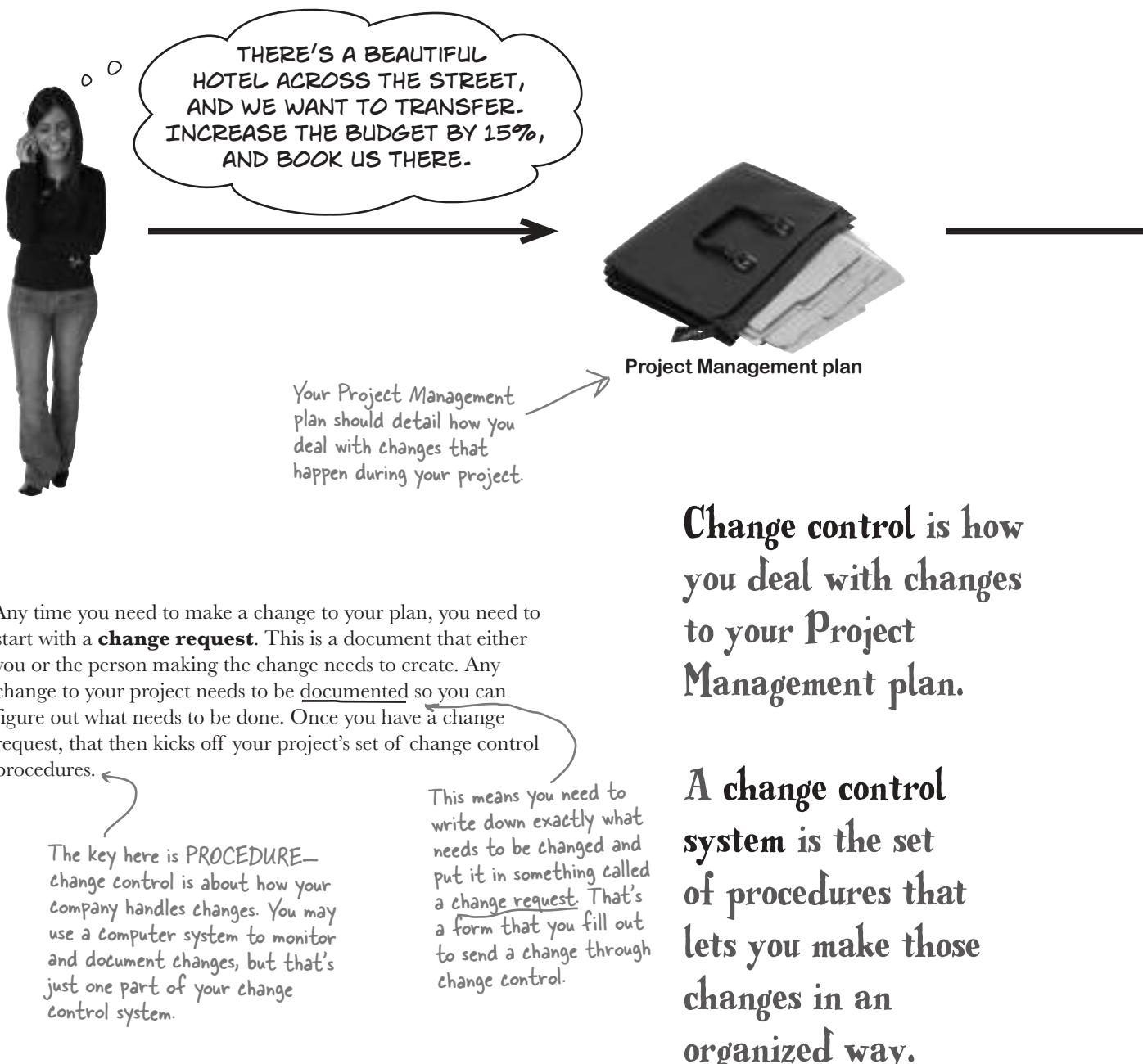
# How the processes interact with one another

While monitoring the teachers' trip, you notice that they all ask for nonsmoking rooms every time they check into a hotel. But some hotels don't have enough nonsmoking rooms available, and the teachers aren't too thrilled about that.

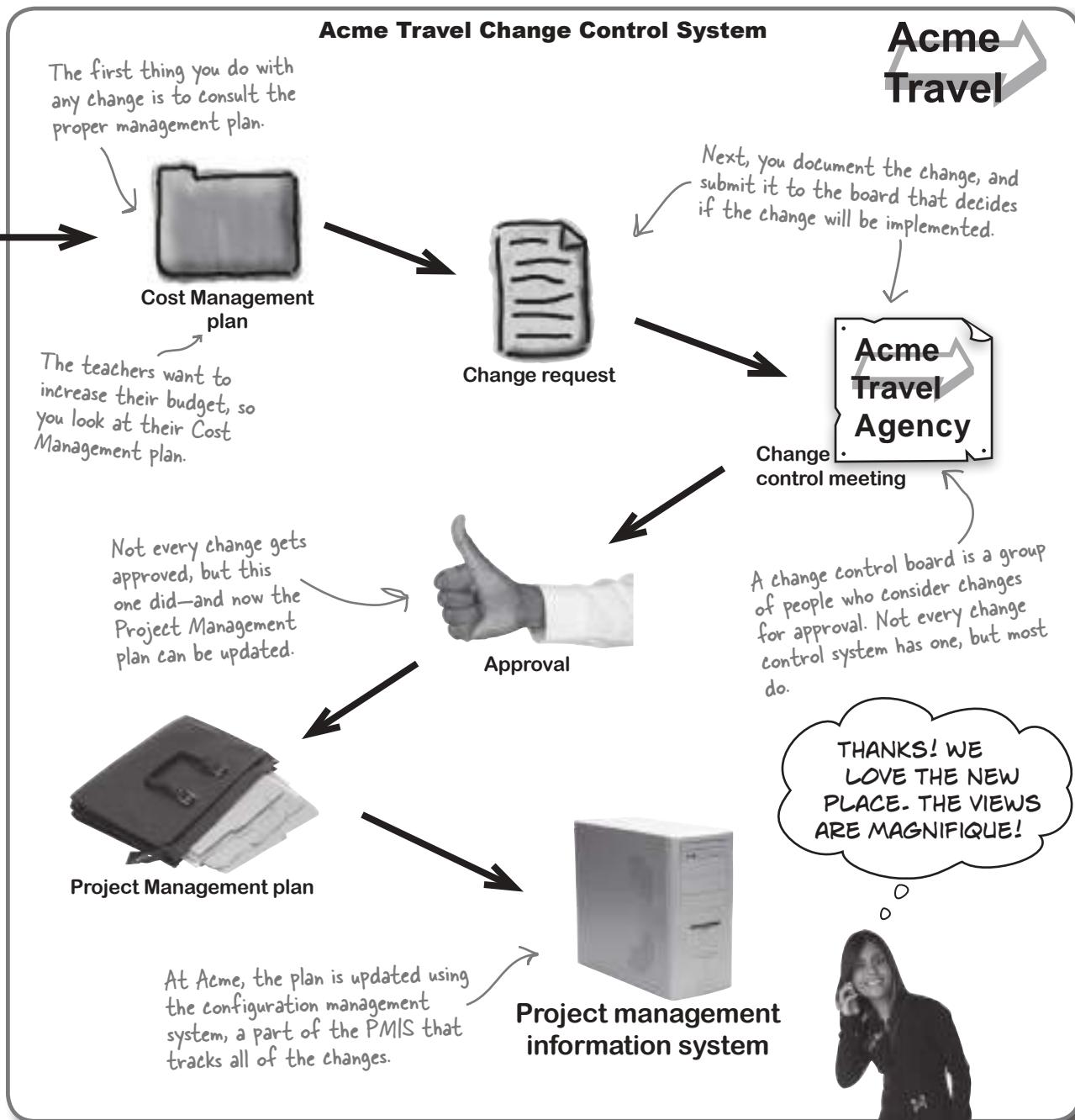
After you talk it over with the teachers it's clear that it's worth splitting up the group over multiple hotels to make sure they all are in nonsmoking rooms—and some hotels are more expensive than you'd planned. The cost change will put you over budget, so the cost management plan needs to be updated. Time to take the request to change control:



## Control your changes; use change control



This is Acme's change control system. It's specific to the company, but it contains all of the steps you'd see in a typical change control system.



## Preventing or correcting problems

When you monitor your project, you might be checking the actual time it's taking you to do scheduled work versus the amount of time you planned, or you might be gathering information on the number of defects you have found versus the number you expected. In both cases, it's possible that you might find problems. If you do, you have to change the way you do your work and keep your project from being dragged down. When you make a course change on your project, that's taking **corrective action**.

It's also possible that you might see problems that are going to occur even though they haven't happened yet. If you do, you will want to take **preventive action**, or steps that you take to avoid potential problems.

When people predict problems on projects before they happen, it's called a **forecast**. A forecast can be a good reason to make a change too!

In both corrective and preventive action, you always need to submit your proposed change and put it through the Perform Integrated Change Control process—and only if it is approved will you implement it. If your recommended action makes it through, you need to change the plan and any of your **baselines** to include it.

The documented scope, schedule, and cost baselines in the Project Management plan are called the **performance measurement baseline**.

We'll learn more about the performance measurement baseline in upcoming chapters.



Here is a list of actions that are recommended by a project manager. Which are preventive and which are corrective?

1. A software project is running late, so a software project manager looks to find slack time and reassign resources to get things done more quickly.

Preventive action       Corrective action

2. A caterer notices that the crudités are all gone and assigns a chef to make more.

Preventive action       Corrective action

3. A photographer brings an extra camera body to a shoot, in case one breaks down.

Preventive action       Corrective action

4. A consulting company assigns extra resources to a project to compensate for possible attrition.

Preventive action       Corrective action

→ Answers on page 148.

## there are no Dumb Questions

**Q:** Sometimes my team members come to me and tell me that the project could have problems later. What do I do with that?

**A:** For some project managers, it seems natural to dismiss these “negative Nellies” who seem concerned with problems that could go wrong in the future. But working with them instead is one of the best ways you can satisfy your stakeholders.

When someone makes an estimate or prediction of a future condition that could lead to trouble, it’s called a **forecast**, and that’s very valuable information. You should distribute it along with your work performance information, and try to think of ways to avoid the problem—which is what preventive action is all about.

A big part of your job as a project manager is to figure out how to prevent changes. This might seem a little weird—how can you prevent changes before the project is implemented? One way to do this is plan as well as possible, because a lot of changes happen because of a lack of planning. But it also means talking to stakeholders throughout the project and keeping an eye out for potential problems. When you take the PMP exam, if you see the phrase “**influencing factors that cause change**,” this is what it’s referring to.

**Q:** Who approves changes?

**A:** Usually there’s a **change control board (CCB)** that approves changes. That’s a group of people, most often including the stakeholders and sponsor, who look at the benefits of a change and figure out if it’s worth the cost. If there’s a CCB, your change control system will include a procedure that mentions it. But not every company has a CCB, and there is no requirement in the *PMBOK Guide* that you have one.

**Q:** What if there’s a problem outside my project, and I’m not sure it affects me?

**A:** You should still consider its potential impact when you’re monitoring your project’s work. It’s important that you’re always on the lookout for potential problems. If you’re not sure whether something could impact your project, it’s your responsibility as a project manager to bring it to the attention of your stakeholders. And if you can make a change on your own that doesn’t impact the project constraints (scope, cost, time, quality, risk, or resources), then it’s completely within your rights as a project manager to do it.

**Q:** Once a change is approved, what do I do with it?

**A:** You change your Project Management plan to incorporate the change. This can mean that you create a new baseline with the new Project Management plan. For example, say you forgot to add a stakeholder to the change control board, so your project plan now describes the wrong process for making changes. You’ll need to fix that, and you’ll need to go through change control to do it.

Every time a change is reviewed by the change control board, you keep a record of it in your change log. So whether the change was approved or rejected, the change request and the decision the CCB makes about it should be documented.

**Q:** What about changes that don’t affect the project constraints?

**A:** If you evaluate the impact of a change and find that it won’t have an impact on the project constraints, then you can make the change without going through change control. Sometimes you need to change resources or move tasks around, and you

can make those changes without affecting the bottom line or the end product. In these cases, change control wastes time and resources, rather than helping your project.

**Q:** Now, what’s a performance baseline again, and what do I do with it?

**A:** A performance baseline is a snapshot of your project’s scope, schedule, and cost. When you plan out the work you’ll do on a project, you write down all of the activities you’ll need to do and save that understanding as your scope baseline. You’ll do the same with your understanding of the project’s schedule and its cost. That way, you can always compare your actual performance to your plan.

Every time a change is approved, that means the plan has changed. So you have to update your baseline to include the new work (or cost, or schedule).

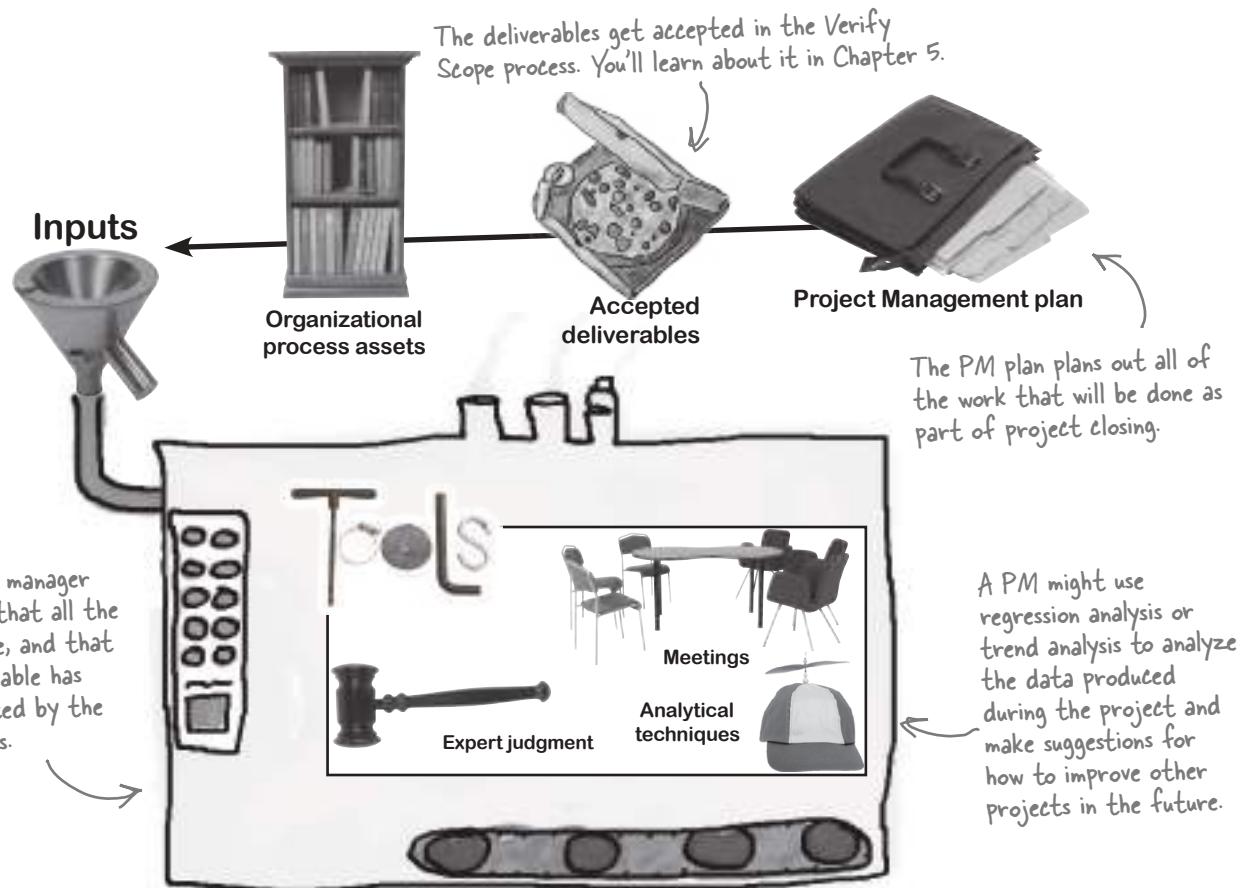
**You always have the authority to make changes to your project if they don’t affect cost, schedule, or scope.**

## Finish the work, close the project

You can't finish the project until you get paid! Most projects start with contracts, and when they do you need to make sure the terms are met. Acme signed a contract with the Midwestern Teachers' Association when the project started, and now it's time to make sure all of the parts of that contract are met. And that's part of what you do in the **Close Project or Phase** process. But an even more important part of this process is that you create the **lessons learned** and add them to your company's organizational process assets. That way you and other project managers can learn from this **historical** information in the future. The inputs to the Close Project or Phase process include the Project Management plan, organizational process assets, enterprise environmental factors, work performance information, and deliverables, along with any contract you have for the work (if there is one). And you use the same familiar **tools and techniques** list that you've seen throughout the chapter.



The most important output of the Close Project or Phase process is the final product that you deliver to the customer!

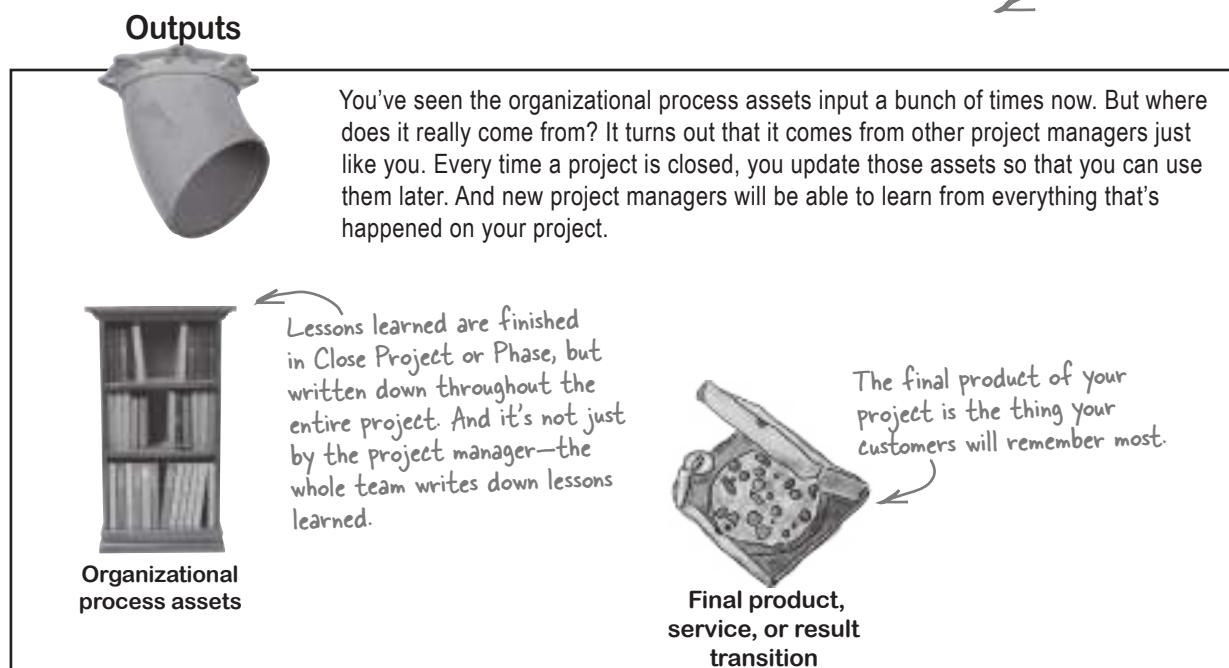


# You don't have to go home, but you can't stay here

The teachers have gone through their entire itinerary. They're now on their way to Paris, which is the final leg of their tour. They've had a great time, and now it's time for you to finish up.

Every project needs to end, and that's what the Close Project or Phase process is all about. You want other travel agents at Acme to learn from anything new you've discovered. Remember how you had to scramble with the nonsmoking room request? Maybe your friends at Acme can learn from that, and ask new clients up front what they want! That's why you write down your lessons learned, and that's a big part of closing the project.

Even if your project ends early, you still need to follow the Close Project or Phase process.



Think about a major project you've heard of that did not end well, like one that was shut down before the work was done. What lessons could have been learned from that project?

How can the project manager use the Close Project or Phase process to make sure that something good comes out of early termination?



## So why INTEGRATION Management?

The Integration Management knowledge area has all of the processes that you do in your day-to-day work as a project manager. So why are they called “Integration Management” processes? Well, think about what it takes to run a project: you need people and other resources from all around your company; knowledge about how your company does its business; standards, templates, and other assets that you’ve gathered from other projects; and the ability to put it all together—that’s what a project manager does. And that’s where the “integration” part comes in.

This is especially important when you need to work with consultants, because your job is to procure services for the project. And you need to plan for all of it at the beginning—which is when you **integrate** all of these things together into a single plan. It’s your job to make sure that every one of the 47 processes in the *PMBOK Guide* is addressed in the plan, even if you’re not going to use it (for example, if you don’t need contractors or consultants, you won’t use Procurement processes).



**Integration Management means making sure that all of the processes work together seamlessly to make your project successful.**

### What else is there?

Huh...it seems like we covered the whole project, right? You got authorized to do the work, you planned the project, you executed it, you corrected problems along the way, and you closed it out. Isn't that everything?

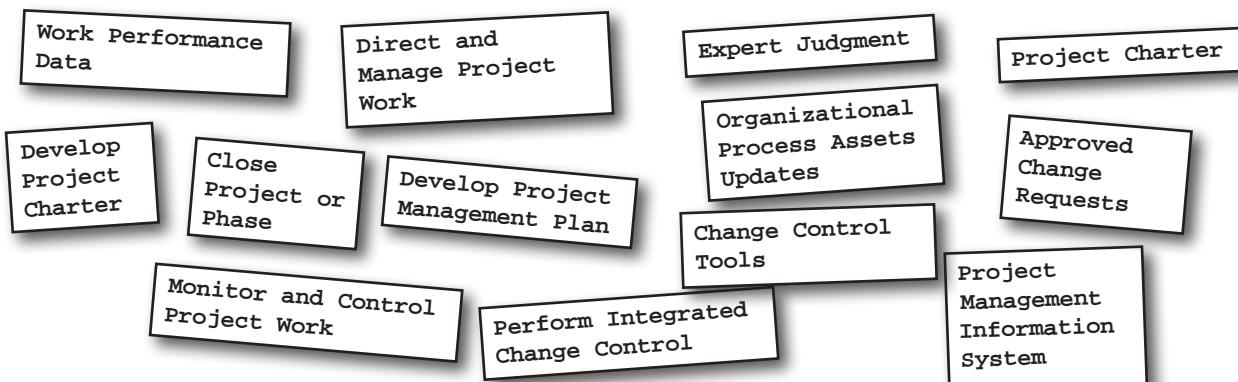
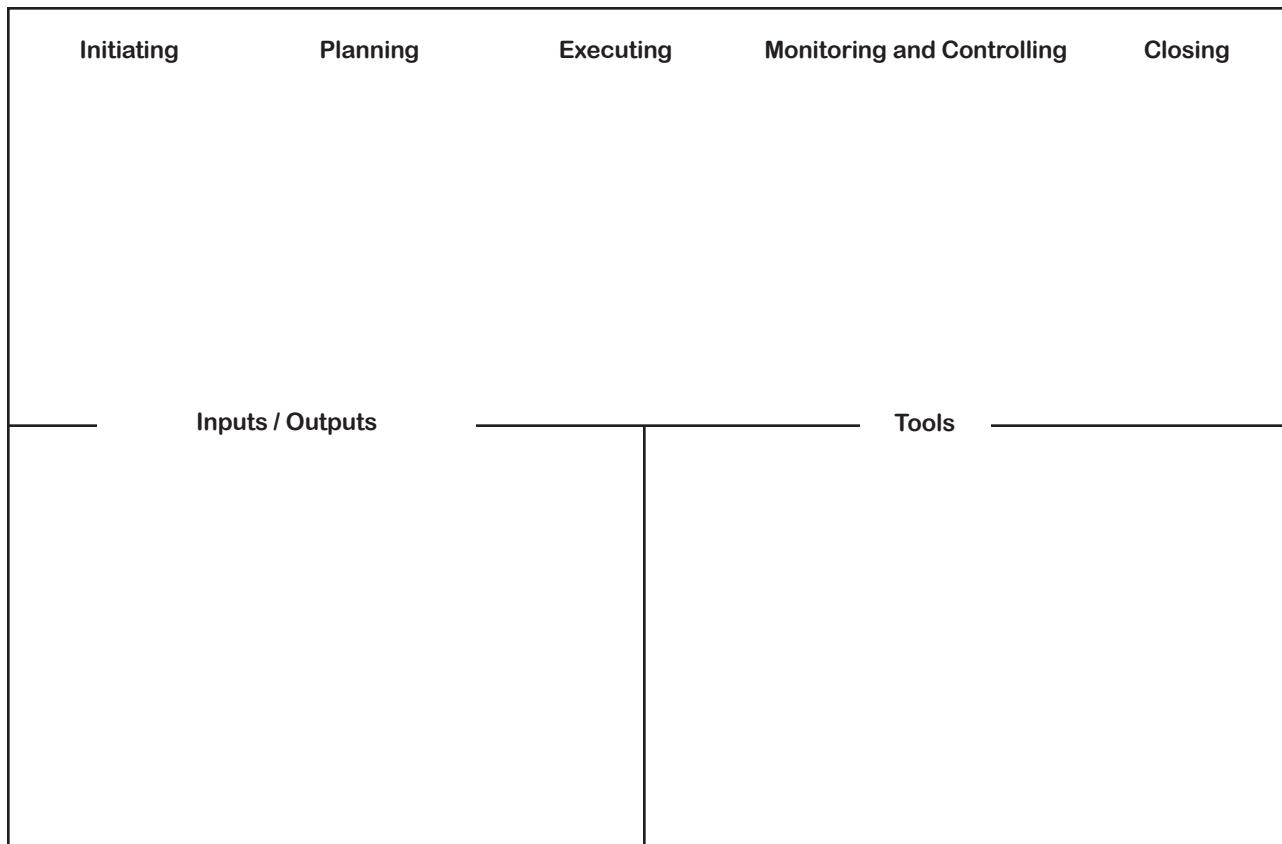
Well, of course not! There's a whole lot more planning that you have to do, and many skills that you need to have. Luckily, we've got the *PMBOK Guide* to help us figure out exactly what we need to know to manage projects effectively.

That's what the rest of the book is about.



# Project Integration Management Magnets

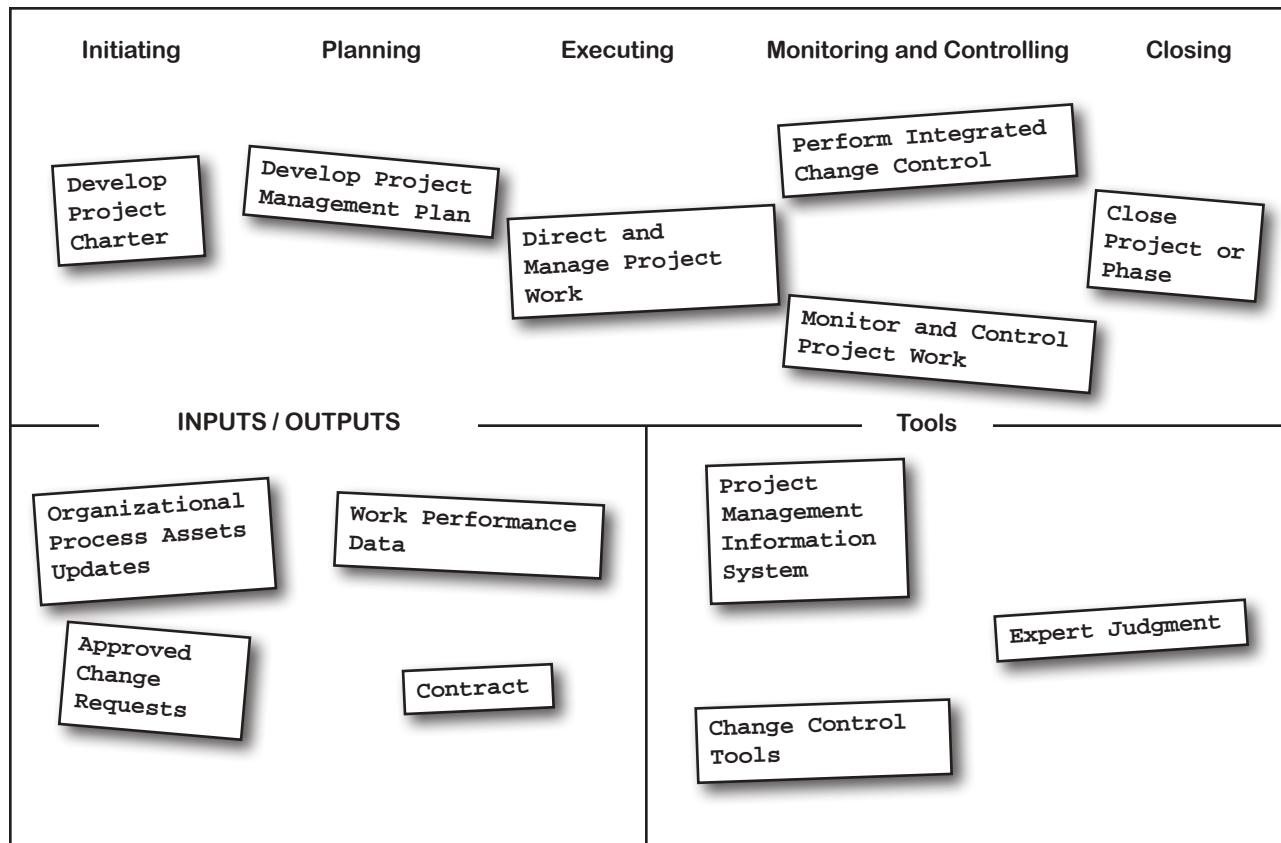
These inputs, outputs, and processes are all scrambled up on the fridge. Can you reconstruct them so that the processes go under the correct process groups, and the inputs, outputs, and tools go in the right categories?





## Project Integration Management Magnets Solution

These inputs, outputs, and processes are all scrambled up on the fridge. Can you reconstruct them so that the processes go under the correct process groups, and the inputs, outputs, and tools go in the right categories?



## Integration Management kept your project on track, and the teachers satisfied

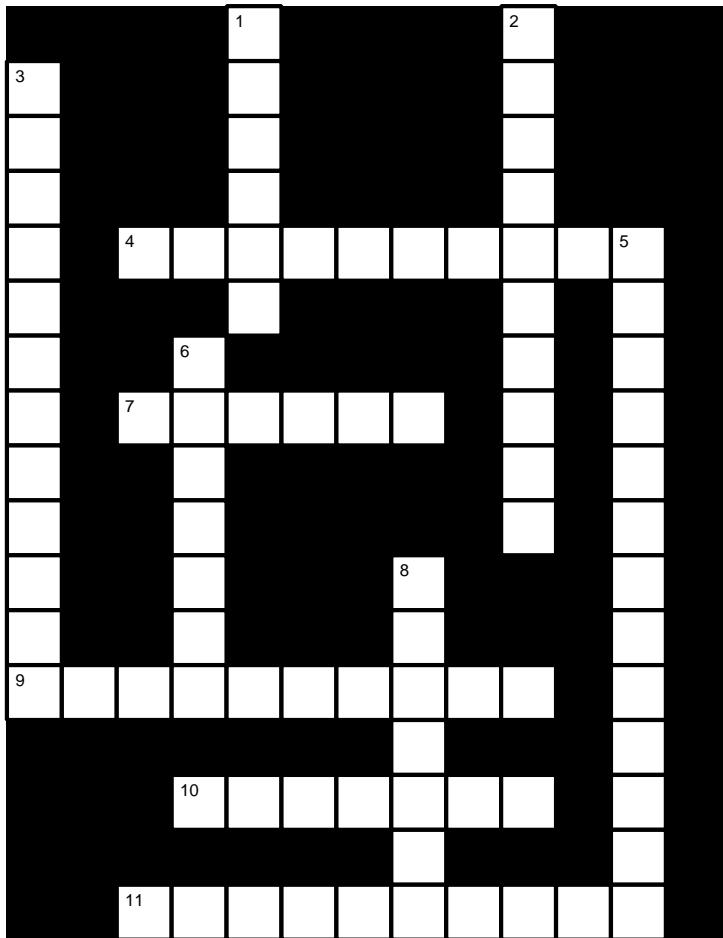
By using all of the Integration Management processes, you kept the project on track. You handled all of the problems that came up, made some important changes in the process, and the teachers got to all of their destinations on time and on budget.





## Integrationcross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



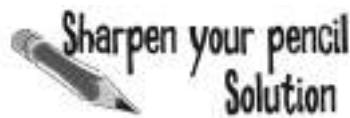
### Across

4. Fixing problems that have already happened is called \_\_\_\_\_ action.
7. A problem in a deliverable that shows that it does not do what you meant for it to do.
9. The Project Management plan is a collection of \_\_\_\_\_ plans.
10. When you watch what's happening in your project to look for changes, corrective actions, and preventive actions, you are in the \_\_\_\_\_ and Control Project Work process.
11. \_\_\_\_\_ information is an important organizational process asset that comes from documenting lessons learned.

### Down

1. When you ask someone who has experience to help you figure something out, you are using the \_\_\_\_\_ judgment tool and technique.
2. The \_\_\_\_\_ process group contains the processes that help you start your project.
3. The things your project produces.
5. Work culture and company policies are called enterprise \_\_\_\_\_ factors.
6. A record of all of the decisions you have made and their consequences that you write when you close your project is called \_\_\_\_\_ learned.
8. The project \_\_\_\_\_ is a document that gives the project manager authority over the team.

→ Answers on page 151.



Here are a few of the things you might have to deal with in working on the teachers' vacation trip. Figure out which of the seven Integration Management processes you'd use in each situation, and write down the process name in the blank.

- 1** It turns out that one of the teachers is a vegetarian, so you need to change your plans to include vegetarian meals on the airlines and find restaurants that accommodate him.

Perform Integrated Change Control

- 2** You come up with a detailed description of everything that you plan to do to get the teachers where they want to be.

Develop Project Management Plan

- 3** The CEO of Acme Travel sends you a document that assigns you to the project.

Develop Project Charter

- 4** You check in with the teachers at each destination to make sure everything is going according to plan.

Monitor and Control Project Work

- 5** When the teachers get back, you write up everything you learned while handling the trip so other travel agents can learn from your experience.

Close Project or Phase

- 6** You book the tickets and hotel accommodations.

Direct and Manage Project Work

**Develop Project Charter**

**Develop Project Management Plan**

**Direct and Manage Project Work**

**Monitor and Control Project Work**

**Perform Integrated Change Control**

**Close Project or Phase**



## Exercise Solution

Here is a list of actions that are recommended by a project manager. Which are preventive and which are corrective?

1. A software project is running late, so a software project manager looks to find slack time and reassign resources to get things done more quickly.

Preventive action       Corrective action

2. A caterer notices that the crudités are all gone and assigns a chef to make more.

Preventive action       Corrective action

3. A photographer brings an extra camera body to a shoot, in case one breaks down.

Preventive action       Corrective action

4. A consulting company assigns extra resources to a project to compensate for possible attrition.

Preventive action       Corrective action



Below is a whole crop of problems that the teachers are running into. Write down which subsidiary plan you'd look in to get some help. If you're not sure, just reread the descriptions of each subsidiary plan on the last page, and take your best guess.

1. The teachers want to go Bali, but Acme Travel doesn't book flights there so you need to subcontract one leg of the travel to another travel agency.

Procurement Management plan

2. The teachers are having so much fun that they want to stay at a better hotel. They tell you to increase their budget by 15% to do that.

Cost Management plan

3. Just as you're about to mail off the teachers' tickets, you notice they've been printed incorrectly.

Quality Management plan

4. The teachers might run into more bad weather, and you've got to figure out what contingencies you can put into place if that happens.

Risk Management plan

5. The teachers are concerned that they won't be able to get in touch with you when they're away.

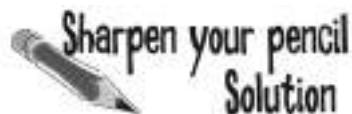
Communications Management plan

6. One of the teachers realizes that he needs to come back earlier, and you want to make sure the budget reflects his lessened costs.

Cost Management plan

7. You find out that you need to get the tickets out earlier than expected, because the teachers' contract requires that all trips be preapproved by the superintendent of their school district.

Schedule Management plan



## Sharpen your pencil Solution

Here's a list of things produced by some typical projects. Some of them are deliverables, and others are work performance data produced by running reports. There's also a list of changes, some of which affect the Project Management plan, and some of which just affect the project deliverables. It's up to you to figure out which is which.

**1. The software project team builds software.**

Deliverable       Work performance data

**2. A builder hangs a door.**

Deliverable       Work performance data

**3. A wedding photographer sends the photo proofs to the client.**

Deliverable       Work performance data

**4. The cable repair technicians takes an average of four hours per job.**

Deliverable       Work performance data

**5. The construction crew worked 46 hours of overtime in March.**

Deliverable       Work performance data

**6. The construction crew built the six houses required by the plan.**

Deliverable       Work performance data

**7. A software test team finds bugs in the software.**

Defect in deliverable       Change to Project Management plan

**8. A bride asks the photographer to stop asking her mother for permission to make changes.**

Defect in deliverable       Change to Project Management plan

**9. A construction crew used the wrong kind of lumber in a house.**

Defect in deliverable       Change to Project Management plan

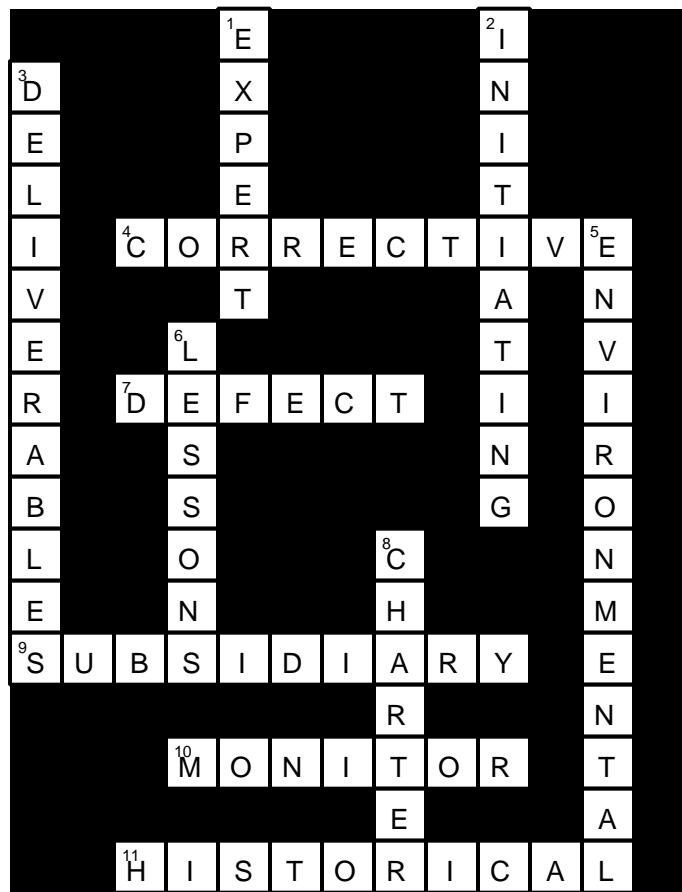
**10. A photographer's prints are grainy.**

Defect in deliverable       Change to Project Management plan



# Integrationcross Solution

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



## Exam Questions

**1. You've just received a change request. This means:**

- A. The project charter is complete, but the work cannot begin yet because you need to make a change to the scope baseline.
- B. You are in the Direct and Manage Project Work process, and you can implement the change now.
- C. The change needs to be approved before it can be implemented.
- D. There is a defect in a deliverable that must be repaired.

**2. Which of these is not an input to Develop Project Charter?**

- A. Enterprise environmental factors
- B. Project Management plan
- C. Agreements
- D. Project statement of work

**3. What is the output of Direct and Manage Project Work?**

- A. Approved change requests
- B. Project Management processes
- C. Deliverables
- D. Forecasts

**4. You're managing a graphic design project. One of your team members reports that there is a serious problem, and you realize that it will cause a delay that could harm the business of the stakeholders. Even worse, it will take another two days for you to fully assess the impact—until then, you won't have the whole story. What is the BEST way to handle this situation?**

- A. Create a change request document and submit it to the change control meeting.
- B. Pull out the project charter and show them that you have authority to make decisions.
- C. Meet with the stakeholders and tell them that there's a problem, and you need two more days to get them the information they need.
- D. Update the lessons learned and add it to your organizational process assets.

**5. You're a project manager on a construction project. The electrician has started laying out the wiring, when the client comes to you with a change request. He needs additional outlets, and you think that will increase the cost of the electrical work. What is the first thing you do?**

- A. Refuse to make the change because it will increase the cost of the project and blow your budget.
- B. Refer to the Project Management plan to see how the change should be handled.
- C. Consult the contract to see if there is a clause.
- D. Make the change, since the client requested it.

# Exam Questions

**6. The work authorization system:**

- A. Ensures that every work package is performed at the right time and in the proper sequence
- B. Authorizes the project manager to spend money on work
- C. Is a set of processes and tools that aids project manager in effectively guiding the project to completion
- D. Is a formalized, written description of how to carry out an activity

**7. You're the project manager at a telecommunications company. You recently had stakeholders approach you with changes. You figured out that the changes would cost additional time and money. The stakeholders agreed, you were given additional time and budget, and the changes were approved. Now you have to incorporate the changes into the project. What do you do next?**

- A. Modify the project charter to include the changes.
- B. Use the project management information system to make sure the work is performed.
- C. Make sure to track your changes against the project's baseline so you know how much they eventually cost.
- D. Incorporate the changes into the baseline so you can track the project properly.

**8. You are a project manager on a software project. When you planned the project, your enterprise environmental factors included a policy that all changes that cost over 2% of the budget need to be approved by the CFO, but smaller changes could be paid for by a management contingency fund. One of your stakeholders submitted a change request that requires a 3% increase in the budget. Your company has an outsourcing effort, and you believe that a small change to the way that the change is requested could allow you to take advantage of it and cut your costs in half. What is the BEST way to handle this situation?**

- A. Work with the stakeholder to figure out how to reduce the cost of the change by a third.
- B. Request approval from the CFO.
- C. Refuse the change because it is over 2% of the budget.
- D. Document the change request, since all changes must be documented.

**9. You're on the project selection committee. You're reviewing a document that describes the strategic value of a potential project and its benefits to the company. What's this document called?**

- A. Project charter
- B. Business case
- C. Benefit measurement method
- D. Contract

## Exam Questions

**10. One of your team members has discovered a defect in a deliverable and has recommended that it be repaired. Which of the following is NOT true:**

- A. The project charter has authorized you to perform the work.
- B. Your project is in Monitor and Control Project Work process.
- C. The defect repair must be approved before the deliverable can be repaired.
- D. You must update the Project Management plan to document the defect.

**11. You are holding a formal, approved document that defines how the project is executed, monitored, and controlled. You are holding:**

- A. The Project Management plan
- B. The performance measurement baseline
- C. The project charter
- D. The work breakdown structure

**12. You are the project manager for a software project, when the sponsor pulls the plug and cancels the project. What do you do?**

- A. Give the team the day off to recuperate from the bad news.
- B. Create a budget summary for the remaining unspent budget.
- C. Follow project closure procedures to close the project and update lessons learned.
- D. Find new assignments for any people previously assigned to your project.

**13. You are managing a software project, when you find out that a programming team whom you were supposed to have access to has been reassigned to another project. What is the first thing that you should do?**

- A. Figure out the impact that this will have on your project.
- B. Bring a copy of your project's charter to the other manager, and explain that you need that team for your own project.
- C. Go to your sponsor and demand the team.
- D. Figure out a way to compress the project schedule so that you can work with the team if they become available.

**14. You are a project manager on a software project. There are several changes that need to be made, and you need to decide how to apply project resources in order to implement them. What do you do?**

- A. Decide the priority of the changes and announce them to the team.
- B. You should call a team meeting and invite the stakeholders, so that everyone can reach a consensus on the priority.
- C. Deny the changes because they will delay the project.
- D. Consult the Change Prioritization plan for guidance on prioritizing new changes.

## Exam Questions

15. You're a project manager on a software project. Your team is busy executing the project and creating the deliverables, but there have been several changes requested by stakeholders over the past few weeks. Each time you got one of these changes, you called a meeting with your team and the stakeholders to discuss it. Why did you do this?

- A. Every change needs to be evaluated by a change control board.
- B. You're delegating the work of evaluating changes.
- C. You do not have a good change control system in place.
- D. You are using a project management information system to assign the work.

16. You are the project manager on a construction project, and you have just received a change request. You consulted the Project Management plan, and followed the procedures laid out in the change control system. You are in the process of reviewing the change and documenting its impact. Your manager asks you why you are doing this. Which process are you doing by reviewing the change and documenting its impact?

- A. Perform Integrated Change Control
- B. Monitor and Control Project Work
- C. Manage Requested Changes
- D. Direct and Manage Project Work

17. Which of the following is NOT true about the project charter?

- A. The project charter defines the requirements that satisfy customer needs.
- B. The project charter defines the work authorization system.
- C. The project charter makes the business case that justifies the project.
- D. The project charter includes the milestone schedule.

18. You have just verified that all of the work on your project is completed. Which of these things is NOT part of the Closing process?

- A. Update historical information by documenting lessons learned.
- B. Document the work performance information to show the deliverables that have been completed and record the lessons learned.
- C. Verify that all of the deliverables have been accepted by the stakeholders.
- D. Follow the project closure procedure.

19. Which of the following is NOT true about the Project Management Plan?

- A. The Project Management plan contains the Scope Management plan.
- B. The Project Management plan gives authority to the project manager.
- C. The Project Management plan contains the schedule baseline.
- D. The Project Management plan contains the performance baseline.

## Exam Questions

**20. Which of the following is NOT an output of the Direct and Manage Project Work process?**

- A. Work performance information
- B. Deliverables
- C. Implemented change requests
- D. Forecasts

**21. You are a project manager starting a new project. Your manager warns you that previous projects ran into trouble. Which of the following would be BEST for you to rely on to help plan your project:**

- A. Our project management expertise
- B. Historical information
- C. The change control system
- D. Forecasts

**22. Which is NOT true about the project charter:**

- A. The project manager must be consulted before the charter is finalized.
- B. The charter is issued by the project sponsor.
- C. The project manager's authority to manage the project is granted by the charter.
- D. The charter gives a summary milestone schedule.

**23. Which of the following is NOT an input to the Develop Project Management Plan process?**

- A. Outputs of the planning processes
- B. Project charter
- C. Expert judgment
- D. Enterprise environmental factors

**24. You are the project manager on a network engineering project. Two weeks ago, your team began executing the project. The work has been going well, and you are now a day ahead of schedule. Two stakeholders just approached you to tell you that they have an important change that needs to be made. That change will put you behind schedule. What do you do?**

- A. Implement the change because you're ahead of schedule.
- B. Refuse to make the change because the stakeholders did not take it to the change control board.
- C. Refuse to make the change until the stakeholders document it in a change request.
- D. Make sure the stakeholders know that you're open to change, and tell them to talk to the project sponsor.

## Exam Questions

25. Diane is a project manager at a software company. She just got a change request from one of her stakeholders, but is concerned that it will cause a serious problem with her schedule. She called a meeting with the project team, and decided that there was a real change, and now they need to start change control. Which of the following is NOT an output of the Perform Integrated Change Control process?

- A. Project document updates
- B. Change request status updates
- C. Project Management plan updates
- D. Change requests

Start thinking about the kinds of questions you're seeing. Some have extraneous details—we call them "red herrings." Others are about inputs and outputs. That will definitely make the exam more familiar and easier.

OH, I SEE. SOMETIMES THE DETAILS OF THE QUESTION DON'T MATTER. THEY'RE JUST THERE TO THROW YOU OFF TRACK.

### Watch out for those red herrings.

Take some time to go over the answers to these questions and if they did throw you off track, reread the question to understand why.

**Just remember...if you get something wrong now, that means you're actually MORE likely to remember it on the exam! That's why practice exams are so useful.**



## Answers

~~Exam Questions~~**1. Answer: C**

This is really a question about inputs and outputs. There's only one process that takes "change requests" as an input, and that's Perform Integrated Change Control. That's where your changes get approved. The other answers all refer to other processes: A is about building a baseline (which is part of Develop Project Management Plan), while B and D are both about Direct and Manage Project Work.

**2. Answer: B**

The Project Management plan is created in the Develop Project Management Plan process, which happens after Develop Project Charter. Develop Project Charter is the very first process on any project, and the inputs in answers A, C, and D exist before the project started. The Project Management plan is created during the project.



This is a "which-is-not" question. When you see a question asking you to choose which input or output is not associated with a process, one good strategy is to try to think of what it is that process does.

**3. Answer: C**

The whole reason for the Direct and Manage Project Work process is to actually do the project work, and the deliverables are the products or services that are created by the project. Don't get fooled by answer D—even though the work is performed in Direct and Manage Project Work, the information about how that work is performed is turned into forecasts in Monitor and Control Project Work.



That makes sense. You need to monitor the work to figure out how well it's being performed.

**4. Answer: C**

When you get a question about communication, look for the answer that provides the most complete, honest, and up-front information, even if that information won't necessarily solve the problem or make everyone happy.

**5. Answer: B**

All changes must be handled using the change control system, which is a set of procedures that is contained in the Project Management plan. There is no way to tell from the question what specific steps will be in that change control system—answers A, C, and D are all possible ways to deal with changes, depending on the situation. The only way to know for sure what to do is to follow the change control procedures in the Project Management plan.

# Answers

## ~~Exam Questions~~

### 6. Answer: A

This is a “just the facts” question, and answer A is the actual definition of the Work Authorization System from the *PMBOK Guide*. After you’re done with these questions, look it up—it’s on page 567. Underline or highlight it, and then read it out loud. Once you’ve read about it in the chapter, answered this question about it, and then looked up the definition, you’ll never forget it!

### 7. Answer: D

The first thing you do after a change is approved is to update the baseline. If you chose answer C, don’t feel bad—it’s easy to get a little mixed up about what a baseline is used for. The whole purpose of the baseline is to figure out whether your project has deviated from the plan. But a change isn’t a deviation from the plan! A deviation is accidental, while a change is done on purpose. That’s why it’s so important to get the change approved: that way, everyone knows about it, which means that you can plan for it. And updating the baseline is how you do that planning.

### 8. Answer: B

When your company has a policy, you need to follow it and not try to work around it. Also, don’t get fooled by answer D—the question said that a change request was submitted, so it’s already documented. The exam could contain tricks like that!

### 9. Answer: B

This is a business case—it describes the benefits of doing a project and can be used to decide whether it’s worth it for your company to do the work. Sometimes the benefits will be about gaining capabilities, not just money.

### 10. Answer: D

Defects do not need to be documented in the Project Management plan. Take a look at the other answers—do you understand why they are correct? Answer A is simply the definition of the project charter; it doesn’t have anything to do with the defect, but it’s still true. When you’re performing the Monitor and Control Project Work process, you need to make sure defect repairs are approved before you change the deliverables, so answer B is true as well. And as far as answer C goes, that’s the whole purpose of the Perform Integrated Change Control process: to approve defect repairs, changes, and preventive and corrective actions!

You use the baseline to protect yourself from nasty surprises... and an approved change is not a surprise.

The important stuff in this question is all in the second and third sentences. The outsourcing detail is a red herring.

There will be questions on the exam where there are two valid answers but only one BEST answer.

# Answers

## ~~Exam Questions~~

### 11. Answer: A

This is the definition of the Project Management plan!

### 12. Answer: C

Even when a project is terminated, you still need to close it out.

### 13. Answer: A

If a resource is not available to you, it doesn't matter what's in your project charter or what your sponsors and stakeholders want. You need to figure out how to move forward from here, and the first step in doing that is evaluating the impact that this new problem will have on your project.

A question like this needs you to actually think about what you'd do—it's not just about applying a rule that you've learned.

### 14. Answer: A

The project manager must decide the priority of the changes. If the changes need to be made, that means that they were approved. So you can't simply deny them. And you can't call the team in for a meeting, because they need to do the work. Some people may think that the stakeholders need to be involved—but since the change was already approved, you've gotten their buy-in. Now it's up to you to decide the order in which they're implemented.

There's no such thing as a Change Prioritization plan! Keep an eye out for fake artifacts and processes.

### 15. Answer: C

When you get a change request, you need to consult the Project Management plan and follow the procedures defined in the change control system. It is generally not a good idea to involve the entire team in evaluating each change that comes in—there may be many changes, and if you pull your team off the job for each one, they'll never get their job done!

This is NOT a good change control board because a change control meeting doesn't usually include the whole team!

### 16. Answer: A

Once a change is requested, all of the work that you do with it falls under Perform Integrated Change Control, right up until it's approved and you can implement it.

Doesn't C seem like the right answer? Too bad it's not a real process!

# Answers

## ~~Exam Questions~~

### 17. Answer: B

The project management information system is defined by the company, and it's external to the project. You can think about it as the rules that you are told to follow in order to assign work in your company. They are part of the enterprise environmental factors, an input to Develop Project Charter.

Remember that lessons learned are documented throughout the project, not just at the end! That's why they're part of Work Performance Information.

When you close a process or phase, you need to make sure each deliverable has been accepted by the stakeholders.

### 18. Answer: B

The work performance information is documented as part of Direct and Manage Project Work. By the time the project closes, it's too late to use the work performance information! That's why it's an input to Monitor and Control Project Work—so you can take corrective action if the work is not being performed well.

We'll learn about Scope Management in the next chapter.

### 19. Answer: B

The project charter authorizes the project manager.

IT SEEMS LIKE HISTORICAL INFORMATION IS AN IMPORTANT CONCEPT. I'LL BET THERE WILL A QUESTION OR TWO ABOUT IT ON THE EXAM.

### 20. Answer: D

You'll learn about forecasts in Chapter 7—they're used to help predict whether the project will come in on time and within budget. If not, preventive or corrective actions will be needed! But you don't need to know that to know they're not an output of Direct and Manage Project Work.

O  
O

### 21. Answer: B

Historical information is an important input into Develop Project Charter, which is the first process that you perform when you start a new project. Historical information is very important, because it's how you learn about past projects' successes and failures. It's not actually listed as its own input. It's a part of organizational process assets—and it really is a huge asset to any organization!

When you add lessons learned to your organizational process assets, you're recording important historical information that other project managers can use later.



*Answers*~~Exam Questions~~**22. Answer: A**

The project manager may be consulted when the project charter is created, but that's not always the case. It's possible that the project manager for a project is not even known when the charter is created!

**23. Answer: C**

While you may employ good judgment in developing your project management plan, expert judgment is not an input. It's a tool/technique used in the various processes.

*Didn't D look like a good answer?*

**24. Answer: C**

The first step in handling any change is to document it. That's why change requests are an input to Perform Integrated Change Control: the change control process cannot begin until the change is written down!

**25. Answer: D**

If you're having trouble remembering what the inputs and outputs are for Monitor and Control Project Work and Perform Integrated Change Control, one way to think about it is that change control is all about deciding whether or not to do something. Monitor and Control Project Work is where you spot the problems—that's why all of the REQUESTED changes are outputs of it, and inputs into Perform Integrated Change Control.

Perform Integrated Change Control is where those recommendations get evaluated and turned into APPROVED actions and changes. The ones that are not approved are REJECTED. Then they go back to Direct and Manage Project Work, where they are IMPLEMENTED, because that's project work and all project work happens in that process.

REJECTING CHANGES MEANS THAT SOMETIMES YOU NEED TO SAY NO TO PEOPLE TO MAKE THEM HAPPY IN THE END—THEY MIGHT NOT LIKE IT, BUT THEY'LL END UP SATISFIED WHEN THE PROJECT GOES WELL.



Remember, this is how you handle changes:  
Find it...evaluate it...fix it.

**So how did you do?**

## 5 Scope management

# *Doing the right stuff*



### **Confused about exactly what you should be working on?**

Once you have a good idea of what needs to be done, you need to **track your scope** as the project work is happening. As each goal is accomplished, you confirm that all of the work has been done and make sure that the people who asked for it are **satisfied with the result**. In this chapter, you'll learn the tools that help your project team **set its goals** and keep everybody on track.

## Out of the frying pan...

The people at Ranch Hand Games have been working hard for over a year on the sequel to their most successful title, *Cows Gone Wild*. It seemed like the project would never end...



## ...and right back into the fire

Since it took so long to get this version out, it's already time to start working on the next version. But nobody wants to see that project spin out of control the way it did last time.



The Cows Gone Wild II team ran into a lot of changes throughout the project. Could they have done something to avoid that problem?

## Cubicle conversation



IT TOOK WAY TOO  
LONG TO GET COWS  
GONE WILD II OUT THE  
DOOR.

**Brian:** The project rocked in the beginning. We brought in some really talented programmers so that we could handle all of the technical challenges that might come up. We spent all that time whiteboarding and working our way through the technical issues in design. It really felt like this game was going to be amazing and fun to build. What went wrong?

**Amy:** We got sidetracked all over the place. Remember what happened with the website? We spent months making that site look just like the game. It got to the point where it actually looked a lot better than the game did.

**Brian:** Yeah, you're right. And there were all these changes along the way—the story got updated like a thousand times. It was nuts.

**Amy:** I remember that. What a mess.

**Brian:** Totally. Oh man, and that time we realized you had to redraw all the artwork for the Haymaker level? We all slept in the office for like a week!

**Amy:** Right...um, so what's gonna keep that from happening this time?



Maybe the Cows Gone Wild II project would have gone better if they'd had a project manager on board...



How would you solve these problems that happened in *Cows Gone Wild II* so they don't cause the same kind of trouble on *CGW III*?

Just write down a short sentence for each of these.

1. The website got larger and larger and took almost as much time to build as the game itself.

The team had to rework a bunch  
of artwork because the game  
story changed.

2. Last-minute story changes.

3. Artwork changes that caused rewrites at the last minute.

4. The game was over a year late.



## Exercise Solution

Here are some answers that are good for dealing with these scenarios.

1. The website got larger and larger and took almost as much time to build as the game itself.

### Keep the team from doing unnecessary work.

You can't depend on the team to figure out what to do along the way. You need to scope out the work from the very beginning.

Luckily, if you nail down the scope up front, your team won't waste time doing unnecessary work later.

2. Last-minute story changes.

### Plan ahead and avoid late-breaking changes.

Writing down all of the work and the effort required to do it will help everyone understand the impact of their changes.

If the creative team figured out earlier that they'd need to make changes, the programmers could have worked on parts that weren't going to change. That would have been a lot more efficient.

3. Artwork changes that caused rewrites at the last minute.

### Get started on the artwork changes sooner.

It's easier to figure out what's going to have to change if everyone is in sync on the scope.

Sounds like this game was late because the scope kept changing. Better planning could have fixed this.

4. The game was over a year late.

### Start planning sooner. Figure out what the team is going to do before they start.

Knowing what you're going to build BEFORE you build it means you can do a better job predicting how long it will take.

Doing more planning at the start of the project helps you prioritize so that the most important work gets done efficiently.

# It looks like we have a scope problem

All of the major problems on *Cows Gone Wild II* were **scope problems**. The website was bloated with features that were added on late in the project. The creative team kept realizing that they had to do a lot more work. These are classic scope problems.

The product scope is all about the final product—its features, components, pieces.



**Product scope** means the features and functions of the product or service that you and your team are building.

When people talk about scoping out their products, a lot of times they're talking about figuring out the features of the product, not the work that goes into it.



When we talk about scoping out a project, we mean figuring out all of the work that needs to be done to make the product.



**Project scope** is all of the work that needs to be done to make the product.

THIS is a big part of what the project manager is concerned with...the work the team has to do.



**Scope creep** means uncontrolled changes that cause the team to do extra work.

This means changes that just went in without anyone bothering to figure out what effect they'd have on the project's time, cost, scope, quality, risk, or resources.

**For the exam, you need to understand both product and project scope.**



Here are some attributes of *Cows Gone Wild III*. Which are project scope and which are product scope?

**1. Programming**

Project scope

Product scope

Project scope

Product scope

**3. Graphic design**

Project scope

Product scope

Project scope

Product scope

**5. Great graphics**

Project scope

Product scope

Project scope

Product scope

**7. Mac and PC compatible**

Project scope

Product scope

Project scope

Product scope

**6. Testing**

**8. A “boss battle” milk fight level at the end**

Project scope

Product scope

→ **Answers on page 228.**

*there are no*  
**Dumb Questions**

**Q:** Does the scope include all of the stuff that I make, like a project schedule or a budget? What about things that are used to build the product but not actually delivered to the people who use it?

**A:** Yes, the project scope includes every single thing made by you and the team, and that includes the project plan and other project management documents. There are plenty of things on a project that are deliverables, but which the people who use the product will never see...like a project schedule, specifications, blueprints, and budgets. And while some of these things are made by the project manager, there are a lot of them that aren't, and it's not your job to figure out what goes into them. You just need to make sure they get done.

**Q:** Won't the team care more about what they are making than how they are making it?

**A:** Yes, definitely. It's your job as project manager to worry about all of the work the team does to build the product, so that they can focus on actually building it. But that doesn't mean you don't need their cooperation to make sure you've written down all of the work, and nothing else.

**Q:** Does that mean the project manager doesn't care about the product scope at all, just the project scope?

**A:** No, you still need to think about your project's final product. You can never ignore product scope, because most projects have

changes to the product scope along the way. You'll have to change your project scope to include the work that's caused by product scope changes. Changes like that will probably have an impact on time and cost, too.

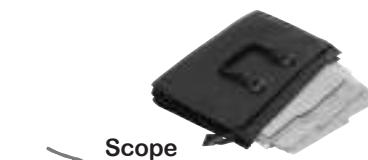
Here's an example: if somebody asks for a new feature in *Cows Gone Wild III*, the first thing the team needs to do is understand how much work is involved to accommodate it, and what that scope change will do to the cost and schedule.

As a project manager, your main concern is understanding that impact, and making sure everyone is OK with it before the change gets made. It's not your job to decide which is the best feature for the product, just to help everybody involved keep their priorities in mind and do what's best for the project.

# You've got to know what (and how) you will build before you build it

You always want to know exactly what work has to be done to finish your project *before* you start it. You've got a bunch of team members, and you need to know exactly what they're going to do to build your product. So how do you write down the scope?

That's the goal of the **six Scope Management processes**. They're about figuring out how you will identify all of the work your team will do during the project, coming up with a way to make sure that you've written down what work will be done (~~and nothing else!~~) and making sure that when things change on your project, you keep its scope up to date so that your team is always building the right product.



You need to write down exactly how you're going to do all of those things in the Scope Management plan.

## That's a good idea. But what happens if they miss something?

It often seems like you should just be able to get everyone in the same room when the project starts and just hash all this stuff out. But it's really easy to miss something, and it's even easier for a team to get sidetracked.

It's way too easy for people to go off track and start doing things that don't really contribute to the project—like building the website for a video game instead of building the game itself.

This is why the Scope Management plan needs to say how you're going to keep unnecessary work out of the project.

**The Scope Management plan describes how you write down the scope, make sure it's right, and keep it up to date.**

# The power of Scope Management

When you take control of your project's scope, you're doing more than just planning. It turns out that when projects have scope problems, the results are actually pretty predictable. Take a look at these problems that the Ranch Hand team ran into. Do any of these sound familiar to you? Many project managers run into similar problems on their own projects.

1

## **The team had trouble getting the project off the ground.**

Everyone on the team was good at their individual jobs, but it seemed like nobody knew how to get the project started.



They'd sit around in meetings talking about what they wanted to build, but it seemed like weeks before anything started getting done.

2

**There were a lot of false starts.** Just when they thought they were getting the project under way, it seemed like something would shift and they'd be back to square one.

3

**The sponsor and stakeholders were unpredictable.** There were three different times that Amy and Brian thought they were done. But each time, a stakeholder found a problem that sent them back to the drawing board.



The worst part about this was that there was no way to know when they were done with the project without asking for the sponsor's opinion...and it seemed like that opinion was always changing.

4

**There were a whole lot of changes.** They were always scrambling to keep up with shifting priorities and ideas, and they never knew for sure what they'd be working on each week.



The team was tempted to lay down the law and forbid any changes...but a lot of those changes were necessary, and good ideas.

# The six Scope Management processes

Each of the Scope Management processes was designed to help you avoid the kinds of scope problems that cause a lot of projects to go off track. One of the best ways to remember these processes for the exam is to understand why they're useful, and how they solve the kinds of problems that you've seen on your own projects.



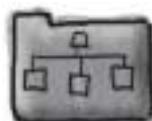
**Project Management plan**



**Requirements documentation**



**Project scope statement**



**Work breakdown structure**



**Change requests**



**Accepted deliverables**

## Plan Scope Management

Here's where you write down the subsidiary plan for the project management plan that we talked about in the last chapter. You plan out all of the work you'll do to define your scope, make sure the team is planning to do the right work, and control it.

## Collect Requirements

In this process, you find out all of the stakeholders' needs and write them down so that you know what to build and your requirements can be measured and tracked.

## Define Scope

Here's where you write down a detailed description of the work you'll do and what you'll produce.

When you do this right, the stakeholders are never unpredictable because you already understand their needs.

## Create WBS

The work breakdown structure (WBS) organizes all of your team's work into work packages—or discrete pieces of work that team members do—so that you can keep the momentum of the project going from the start.

## Control Scope

We already know how important it is to control changes on your project. When scope changes aren't controlled, it leads to the most frustrating sort of project problems. Luckily, you already know about change control, and now you can use it to manage your project's scope.

Pay attention to the WBS—there will be a lot of questions about it on the exam.

## Validate Scope

Once the work is complete, you need to make sure that what you're delivering matches what you wrote down in the project scope statement. That way, the team never delivers the wrong product to the customer.

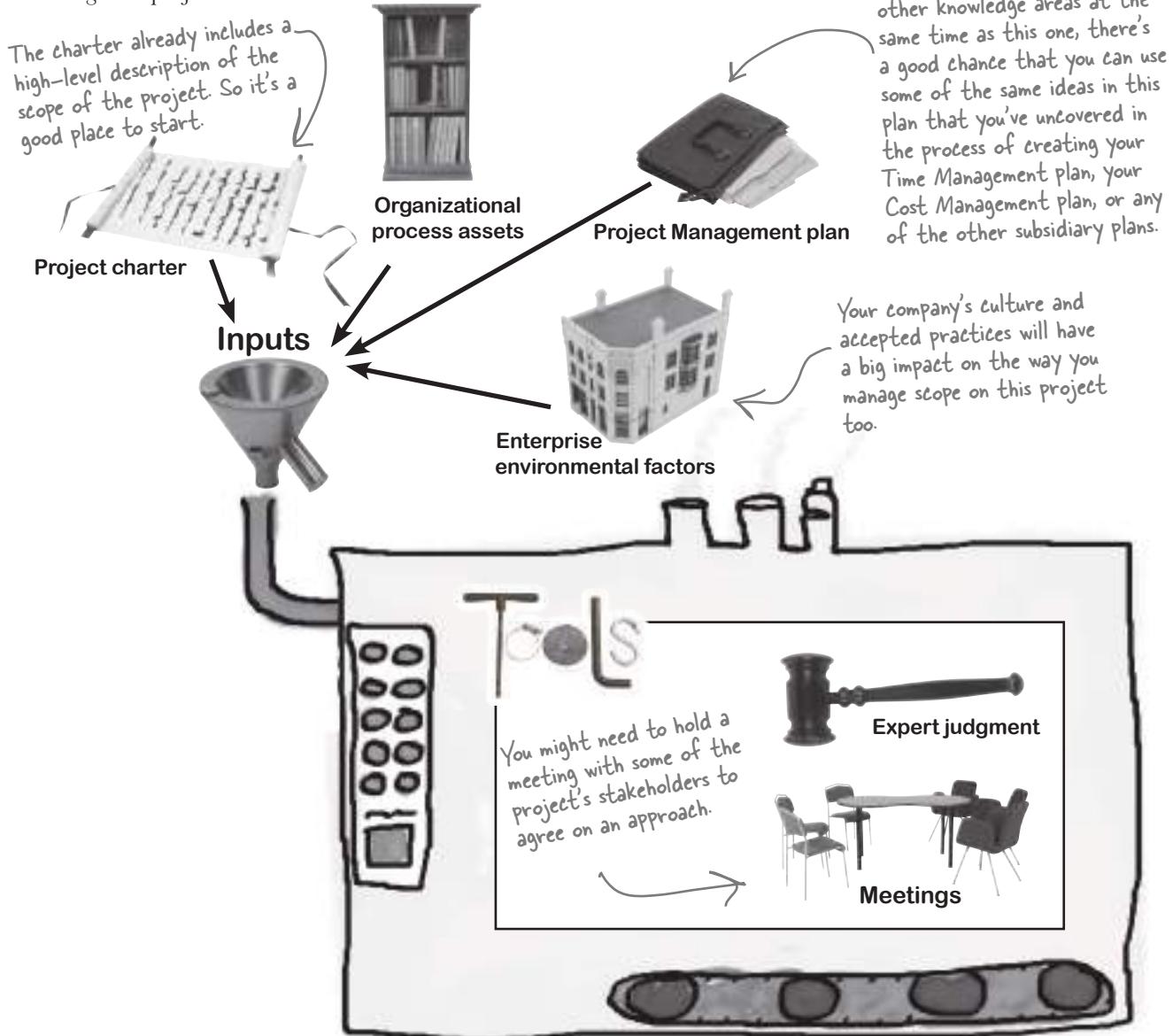
Remember integrated change control from Chapter 4? Now you'll see it in action.

On the exam, "customer" can mean the same thing as "client" and "sponsor."

# Plan your scoping processes



Here's where you figure out how you'll approach defining and validating the scope of your project. The **Plan Scope Management** process is where you lay out your approach to figuring out what work you'll do and what's out of scope. All of the other processes in the Scope Management knowledge area are defined and described in this document. It's the blueprint you'll use for everything else you'll do to manage scope through the project.



# Now you've got a roadmap for managing scope

There are two outputs of the Plan Scope Management process: the Scope Management plan and the Requirements Management plan. Both of them help you define the scope of your project and make sure that you and your team are focused on only the work that will help you satisfy your customers' needs. The Scope Management plan keeps you on track by detailing the processes you and your team will follow as you document your scope, figure out your work breakdown structures, and validate and control your scope for the rest of the project. The Requirements Management plan details the process you'll use to collect requirements and how you'll manage them once they've been written down.

## Outputs



Your Requirements Management plan will describe all of the processes your team will use to document your requirements and maintain that document throughout the project.



The Scope Management plan isn't just about writing a scope document; it details the process you use to come up with your work breakdown structure too.

## Requirements Management plan

Here's where you'll find a description of the approach the team will take to planning, tracking, and reporting on requirements. You'll use this document to describe the prioritization process for requirements, and how you'll build a traceability matrix for your requirements as well.

## Scope Management plan

Here's where you write down the subsidiary plan for the Project Management plan that we talked about in Chapter 4. You plan out all of the work you'll do to define your scope, with the right work planned for the team, and control it.

**The Plan Scope Management process helps you think through everything you'll need to do to keep your project focused on the right work from beginning to end.**

## Cubicle conversation

Meet Mike, the new project manager at Ranch Hand Games.



**Brian:** So we finally hired a project manager. Welcome aboard!

**Amy:** I'm glad they brought you in to help fix this mess.

**Brian:** So what are you gonna do to help us? Because I don't see what you can really change.

**Mike:** Thanks for the vote of confidence. Look, I might not be able to fix everything, but we should be able to keep this scope under control.

**Brian:** Sure, you say that now. But we all thought the last project would go fine too, and that one was a real pain!

**Mike:** Well, did you gather the requirements for your last project?

**Amy:** No, but we've built video games before and we knew basically what we needed to do when we started out.

**Mike:** It sounds like that wasn't enough.

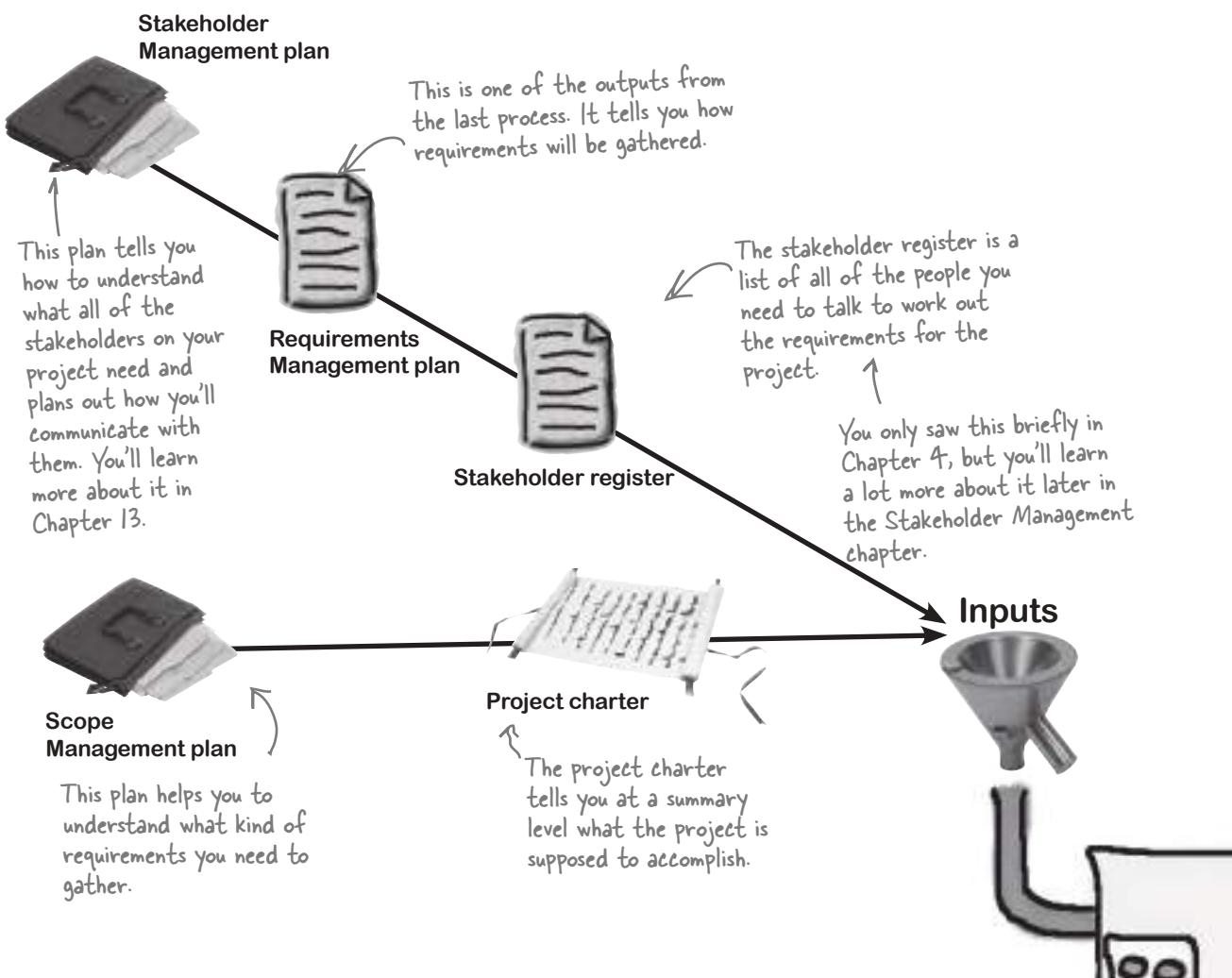


What's the first thing Mike should do to make sure that *Cows Gone Wild III* goes well?



# Collect requirements for your project

Gathering requirements is all about sitting down with all of the stakeholders for your project and working out what their needs are, and that's what you do in the **Collect Requirements** process. If your project is going to be successful, you need to know what it will take for all of your stakeholders to agree that your project has met its goals. You need to have a good idea of what's required of your project up front, or you'll have a tough time knowing whether or not you're doing a good job as you go. That's why you need to write down all of your project and product requirements with enough detail that you can measure your team's progress.





# Talk to your stakeholders

The **Collect Requirements** process involves talking to the people who are affected by your project to find out what they need. All of the tools in this process are focused on getting your stakeholders to tell you about the problem that the project is going to solve. Sometimes that means sitting down with each of them one-on-one, and other times you can do it in a group setting. One of the most important things to understand about requirements is that every requirement fulfills a specific stakeholder need. Lucky for you, a lot of those needs are already written down—in your business case document.

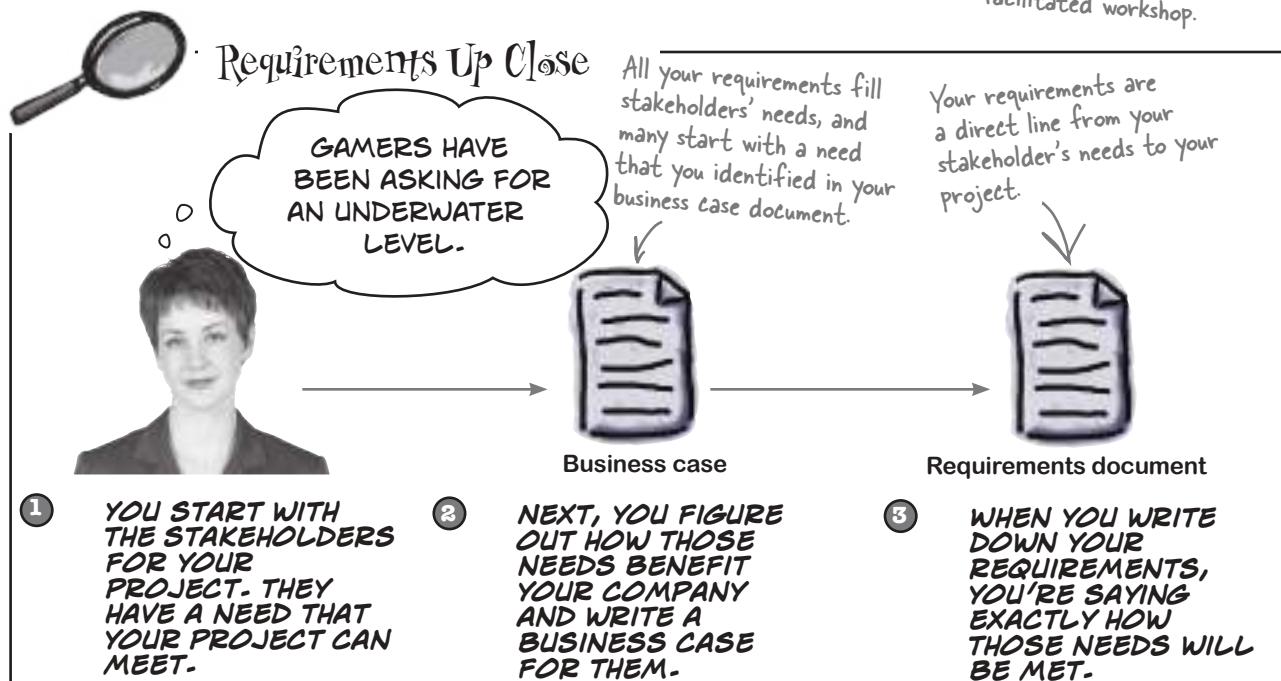
But that's not the only place you'll find requirements, so here are three really useful tools and techniques to help you gather requirements:

**Interviews** are important ways to get your stakeholders to explain how they'll use the product or service your project is creating. By talking to people one-on-one, you can get them to explain exactly what they need so that you can be sure that your project can meet its goals.

**Facilitated workshops** are more structured group conversations where a moderator leads the group through brainstorming requirements together. In facilitated workshops, misunderstandings and issues can get reconciled all at once because all of the stakeholders are working together to define the requirements.

**Focus groups** are another way to get a group of people to discuss their needs with you. By letting a group discuss the end product together, you can get them to tell you requirements that they might not have thought of by themselves.

If you've ever done a joint application design (JAD) session where users and the development team work together to define requirements, it's considered a facilitated workshop.





# Make decisions about requirements

A big project usually has a lot of stakeholders, and that means a lot of opinions. You'll need to find a way of making decisions when those opinions conflict with each other. There are four major decision-making techniques you can choose from. These are referred to as **group decision-making techniques** on the test.

**Unanimity** means everyone agrees on the decision.

**Majority** means that more than half the people in the group agree on the decision.

**Plurality** means that the idea that gets the most votes wins.

**Dictatorship** is when one person makes the decision for the whole group.



You'll need to know the difference between the four different decision techniques for the exam. Here are the minutes from a facilitated workshop that the CGW team held with all of its stakeholders. Identify which decision-making technique was used in each case.

1. The group voted on the CCG (cud-chewer gun) five times, but decided not to include it because they couldn't get everyone to agree on it.

- Unanimity     Plurality  
 Majority     Dictatorship

2. The VP of Engineering told everyone that they had to come up with a new character for Team Guernsey. Since he's the highest-ranking person in the room, nobody argued with him.

- Unanimity     Plurality  
 Majority     Dictatorship

3. There were 10 new scenery suggestions up for approval, but only 5 could make it into the game. The team chose the top 5 in a general vote.

- Unanimity     Plurality  
 Majority     Dictatorship

4. Over half the group wanted to see a new story that involved Farmer Ted. So that requirement was recorded as an absolute necessity.

- Unanimity     Plurality  
 Majority     Dictatorship

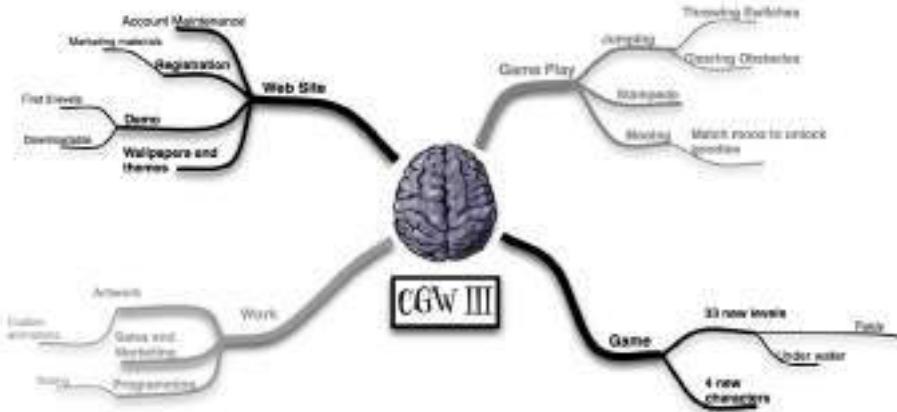
Answers: 1. Unanimity 2. Dictatorship 3. Plurality 4. Majority

## Help your team to get creative



Getting your team to think creatively can help you create a better product from the start. **Group creativity techniques** are all about getting those creative juices flowing while you gather your requirements.

**Idea/mind maps** are a good way to visualize the way your ideas relate to each other. When you've finished working through an idea, it sometimes helps to create a map of how you got there and show which ideas can be grouped together.



The name "Delphi technique," comes from the Oracle at Delphi.

Here's the mind map the CGW team made from their brainstorming session.

**The Delphi technique** is a way of letting everyone in the group give their thoughts about what should be in the product while keeping them anonymous. When you use the Delphi technique, everybody writes down their answers to the same questions about what the product needs to do and then hands them into a moderator. The questions could be about specific features that the product should have.

When the CGW team used the Delphi technique, here were a few of their questions:

### CGW III Delphi Questionnaire

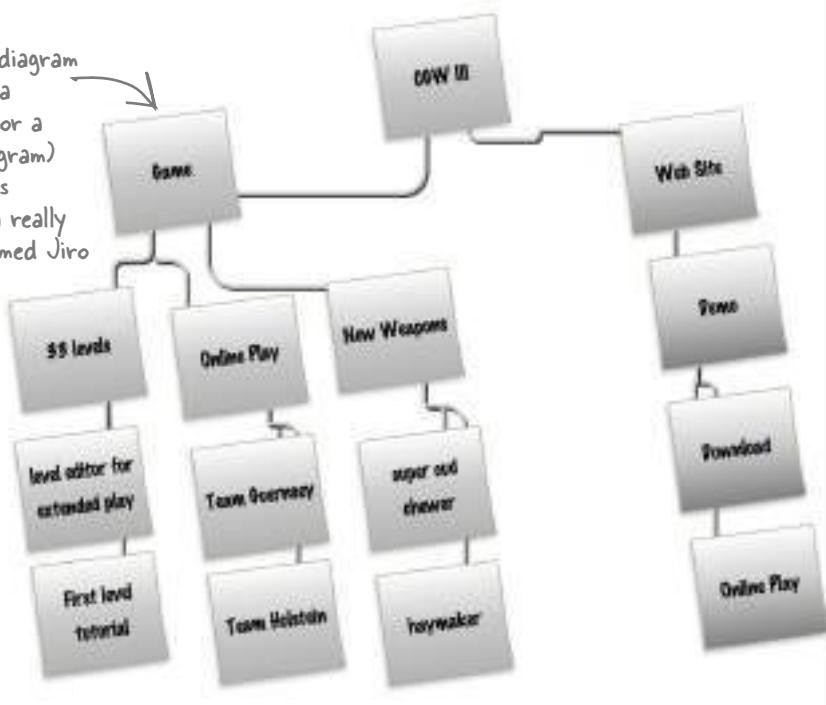
- What new levels would you like to see in the game?
- What new abilities should Bessie have?
- What should the story for CGW III be about?

The Delphi technique can be used to estimate the work the team will need to do and how long it will take too!

The moderator keeps everybody's names to himself , but shares the ideas so that everyone can learn from them and think of new ones. After everybody discusses those ideas, they're given a chance to adjust their original answers to the questions and hand them back in to the moderator. These iterations continue a few times until the group settles on a list of requirements for the product.

# Tools

This kind of diagram is also called a KJ diagram (or a Kawakita diagram) because it was invented by a really smart guy named Jiro Kawakita.



**Affinity diagrams** are great when you have a lot of ideas and you need to group them so you can do something with them. A lot of people make affinity diagrams using Post-it notes on walls. That way, you can move the ideas around and change the groupings when you think of new areas to explore. Sometimes just putting requirements in categories will help you to find new ones.

**The nominal group technique** is a form of brainstorming where you write down the ideas as you find them and have the group vote on which ones they like the best. You then use the votes to rank all of the ideas and separate the ones that aren't important from the ones you want to delve into deeper.

**Context diagrams** help your team show the way all of the processes and features in your product scope relate to each other. It's a picture of the scope of your product that shows how users will interact with it.

**Brainstorming** is one of the most commonly used ways of collecting requirements. Whenever you sit a group of people down to think of new ideas, you're brainstorming.

**Benchmarking** is a way of comparing the processes and practices used in building your software with the practices and processes in other organizations so you can figure out the best ideas for improvement.

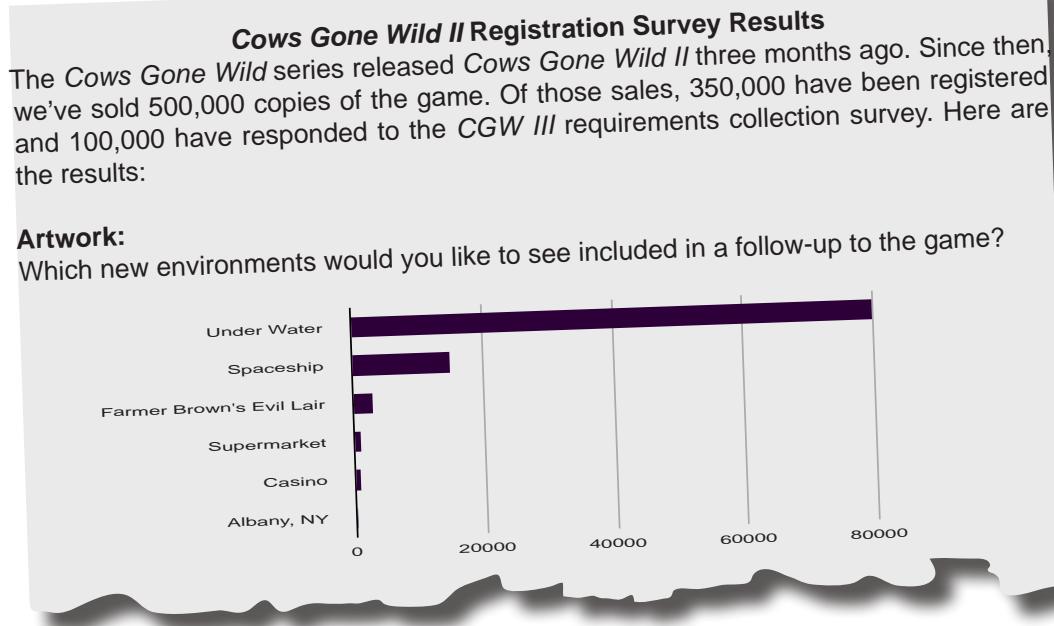
**Document analysis** is a way of collecting requirements by reading through all of the existing documents for your product.

## Use a questionnaire to get requirements from a bigger group of people



The *Cows Gone Wild* development team needed to talk to the people who play their games to figure out what would make the gamers happy in the next version. The team obviously couldn't go around to every customer's house asking questions, so they wrote a questionnaire about new possible features for the game that they sent to gamers who had registered the game.

When it was time to start collecting requirements for the new version, the team started with all of the data they'd gathered from those surveys and did some analysis to figure out which features were most important to the gaming community. Here's an excerpt from their survey results:



## Observation can help you see things from a different point of view

Sometimes observing the people who will use your product while they work with it will give you a better idea of how to solve their problems. People don't always know what to say when you ask them for requirements, so watching them deal with the problem your product is going to address can help you to find requirements that they might not tell you about on their own.

## A prototype shows users what your product will be like

Sometimes the best way to get your stakeholders to give you an opinion on what your product should be is to show it to them in a **prototype**. Prototypes are models of the product that you're going to build that give your stakeholders a better idea of what your team is thinking. Sometimes users who are experimenting with a prototype will come up with a brand new requirement that they never thought of before. If you can get them to find it in the prototype, it's a lot easier to deal with than if you wait until the end of the project to show to them. When you're making a really complicated product, it can make sense to prototype it as part of the requirements collection process so that you can find changes that your users will ask for early on.

Prototypes are a great tool if you're developing your project using iterative techniques. If you're using agile software development processes or defining requirements in phases, prototypes are a great way to keep your stakeholders involved in the project and get their feedback on changes that might be needed.

### *there are no Dumb Questions*

**Q:** In my company, business analysts collect the requirements, not project managers. Why do I need to know all this stuff?

**A:** Good point. A lot of project teams will have a business analyst who will work on gathering requirements for the project and writing specifications for it. As the project manager, though, you are responsible for making sure that the needs of all of the stakeholders are met. So it's a good idea for you to stay on top of the requirements collection process, and be an active participant in it.

Some organizations even divide up the requirements-gathering activities into project requirements and product requirements. The project requirements would be things like staying within the budget, meeting specific deadlines, and using a certain number of resources, while product requirements would be about features of the product. Even if you are lucky enough to have a business analyst on your project to help you gather requirements, you'd better understand both the project and product requirements if you're going to keep your project on track.

**Q:** Can I just skip these requirements-gathering tools and jump straight into code? We do iterative development where I work. That means I can jump right in and plan the work as it's happening, right?



**A:** The short answer is no. The more you know up front, the easier it's going to be for you to plan out your project. Even iterative projects must plan out their requirements for each phase up front. Now, it's true that you should be able to get through the Collect Requirements process more quickly if you're only gathering requirements for a small phase of your project, but it doesn't mean that you can skip requirements altogether.

**Q:** How do I know when I'm done collecting requirements?

**A:** That's a good question. Your requirements need to be measurable to be complete. So it's not enough to write down that you want good performance in your product. You need to be able to tell people what measurement counts as good performance for you. You have to be able to confirm that all of your requirements are met when you close out your project, so you can't leave requirements up to interpretation.

**You know your requirements are complete when you've got a way to verify each of them once they're built.**

# Now you're ready to write a requirements document

The outputs of the Collect Requirements process are the requirements document and a requirements traceability matrix, which allows you to follow the requirements from the document through implementation and verification.

## Outputs



### CGW III Requirements Document

#### 1. Introduction

CGW II was a huge hit. We've done some market research and some internal brainstorming and compiled these requirements for *Cows Gone Wild III: The Milkening*, which will be released next year in time for the holidays.

#### 2. Organizational Impact

This product will have an impact on many departments at Ranch Hand Games, including Research and Development, Marketing, Distribution, Shipping, Administration, Finance, and Customer Service.

#### 3. Functional requirements

Name	RU001—Include Underwater levels.
Summary	The cows will need to be able to move around under water.
Rationale	Underwater environment was the single biggest request from polled gamers.
Requirement	Cows will need to be able to swim, and underwater puzzles will need to be developed that require swimming.

#### 4. Nonfunctional requirements

...

Name	RNF001—Performance as good or better than CGW II.
Summary	The new functionality cannot slow down game play.
Rationale	Gamers were very happy with the performance upgrades in CGW II. We cannot be seen as losing that improvement in the next version.
Requirement	All levels must load in under 15 seconds. All online levels must load in under 25 seconds over a cable connection at 256K.

This requirement is measurable. If the end product has puzzles that involve swimming, the requirement will pass its test. If not, it will fail.

Here, you can load the levels and time it to figure out if the product meets its requirements.

The requirements document needs to list all of the functional and nonfunctional requirements of your product.

**Functional requirements** are most of the kinds of things that you think of right away: new features, bug fixes, and new or different behavior. **Nonfunctional requirements** are sometimes called *quality attributes* because they're things that you expect from your deliverables, but aren't specific features. Some examples of nonfunctional requirements are performance, reliability, error handling, and ease of use.

### CGW III Requirements Traceability Matrix

**Origin codes:** Business case - BC, Survey-S1, Internal- I  
**Requirement Nos:** Cross-reference with requirements document  
**Work Module:** Where implemented, cross-reference with WBS  
**Test:** Where verified, cross reference with design of experiments

Requirements for Underwater Levels

Origin	Requirement	Module	Test
S1	RU001	3.3.1	TC01-TC57
BC1	RU002	3.4.1	TC101-TC350
S3	RU003	3.6.2, 3.7.1	TC2

We'll be talking more about what a WBS is and how to build one in just a few pages.

### CGW II Requirements Management

#### The Requirements Collection Process:

The following techniques will be used for requirements elicitation:

1. Questionnaires and surveys
2. Facilitated workshops
3. Delphi technique
4. Focus groups
5. Interviews
6. Observation

They will be prioritized based on strategic alignment with CGW III's business case document.

**Requirements will be managed as part of integrated change control once approved.**

The Requirements Management plan tells how requirements will be gathered and analyzed.

Once the requirements document is approved by the stakeholders, any changes to it need to be approved using integrated change control.

This document shows where the requirements come from, where they get implemented, and how they get verified. It's a great way to take a quick high-level look at all your requirements and make sure they're mapped to specific test cases.



## BULLET POINTS AIMING FOR THE EXAM

- **Product scope** means the features and functions of the product or service being built. **Project scope** means the work that's needed to build the product.
- **Functional requirements** are the behavior of the product. **Nonfunctional requirements** are implicit expectations about the product.
- **Scope Management** is about figuring out all of the work that's going to be needed for the project, and making sure only that work is done—and nothing else.
- The **Scope Management plan** is created as part of the Project Management plan. It defines the process you'll use for defining scope and managing changes to it.
- You'll need to know the **order of processes** for the exam. A good way to remember them is to understand how the output of one process is used as the input for another.



Write down the Collect Requirements tool or technique that's being used in each one of these scenarios.

1. The team got together to come up with ideas for the game. As they thought of them, they grouped them on different colored index cards and used thumb tacks to arrange them on a bulletin board by type.
- .....

2. Ranch Hand Games listed questions for people visiting the website to answer in exchange for a game promo coupon.
- .....

3. The team got together to brainstorm and periodically voted to rank requirements and separate the least important from the most important.
- .....

Answers: 1. Affinity diagram, 2. Questionnaire, 3. Nominal group technique

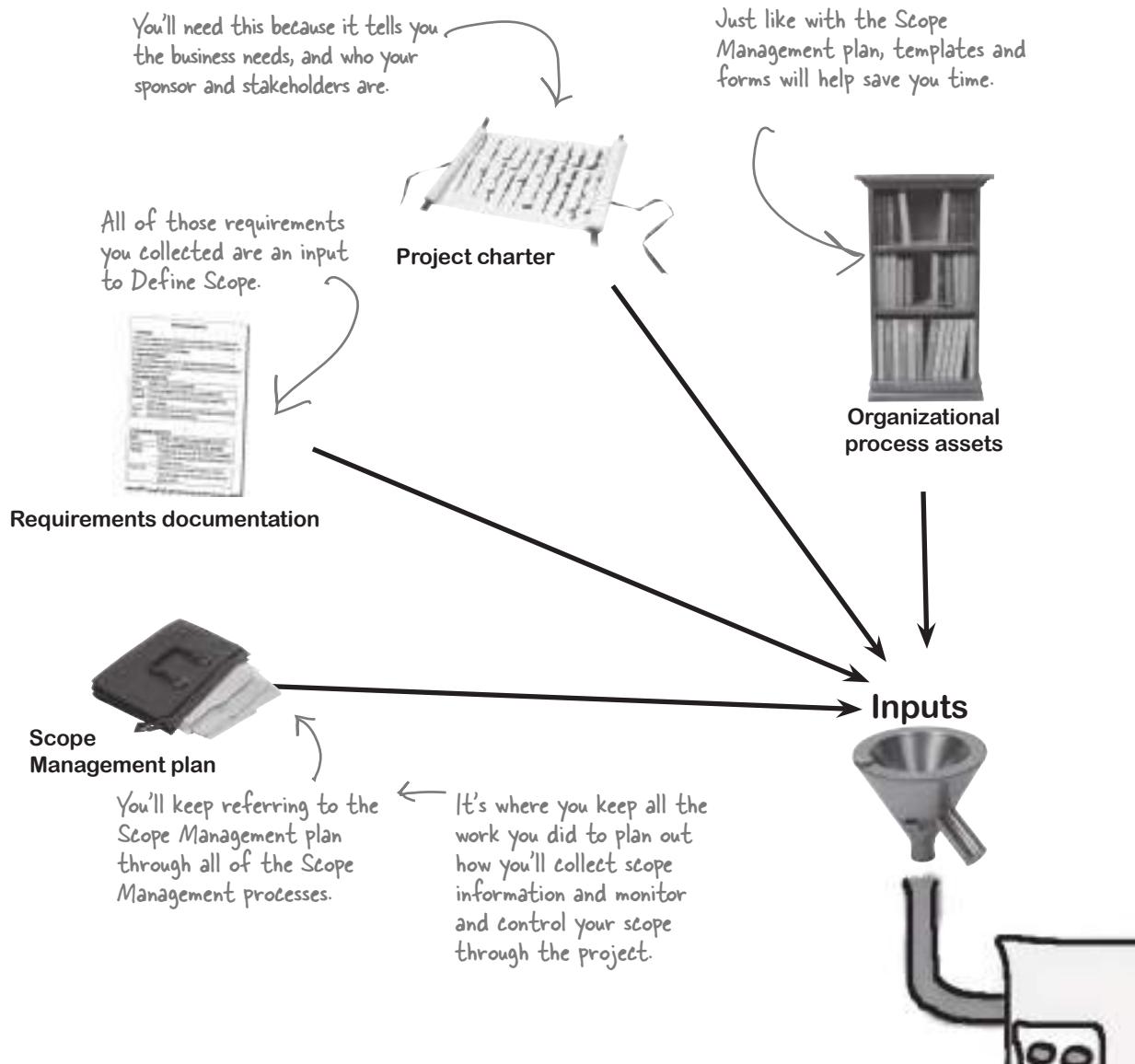


Now that Mike's gathered the requirements, what do you think he should do with them? How can he make sure they actually get implemented in the game?



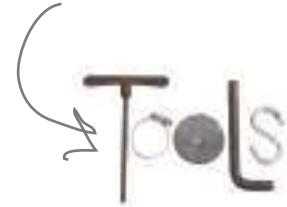
# Define the scope of the project

Now that the Ranch Hand team has a project manager, everything will go smoothly, right? Well, not exactly. Just assigning a project manager isn't enough to get the scope under control. That's why you need the **Define Scope** process. Even the best project managers need to rely on things from the company and the people around them. That's why the inputs to Define Scope are so important. They contain everything you need to know before you can begin to break the project down into the work that the team members will do.



## How do you define the scope?

These are the four tools and techniques of Define Scope.

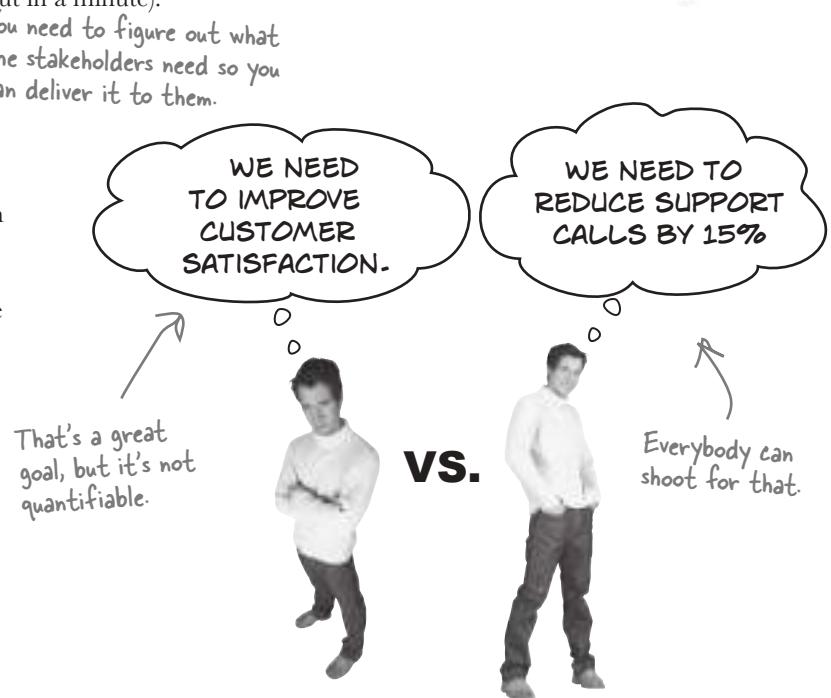


You already got a head start on defining the project scope when you wrote down the requirements. But now you need to go a lot further and write down all of the work that you and your team are going to do over the course of the project. Luckily, the **Define Scope process tools and techniques** are there to help guide you through creating the project scope statement (which you'll learn about in a minute).

### Facilitated workshops

When you do facilitated workshops with your stakeholders, figure out what they need, and write it all down. The reason you do this is because you need to make sure that what you're delivering really meets the needs of the stakeholders. This keeps the team from delivering a poor product.

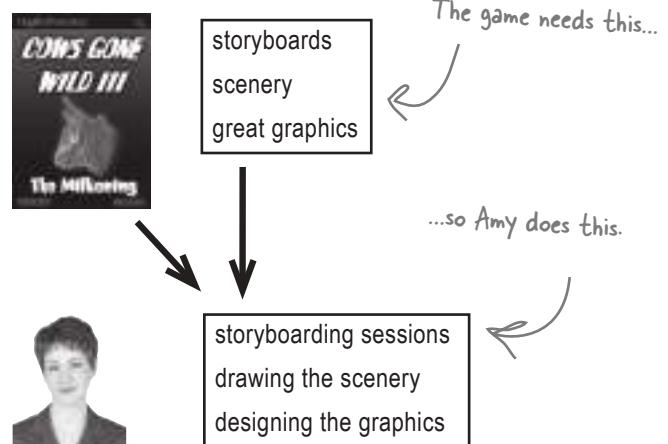
An important part of stakeholder analysis is doing your best to set **quantifiable goals**. That means writing down specific project goals that you can measure, which makes it a lot easier for the team to plan for the work they have to do.



### Product analysis

Remember product versus project scope? People naturally think about the product they are making when they start to define the scope. This tool is all about turning those things into project work that needs to be done.

Once the work is complete, you're going to have to make sure that what you're delivering matches what you put in your requirements. The better your product analysis is at the start of the project, the happier your stakeholders will be with the product, and the less likely it is that you'll discover painful, last-minute problems at the end.



## Alternatives generation

Think of other ways that you could do the work. Exploring different ways to do the work will help you find the one that is most efficient for the project. It's always possible that you might find a better way of doing things and need to change your original plan.

## Designing the graphics: alternatives

**A.**

Hire a graphic designer

**B.**

Send the design work to an outside studio

**C.**

License artwork that already exists



Expert judgment

## Expert judgment

You've seen this one before! Bring in an expert to help you figure out what work needs to be done.

## *there are no* Dumb Questions

**Q:** Is product analysis the same as requirements gathering?

**A:** Not exactly. When people gather requirements, they're trying to understand what needs the product should fill. Requirements are the contents of the product. When you use product analysis to define the scope of the work to be done, you're figuring out what deliverables the team needs to work on in order to build your project scope statement. So product analysis is concerned with how the work will be done, not what's in it.

**Q:** What if there is only one way to do something? Do I still need to do alternatives identification?

**A:** There aren't too many things out there that can only be done one way, but if you happen across one, then you don't have to spend much time on alternative identification because there aren't any alternatives to identify.

**Q:** What if a stakeholder can't tell me how to measure his needs?

**A:** That can get kind of tricky. Sometimes stakeholders know that they want things to get better, but they don't know how to tell when they've succeeded. You need to work with them to find something that can be measured in their ideas about project success. Without a way to measure your success, you won't know whether or not you are accomplishing your goals.

# The project scope statement tells you what you have to do

After you have done your scope planning, figured out as much as you could using stakeholder and product analysis, and identified all of the possible ways of doing the work, you should be ready to add any new findings to the project scope statement.

**Outputs**

This means looking for all the work the project DOESN'T include.

The deliverables listed here are EVERYTHING the project creates, including project management stuff.

Constraints are known limitations. Assumptions are things you think are true.

**Cows Gone Wild III: The Milkening Project Scope Statement**

**Product Scope Description:** The product must contain 34 levels and 4 playable characters, and must be created for both Mac and PC platforms.

**Project Exclusions:** This project does not include a companion website. That will need to be done by another project team.

**Project Deliverables:** The deliverables for this project are:

Game	Test plan	Source code	Schedule
Design documents	Test reports	Defect reports	Change requests
Contract	Budget	Project Management plan	

**Project Acceptance Criteria:** The product must not have an adverse impact on existing systems. All defects found must be judged of low enough priority and severity to be acceptable to all stakeholders.

**Project Constraints:** Artwork from the previous games cannot be used.

**Project Assumptions:** The developers will not be asked to work on any other projects.

This is the other output of the process, and it has to do with change control. We'll get to that when we talk about the Control Scope process.

**Project document updates**



Here are a few things that Mike left out of the *CGW III* project scope statement. Can you figure out where each of them should go?

- |   |                         |
|---|-------------------------|
| 1. The game must have fewer than 15 defects per 10,000 lines of code.   | A. Project exclusions   |
| 2. There will be four graphic designers reporting to the art director, and six programmers and four testers reporting to the development manager. | B. Project deliverables |
| 3. No more than 15 people can be allocated to work on the game at any time.   | C. Project constraints  |
| 4. Scenery artwork.   | D. Project assumptions  |
| 5. The product will not include bug fixes for the previous version.   | E. Project requirements |
| 6. The game needs to run on a machine with 1 GB of memory or less.  | F. Acceptance criteria  |

—————> Answers on page 229.

**The project scope statement tells what work you are—and are not—going to do in the project.**



Tonight's talk: **Requirements Documentation** and **Project Scope Statement** spar over what's important in **Scope Management**

### **Requirements Documentation:**

I'm glad we're finally getting a chance to chat in person.

I wouldn't say that! It's just that, well, I think it's not hard to see why I'm such a critical part of Scope Management.

Well, it ought to be. I mean, you wouldn't even exist if it weren't for me.

There's no work to do if there's no product and without me, nobody knows what to build. So without me, really, who needs you?

But they still need me to tell them what to build. I tell everybody what the product needs to be.

That's true. And it's no wonder that so many projects have problems. But the more you know up front, the easier it is to plan for what might happen along the way.

### **Project Scope Statement:**

Really? I never got the impression that you had much respect for me.

Typical. Everything's about you.

How do you figure?

Now that's just not fair. You think that just because people get together and talk about you in focus groups and brainstorming sessions, you're something special. Without me, people would be arguing over your requirements forever. I'm the one who puts limits on all of this stuff.

That may be true, but think about it for a minute. Your requirements almost always change from the time you start the project until it ends. You're so high-maintenance. You hardly ever hear of a project where the team gets all of the requirements right from the beginning. And when you change, I have to change too. It's so obnoxious.

**Requirements Documentation:**

I guess that means that knowing the project scope up front is pretty important too, now that I think about it.

But you're so broad. I mean, if you really want to know what's getting done on a project, you have to look at me. I represent the need the project is filling; without me, it never would've happened in the first place.

That seems almost as important as my job to me.

**Project Scope Statement:**

That's exactly my point. We're both useful, but I'm the one everyone thinks of first when they think about managing scope.

Here we go again with your attitude. Trust me, without me, no one would know how those needs were going to be met. I'm just as important as you are.

I guess we're never going to see eye-to-eye on this.



You'll need to know the difference between defining the scope and collecting the project's requirements for the exam. Which of these things is part of the project scope statement, and which is part of the requirements document?

**1. The work required to create the graphics**

- Requirements document    Project scope statement

**2. New characters in the game**

- Requirements document    Project scope statement

**3. 33 new levels**

- Requirements document    Project scope statement

**4. The performance requirements for the product**

- Requirements document    Project scope statement

**5. A description of how the WBS is created**

- Requirements document    Project scope statement

**6. How the software will be tested**

- Requirements document    Project scope statement

**7. How the stakeholders will verify the deliverables**

- Requirements document    Project scope statement

**8. A list of all artwork that will be created**

- Requirements document    Project scope statement

## Question Clinic: The "which-is-BEST" question

WHEN YOU'RE TAKING ANY SORT OF EXAM, THE MORE FAMILIAR YOU ARE WITH IT, THE MORE RELAXED YOU'LL BE. AND ONE WAY TO GET FAMILIAR WITH THE PMP EXAM IS TO GET TO KNOW THE DIFFERENT KINDS OF QUESTIONS YOU'LL SEE. ONE IMPORTANT SORT IS THE "WHICH-IS-BEST" QUESTION.

The which-is-BEST question sometimes starts with a sentence or two talking about a particular situation.

This is one of those questions where "customer" is used in place of "sponsor."

OK, now you have enough information to answer the question. What do you do when you find out that certain deliverables need to change?



36. You are the project manager for a building contracting project. You schedule a meeting with your customer and stakeholders to give them an update on the progress of the project. At that meeting, they tell you that certain deliverables need to be changed before they can be accepted. Which is the BEST way for you to proceed?

- A. Inform the stakeholders that they have no authority to decide what deliverables are acceptable.
- B. Consult the project charter and use it to show the stakeholders that you are the authorized project manager.
- C. Figure out what needs to be fixed so that you can tell the team how to make the deliverables acceptable.
- D. Document the requested changes so that you can put them through change control.

Some of the answers will simply be wrong. You should be able to eliminate them first.

This one sounds good... That's what the project charter is for, right? But wait a minute! What does the charter have to do with the scope of the work?

OK, this actually seems right—you do need to do that. But is it really the BEST answer?

THE WHICH-IS-BEST QUESTION MAY HAVE MORE THAN ONE GOOD ANSWER, BUT IT ONLY HAS ONE BEST ANSWER.



Aha! Here's the BEST answer! Even though C was technically correct, D is a much better description of how change control actually works.

# HEAD LIBS

Fill in the blanks to come up with your own “which-is-BEST” question.

You are the project manager for \_\_\_\_\_ . At the end  
of \_\_\_\_\_ (an industry or the name of a project) , you ran into a problem. You find  
out that \_\_\_\_\_ (a Scope Management process) was not performed by  
\_\_\_\_\_ (a tool or technique that is part of that process) correctly. Which is the BEST way for you to proceed?  
\_\_\_\_\_ (the team member or person who is  
supposed to do that tool or technique)

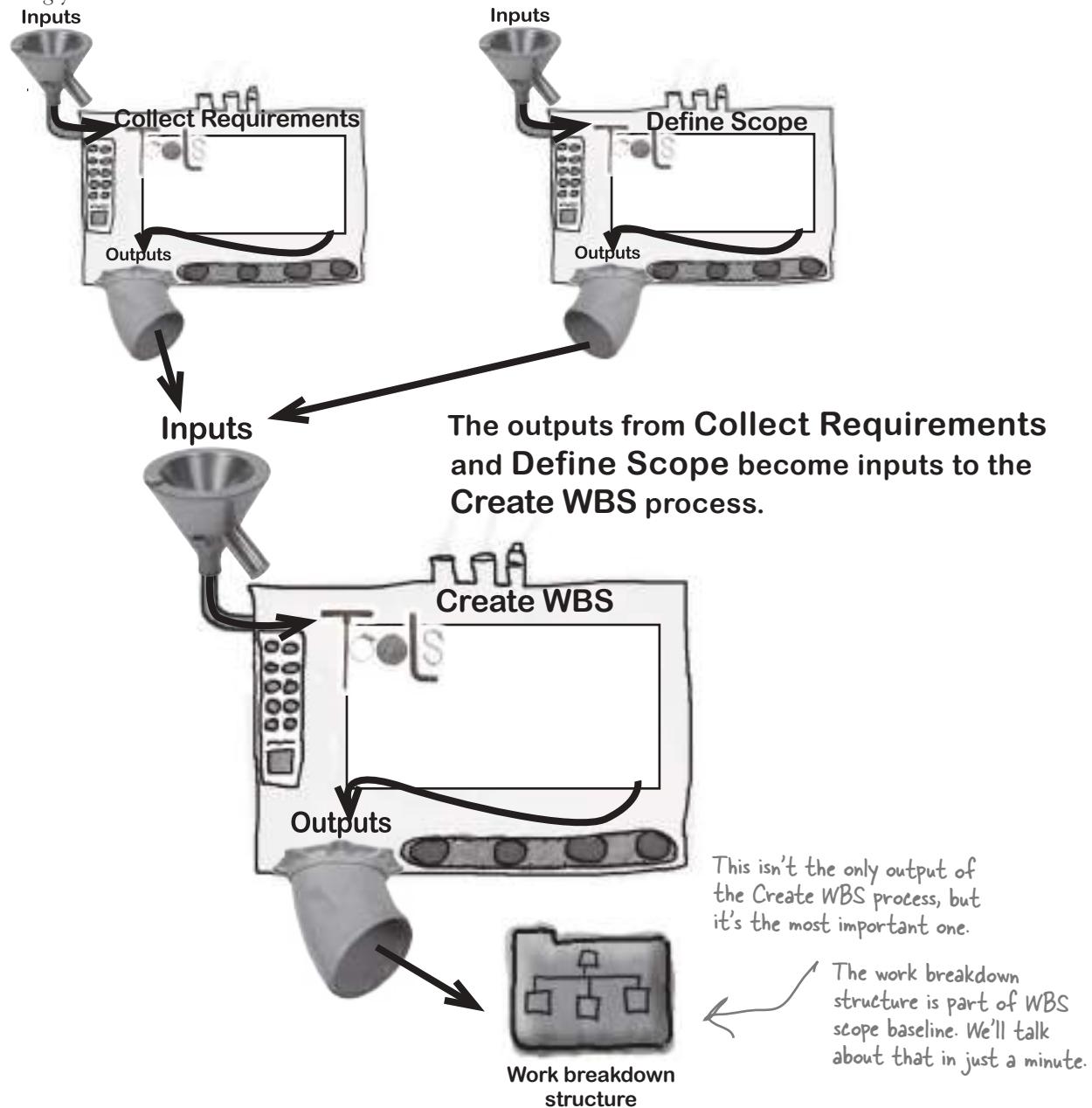
- A. \_\_\_\_\_  
(an obviously wrong answer where the person or project manager uses the tool or technique incorrectly)
- B. \_\_\_\_\_  
(an answer that sounds correct, but isn't the BEST answer)
- C. \_\_\_\_\_  
(the BEST answer that describes exactly how to use the process properly)
- D. \_\_\_\_\_  
(an answer that says something that's true about an irrelevant process, like one from Chapter 4)



Join the Head First PMP community at <http://www.headfirstlabs.com/PMP>  
You can add your Head Libs answer, and see what Head Libs other project managers  
came up with!

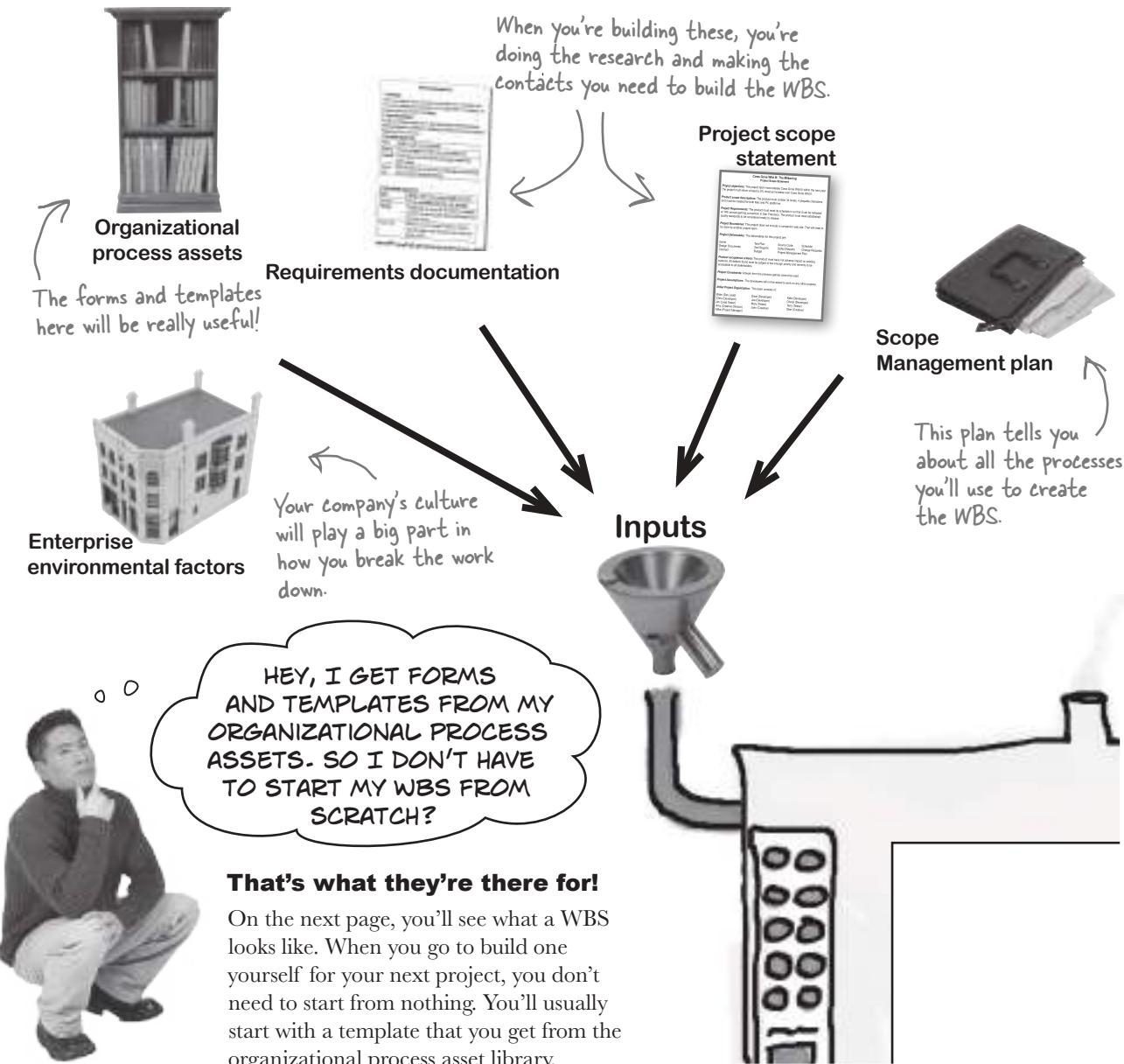
## Create the work breakdown structure

The **Create WBS** process is the most important process in the Scope Management knowledge area because it's where you actually figure out all the work you're going to do. It's where you create the **work breakdown structure** (or WBS), which is the main Scope Management output. Every single thing that anyone on the project team—including you—will do is written down in the WBS somewhere.



# The inputs for the WBS come from other processes

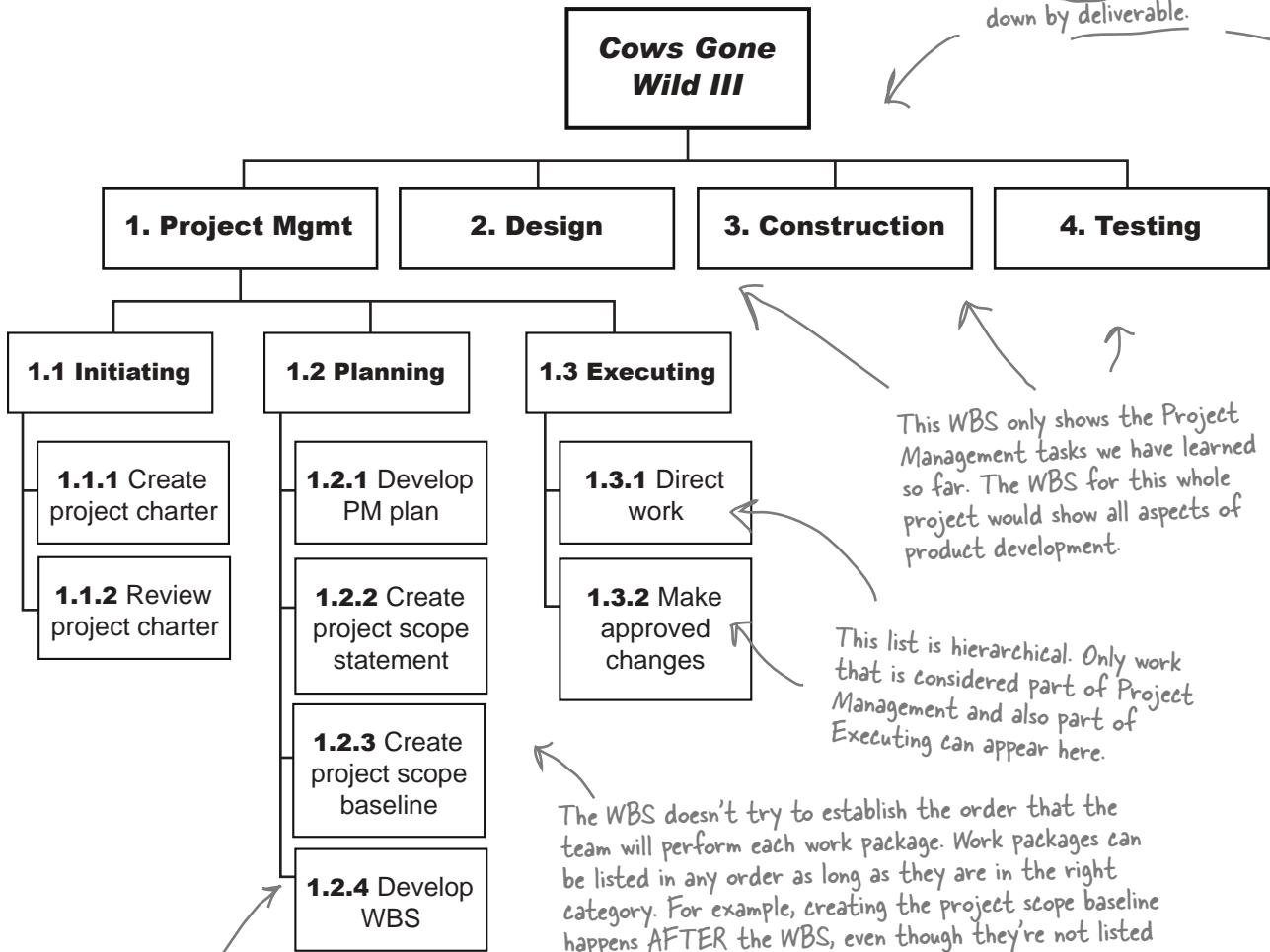
You've already seen all of the inputs that you need to create the WBS. It shouldn't be too surprising that you need the requirements document, project scope statement, and organizational process assets before you create the WBS. When you're developing these things, you're learning what you need to know in order to decompose the project work.



# Breaking down the work

One way to get a clear picture of all of the work that needs to be done on a project is to create a work breakdown structure. The WBS doesn't show the order of the work packages or any dependencies between them. Its only goal is to show the work involved in creating the product.

This WBS breaks the project work down by phase; the one on the right breaks them down by deliverable.



This list is hierarchical. Only work that is considered part of Project Management and also part of Executing can appear here.

The WBS doesn't try to establish the order that the team will perform each work package. Work packages can be listed in any order as long as they are in the right category. For example, creating the project scope baseline happens AFTER the WBS, even though they're not listed here in that order.

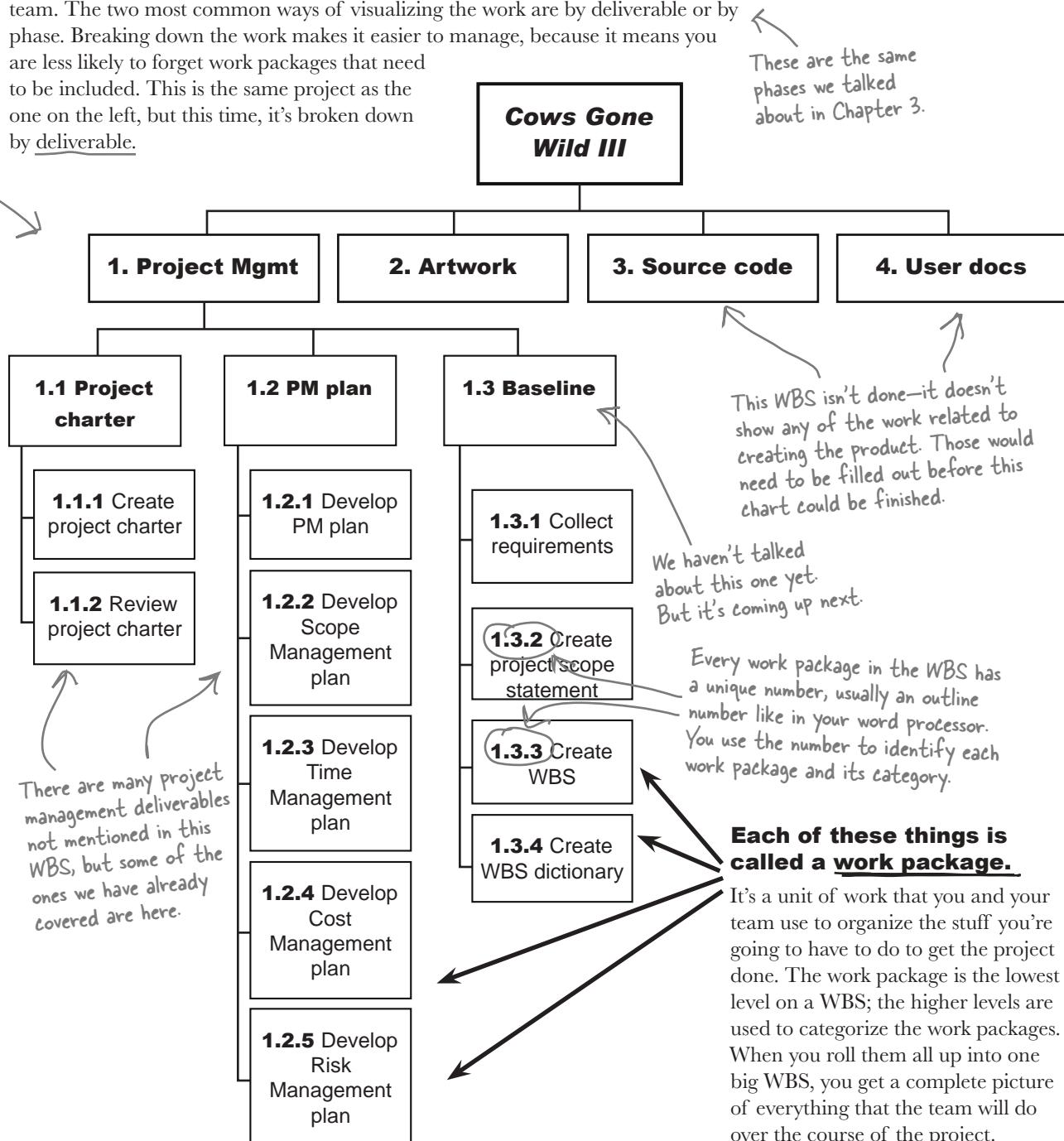
This picture helps everybody to see the magnitude of the work that needs to be done, and sometimes catches work packages that you might not find in a document.



Why would you break the project down by phase rather than deliverable? Why would you want to break it down by deliverable?

# Break it down by project or phase

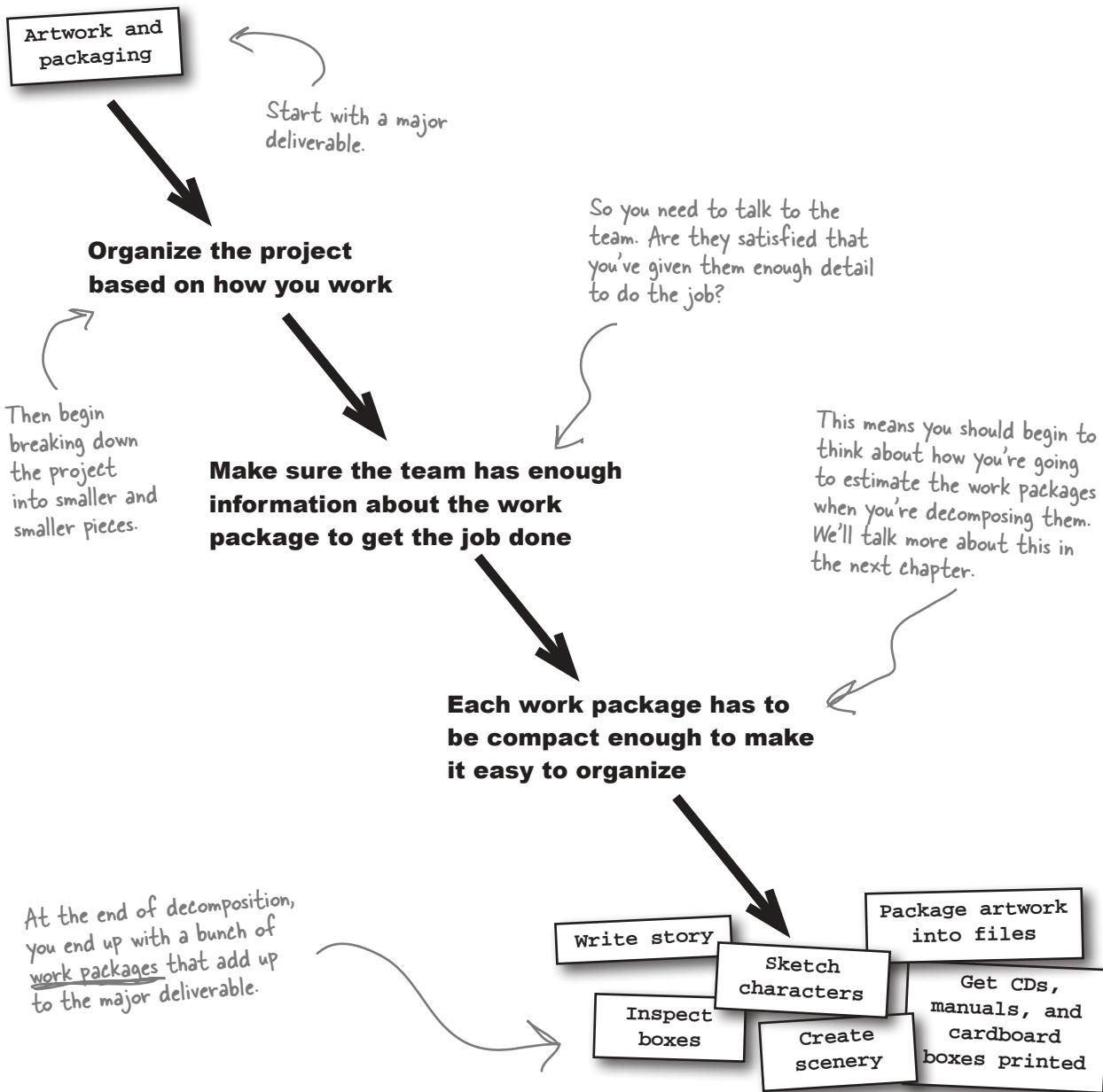
A WBS can be structured any way it makes the most sense to you and your project team. The two most common ways of visualizing the work are by deliverable or by phase. Breaking down the work makes it easier to manage, because it means you are less likely to forget work packages that need to be included. This is the same project as the one on the left, but this time, it's broken down by deliverable.



## Decompose deliverables into work packages



Creating the WBS is all about taking deliverables and coming up with work packages that will create them. When you do that, it's called **decomposition**, and it's the main tool you use to create a WBS.



You won't find any solutions for this, because there aren't any right or wrong answers! It's your chance to take a minute to think things through—that'll get it into your brain.



You'll need to understand decomposition for the exam. Here are a few deliverables from *Cows Gone Wild III*. Based on what you've seen so far, decompose them into work packages. There are no right or wrong answers—this is practice for thinking about decomposition.

Software .....

.....  
.....

Artwork .....

.....  
.....

Marketing materials .....

.....  
.....

Throwing a party for the team .....

.....  
.....

Online play promotional events .....

.....  
.....

Game add-ons .....

.....  
.....

Support forums and message boards .....

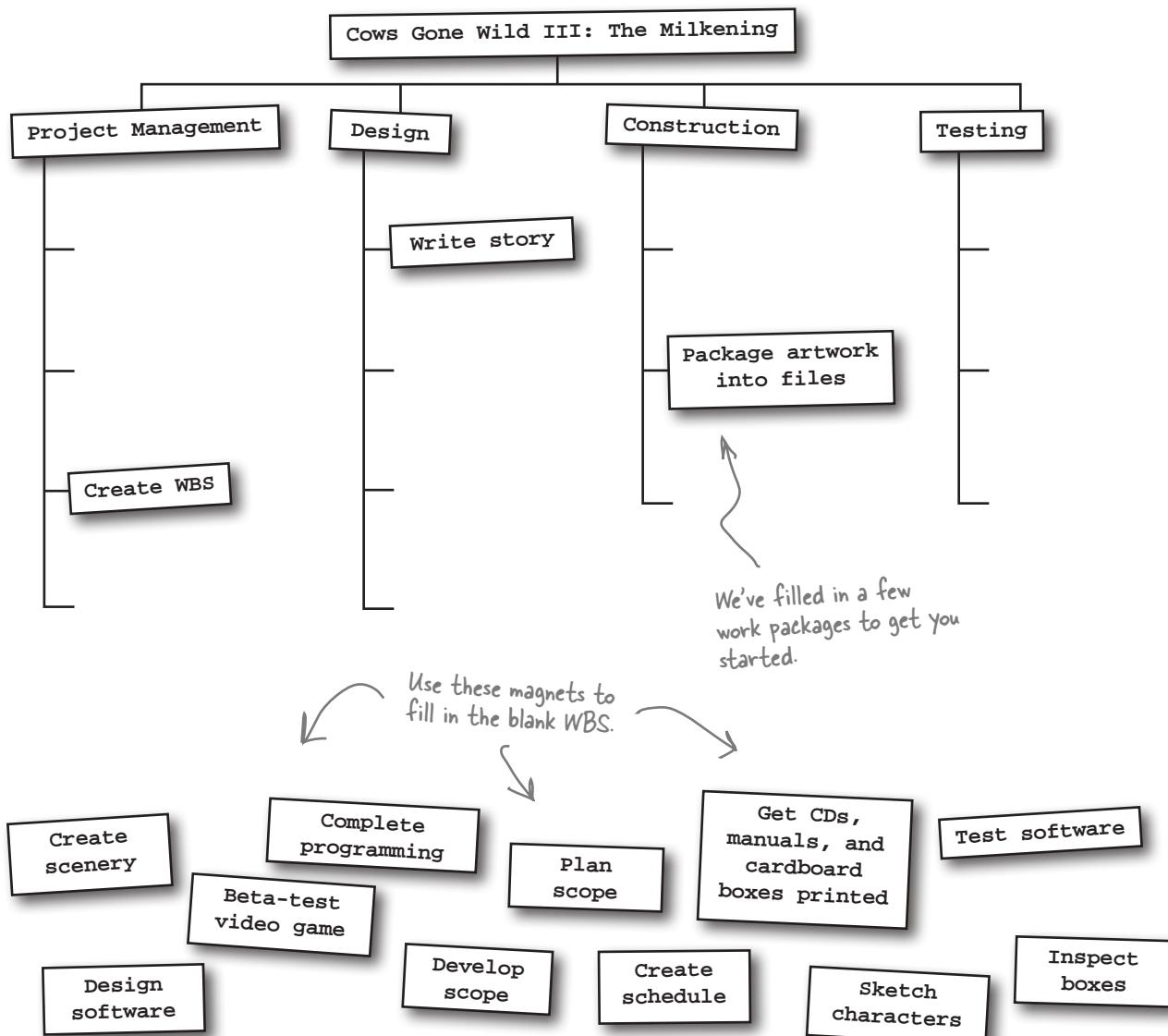
.....  
.....



## Project Scope Management Magnets

Understanding how to build a work breakdown structure is very important for the exam—it's one of the most important parts of the Scope Management knowledge area. Here's your chance to create a WBS for *Cows Gone Wild III: The Milkening*. There are two ways you can break down the work. See if you can use decomposition to do it!

**On this page, create a work breakdown structure broken down by project phase:**

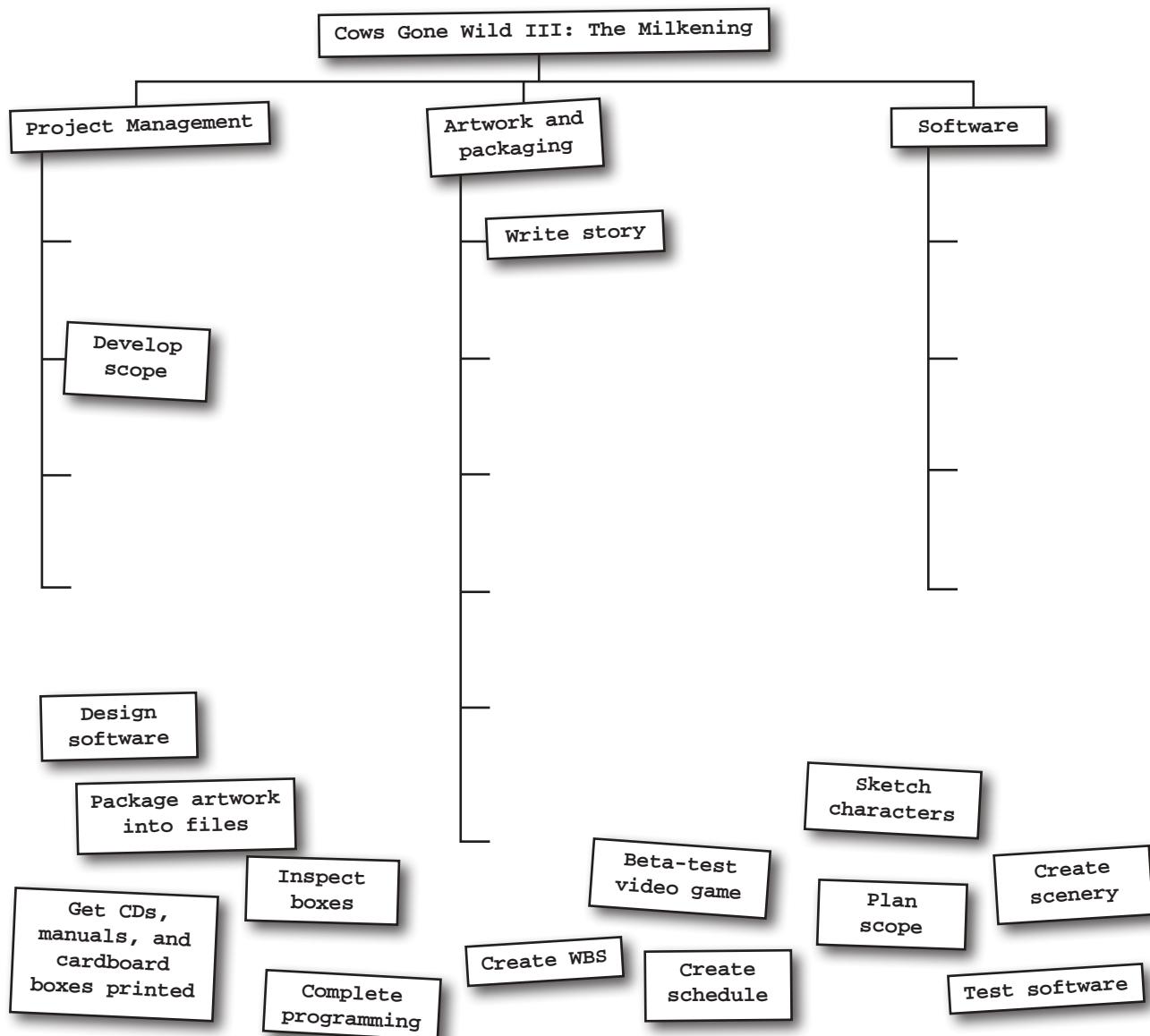




## More Magnets

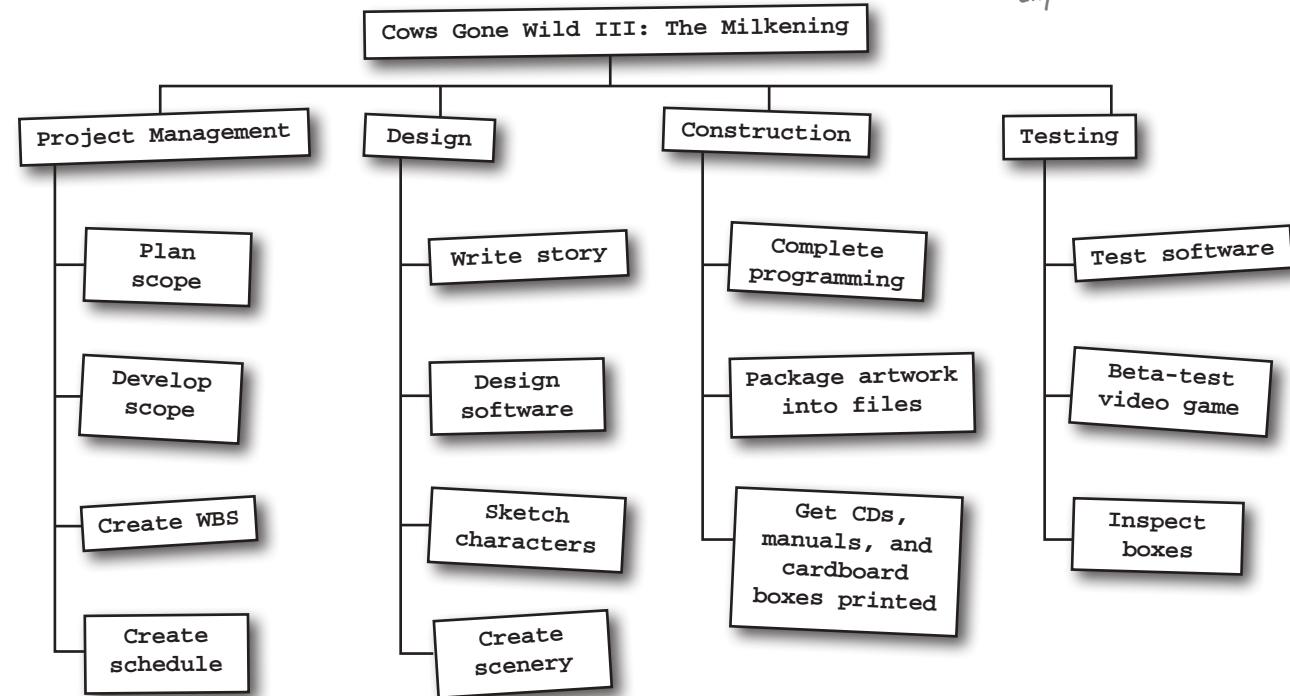
Oops! Looks like the magnets fell off the fridge. Here's your chance to practice breaking down the work to create a different WBS using the same magnets as before. But this time, instead of decomposing project phases into work packages, break the project down by deliverable.

**On this page, create a work breakdown structure broken down by deliverable.**





## Project Scope Management Magnets Solutions

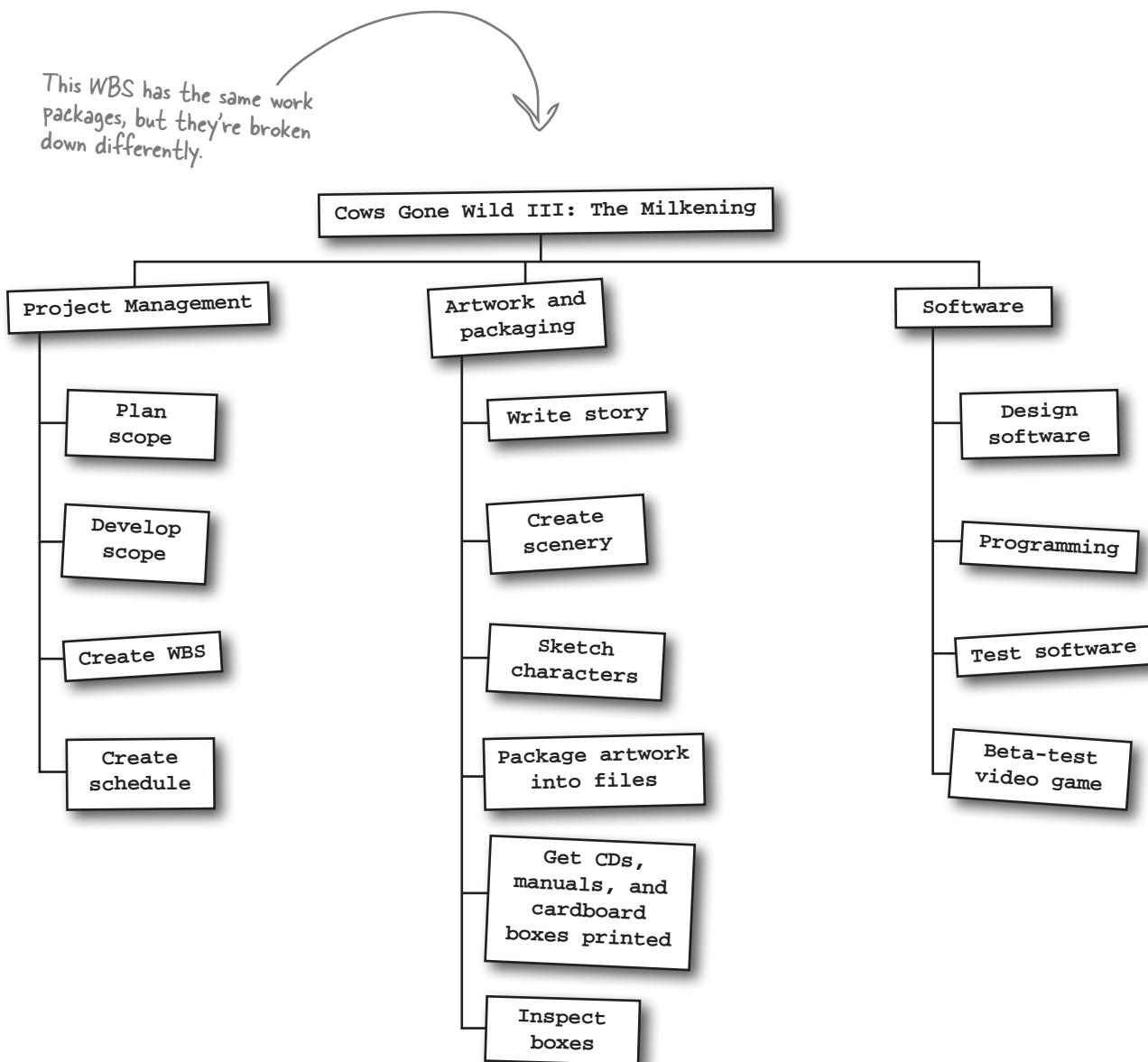


You can break down the work for a project in any number of ways.

It's OK if you decided that, say, creating scenery is a work package under construction, not design. The important thing here is to learn about the WBS, not video game design.



Can you think of a reason that Mike would break down *Cows Gone Wild III* work by phase?  
Can you think of why he'd break it down by deliverable?



Did you notice how the project management work packages are the same in both WBSes? You could break them down into more detailed project management deliverables, and then you'd see a difference.

## Inside the work package

You've probably noticed that the work breakdown structure only shows you the name of each work package. That's not enough to do the work! You and your team need to know a lot more about the work that has to be done. That's where the **WBS dictionary** comes in handy. It brings along all of the details you need to do the project work. The WBS dictionary is an important output of the Create WBS process—the WBS wouldn't be nearly as useful without it.

This is one of the WBS Dictionary entries for the Cows Gone Wild III project. It goes with the "Test Software" work package in the WBS.

**Test Software WBS Dictionary Entry**

**Work Package ID and Name:** 3.2.4 – Test Software

**Statement of Work:**

The goal of software testing is to verify that the Cows Gone Wild III software implements all of the requirements. Each requirement will be fully tested by a team of quality engineers.

**Responsible Organization:** Ranch Hand Games QA Team

**Schedule Milestones:**

- 4/26 – Programming team delivers software
- 6/18 – Functional testing and graphics testing completed
- 8/10 – QA approves software for beta testing

**Quality Requirements:**

The software must meet the requirements defined by the Ranch Hand Games QA team's quality standards document ("RHG QA Standards.doc")

**Code of Account Identifier:** RHG-236

**Required Resources and Cost Estimate:**

- Test planning – One QA lead and two QA analysts (\$8,500)
- Functional testing – 2 leads, 3 analysts, 11 testers (\$36,000)
- Monitor beta testing – 2 leads, 1 analyst (\$6,000)

*This is just a description of the work that needs to be done.*

*Don't forget that the WBS doesn't show dependencies among work packages.*

**The WBS dictionary contains the details of every work package. It's a separate output of the Create WBS process.**

Each work package has a name, and in many WBSes the work packages will also have ID numbers.

Here's what the WBS entry would look like with this ID number.

3.2.4 – Test Software

Each work package should be small enough to make cost and resource estimates.

\*This account identifier is important—it's how you hook your WBS into your company's accounting system. That way, you can make sure all of the work is paid for.

Here's another chance for you to think things through.  
Putting it down on paper helps the cognitive process.



## Sharpen your pencil

It will help you on the exam to know why all of the outputs are important, and the WBS is one of the most important ones. Write down as many reasons for using a WBS as you can think of.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

## <sup>there are no</sup> Dumb Questions

**Q:** Does the work breakdown structure need to be graphical? It looks like a lot of work. Can't I just write out a list of tasks?

**A:** Yes, the WBS has to be graphical. The WBS needs to show all of the work packages, and how they decompose into phases or deliverables. When you look at a simple WBS, it might seem like you could manage your work packages just as efficiently using a simple list. But what if you have a large team with dozens, hundreds, or even thousands of work packages? That's when you'll be really happy that you know how to decompose deliverables into a hierarchy.

**Q:** What if one work package depends on another one?

**A:** There are definitely dependencies among work packages. For example, the Ranch Hand QA team can't begin to test the software until the programming team has finished building it. But while this information is important, the WBS isn't where you figure out the dependencies.

The reason is that you need to figure out what work needs to be done before you start to figure out how the work packages depend on each other.

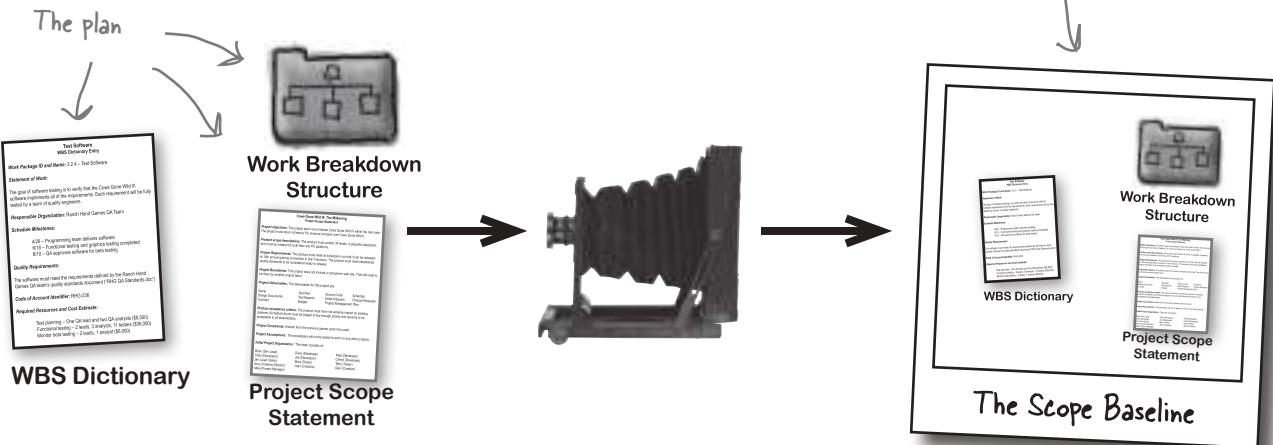
**Q:** What if I don't know enough to estimate the cost of a work package? What do I add to the WBS dictionary?

**A:** The WBS dictionary should contain only information that you can fill in when you create it. A lot of the time, you'll know all of the information that needs to go into it. If you have an estimate and know the resources that should be used, then put it in. But if all you have is a statement of work and an account code, then that's all the information you'll be able to add to the entry.

# The project scope baseline is a snapshot of the plan

As the project goes on, you will want to compare how you are doing to what you planned for. So, the **project scope baseline** is there to compare against. It's made up of the project scope statement, the WBS, and the WBS dictionary. When work gets added to the scope through change control, you need to change the baseline to include the new work packages for that work, so you can always track yourself against the plan.

The project scope baseline is a snapshot of the plan, and it's an important output of Create WBS.



SO, IF SOMEONE  
WANTS TO ADD OR  
REMOVE WORK PACKAGES,  
THAT'S A CHANGE?

Putting together a baseline just means making copies of your project documents so you can compare them with later versions after you put your project through change control.

## Yes. When there's a change you need to take a new snapshot.

Whenever a change is approved through change control, the project scope baseline needs to be updated. Approved changes are changes to the Scope Management plan also, so it's important that you re-baseline your project when they are approved. That way, you'll always be comparing your performance to the most updated plan.

## there are no Dumb Questions

**Q:** What happens if I need to change the scope?

**A:** You need to put it through change control—just like a change to the product scope. As you’re building the product, it’s always possible that some work will pop up in an unexpected place.

It could be that the initial technical design is inadequate or buggy. Or maybe you just think of a better way to do things while you’re working. In either case, you have to determine the impact to the schedule, the budget, the scope, and the quality of the product, and put the proposed change through change control. That’s what it means to look at the project constraints every time there’s a change.

Once everyone understands the impact and approves the change, you need to go back and adjust your project scope baseline to include the new work. If your budget or schedule is affected, you’ll need to change those baselines too and integrate all of them into the Project Management plan. But we’ll talk more about that in later chapters.

**Q:** Do I really need to create a project scope baseline?

**A:** Yes. It might seem like a formality in the beginning, but the baseline is a really useful tool. As you are building your project, you will need to refer back to the baseline if you want to know how you are tracking against stakeholders’ expectations.

Let’s say you said it would take you 12 months to build *Cows Gone Wild III*, and a wrong technical decision creates a two-week delay. You can use the project scope baseline to figure out the impact of that change to all of the different plans you have made, and then explain to everybody the impact of the change.

You can think of the baseline as a way of keeping track of the project team’s understanding of their goals and how they are going to meet them. If the goals change, then the understanding of them needs to change too. By telling everyone who needs to approve the two-week delay about it, you make sure that the goals change for the team as well. Then you change the baseline, so you can measure your team against the new deadline of 12 and a half months.

**Q:** Wait a minute. Doesn’t that mean I need to do change control and update the baseline every time I make any change to the document while I’m writing it? That’s going to make it really hard to write the first version of anything!

**A:** Don’t worry, you don’t have to go through change control until the baseline is approved. And that goes for ANY document or deliverable. Once it’s accepted and approved by all of the stakeholders, only then do the changes need to go through change control. Until it’s approved, you can make any changes you want. That’s the whole reason for change control—to make sure that once a deliverable is approved, you

run all of the changes by a change control board to make sure that they don’t cause an unacceptable impact to the schedule, scope, cost, or quality.

**Q:** How can you know all of this up front?

**A:** You can’t. Even the best planned projects have a few surprises. That’s why the scope planning cycle is iterative. As you find out something new about your scope of work, you put it through change control. When it’s approved, you need to add it to your Scope Management plan, your project scope statement, your WBS, and your WBS dictionary.

It’s also possible that you might find new things that the team should do when you’re making your WBS or your project scope statement. So all of the scope planning documents are closely linked and need to be kept in sync with one another.

**Q:** What if I come up with new work for the team later on?

**A:** You use change control to update the baseline. Your project can change at any time, but before you make a change you need to figure out how it will affect the project constraints—and make sure your sponsors and stakeholders are OK with that impact. That’s what change control does for you.

**Any time you make a change, you need to get it approved, and then update the baseline.**

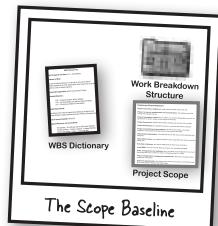
# The outputs of the Create WBS process

The Create WBS process has three major outputs: the **work breakdown structure**, the **WBS dictionary**, and the **baseline**. But there are others as well. When you create the WBS, you usually figure out that there are pieces of the scope that you missed, and you may realize that you need to change your plan. That's what the project document updates are for.

## Outputs



We've already seen the most important ones.  
↓



Baseline

When you're creating the WBS, you often discover missing pieces of the scope. You'll need to go back and plan for them. That kicks off the planning cycle again.



Project document updates

This means changes to the Project Management plan and other project documents.

## Make sure you finalize the WBS

Before your WBS is done, you need to finalize it. You do this by establishing a set of **control accounts** for the work packages. A control account is a tool that your company's management and accountants use to track the individual work packages. For example, Mike gets a list of control accounts from Ranch Hand Games' accounting department, so they know how to categorize the work for tax purposes.

## BULLET POINTS: AIMING FOR THE EXAM

- The **Create WBS** process is a really important process on the PMP exam.
- You create the WBS by **decomposing** large work products into **work packages**.
- To finalize the WBS, **control accounts** are established for the work packages.
- The **WBS dictionary** is a description of each work package listed in the WBS.
- The inputs to WBS creation are the outputs to the Define Scope and Collect Requirements processes: the requirements document and the project scope statement.
- As you decompose the work, you find new information that needs to be added to the requirements document and the project scope statement. That information is treated as a change and goes through change control. Once it's approved, it can be added into the document, and that kicks off the planning cycle again.

## there are no Dumb Questions

**Q:** How do I know if I should use phases or deliverables for my WBS?

**A:** It really depends on the project. You want to present the information so that it allows the management in your organization the ability to visualize and control your project. So, if most people in your organization divide it by phases, then you should, too.

If people do it different ways from project to project where you work, then you might make your decision based on how people think about the work you are about to do.

The point behind the WBS is to help other people see the work that is necessary to get the project done, so if your management thinks of projects in terms of phases and understands them best that way, then it's better to divide your project work along those lines.

It could be that the work you are doing is anxiously awaited by a lot of people who will look at the WBS to understand the project, and, in that case, it probably makes sense to divide your work up by deliverable.



**Q:** How do I know when I have decomposed the work to a small enough work package?

**A:** The short answer is that you should decompose that work until it is manageable.

You need to be careful when you come up with the work packages for your WBS. If you decompose to the most granular level, you could end up wasting everybody's time trying to figure out exactly how much effort goes into, say, writing up meeting minutes for each and every meeting in your project.

So, you should break down the work to small enough packages that everybody can understand what's being done and describe it in the dictionary...and no further.

**Q:** I know how to make scope changes during Planning. What do I do if I run into scope changes during Execution?

**A:** Any time you run into a change to your scope, regardless of where you are in the process, you put it through change control. Only after examining the impact and having the change approved can you incorporate the change.

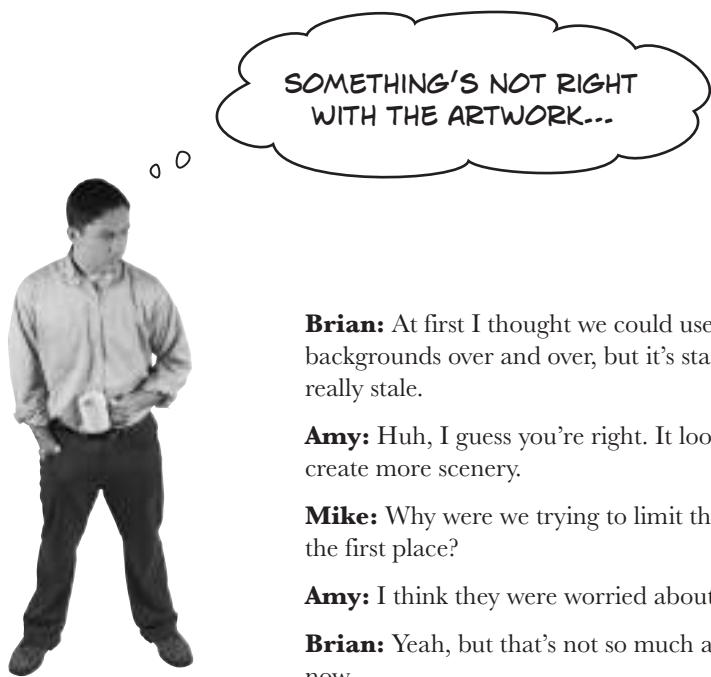
**Q:** Can you back up a minute and go over the difference between the Scope Management plan and the Project Management plan one more time?

**A:** Remember how the Project Management plan was divided into subsidiary plans? The Project Management plan tells you how to manage all of the different knowledge areas, and it has baselines for the scope, schedule, and budget.

The Scope Management plan is one of those subsidiary plans. It has really specific procedures for managing scope. For example, Mike's Scope Management plan tells him which stakeholders he needs to talk to when he's gathering requirements. It lists what tools and techniques he's planning to use when he uses scope definition to define the scope (for example, it says that he needs to consult with specific experts when he does alternatives analysis). And when there's an inevitable change—because even the best project manager can't prevent every change—it gives him procedures for doing Scope Management. So even though the Scope Management plan is created in the Develop Project Management Plan process, it's used throughout all of the Scope Management processes. So definitely expect questions about it on the exam!

## Cubicle conversation

Everything is great. The project is rolling along, and there are no problems with the scope...until something goes wrong.



**Brian:** At first I thought we could use the same five backgrounds over and over, but it's starting to look really stale.

**Amy:** Huh, I guess you're right. It looks like we need to create more scenery.

**Mike:** Why were we trying to limit the backgrounds in the first place?

**Amy:** I think they were worried about disk space.

**Brian:** Yeah, but that's not so much a concern right now.

**Amy:** Great! Let's just change the artwork, then.

**Mike:** Not so fast, Amy. There are a couple of things we need to do first...

This is work that was not planned for, and isn't in the WBS. That means it's a scope change.



What homework do you need to do before you make a change to the scope by adding or removing project work? Why?

# Why scope changes

Sometimes something completely unexpected happens. Say, a really important customer asks for a new feature that nobody saw coming and demands it right away. Or a design for a feature just isn't working, and you need to rethink it. Or new stakeholders come on board and ask for changes.

The scope can change while you are working for a lot of reasons. Some changes are good for your project, while others will definitely reduce your chance of success. Change control is there to help you to see which is which.



## Good change

A good change makes the product better with very little downside. It doesn't cost more time in the schedule or more money from the budget, and it doesn't destabilize the product or otherwise threaten its quality.

Good changes happen pretty rarely, and nearly EVERY change has some impact that should be fully explored before you go forward.



## Bad change

A bad change is one that might seem from the outside like a good idea but ends up making an impact on the project constraints. Here are a couple of examples:

### Scope creep

This happens when you think you know the impact of a change so you go ahead, but it turns out that *that* change leads to another one, and since you are already making the first change, you go with the next. Then another change comes up, and another, and another, until it's hard to tell what the scope of the project is.

The way to avoid scope creep is to plan your changes completely.

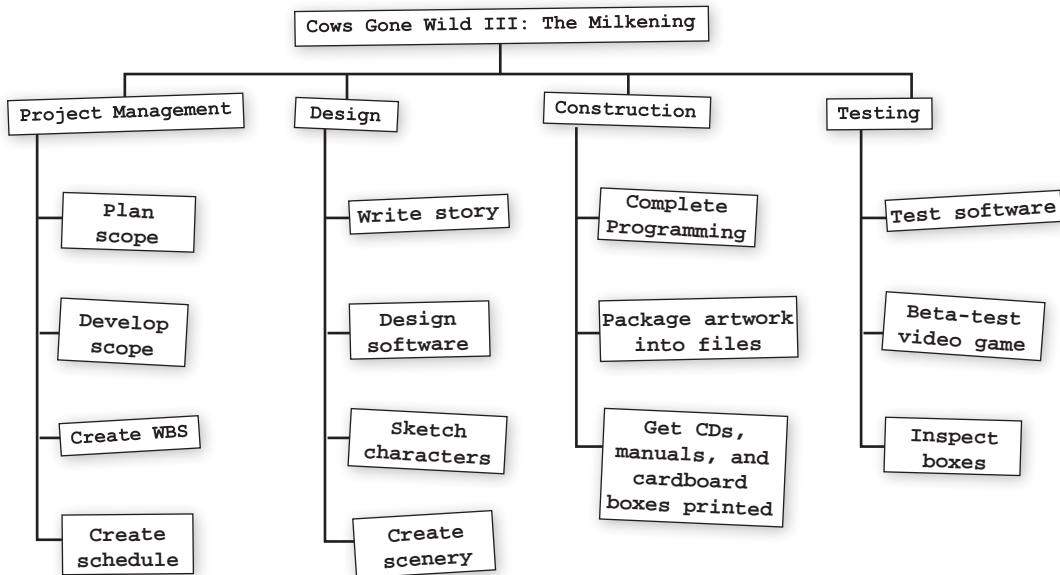
Be on the lookout for examples of scope creep and gold plating on the exam. Both are considered very bad and should never be done.

### Gold plating

Sometimes people think of a really great improvement to the product and go ahead and make it without even checking the impact. In software, this can happen pretty easily. A programmer thinks of a way to make a feature better, for example, and just implements it, without talking it over with anybody. This may sound good, but it's not—because now you have to pay for these features you never asked for.



Here's the WBS that you created for the *Cows Gone Wild III* project, and below that are some changes that the team has asked Mike to make since the work started. All of them are bad changes. Check either scope creep or gold plating for each one.



1. We need to create a screensaver to market the game. Let's kill two birds with one stone and test out a brand new graphics engine on it. Oh, and we'll need a story for the screensaver, so we should write that too. Of course we have to recruit some killer voice talent for the screensaver. Memorable names sell more games.

Scope creep     Gold plating

2. Testing the most recent build, I just noticed that if the player presses x-x-z-a-Shift-Shift-Space in that order, Bessie does the Charleston—it's really funny.

Scope creep     Gold plating

3. We should add a calculator for tracking gallons of milk collected in the game. It will be really easy. We could even release the calculator as a separate add-in, and we could probably make it full-featured enough for the folks developing the game down the hall to use it too.

Scope creep     Gold plating

4. The printer just told us that she could also do silk screen T-shirts for everybody as a ship gift. Let's get our design team to do some special artwork for them. We can have everybody's names written in cows!!! Then we could use the same artwork on posters that we put around the office—oh, and coffee mugs for new people, too

Scope creep     Gold plating

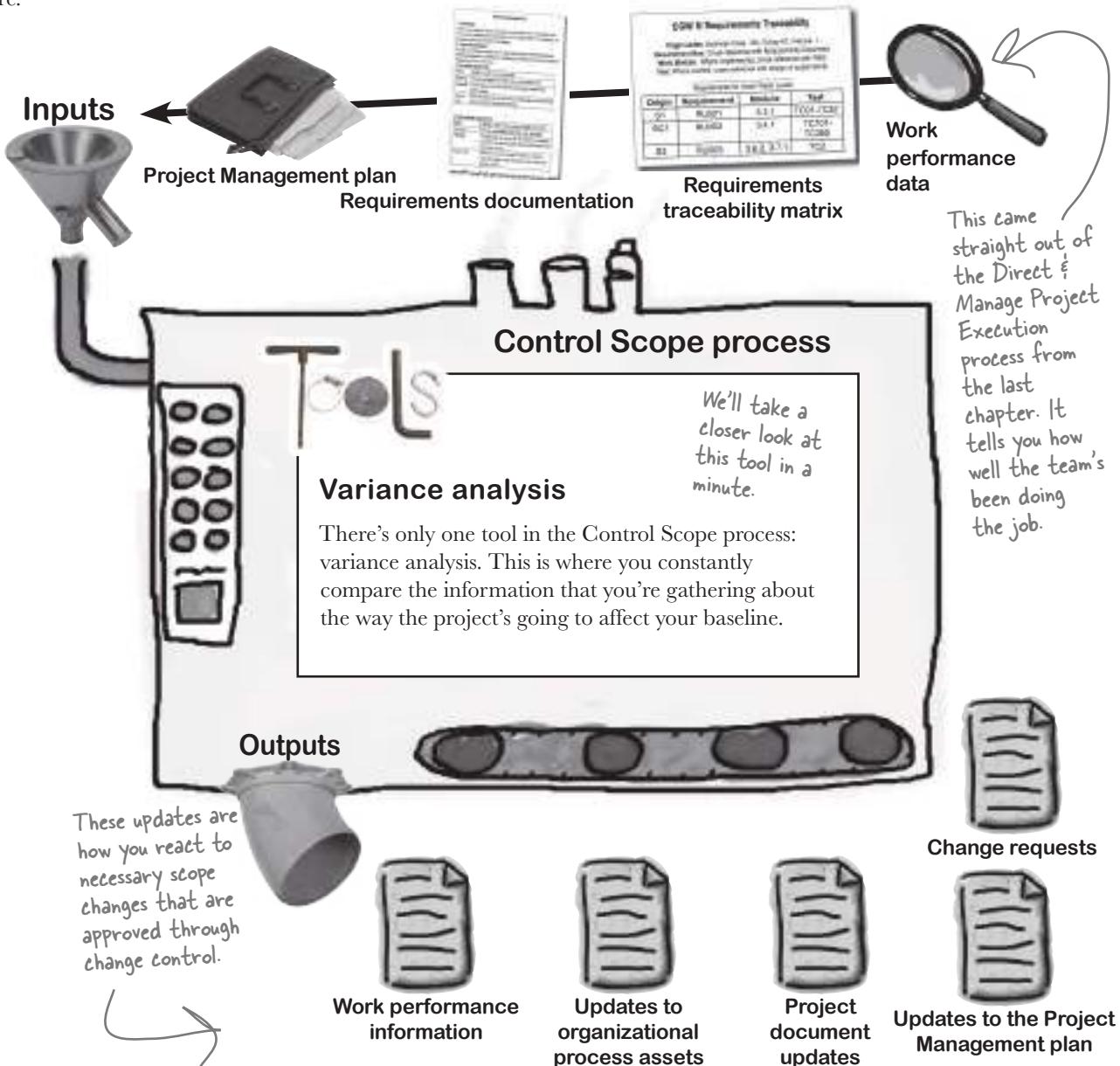
Answers: 1, 3, and 4 are Scope creep. 2 is Gold plating



You'll also use organizational process assets as an input here.

# The Control Scope process

There's no way to predict every possible piece of work that you and your team are going to do in the project. Somewhere along the way, you or someone else will realize that a change needs to happen, and that change will affect the baseline. That's why you need the **Control Scope** process. It's how you make sure that you make only those changes to the scope that you need to make, and that everyone is clear on what the consequences of those changes are.



# Anatomy of a change

Let's take a closer look at what happens when you need to make a change. You can't just go and change the project whenever you want—the whole reason that you have a baseline is so you can always know what work the team is supposed to do. If you make changes, then you need to change the baseline...which means you need to make sure that the change is **really** necessary. Luckily, you have some powerful tools to help you manage changes:



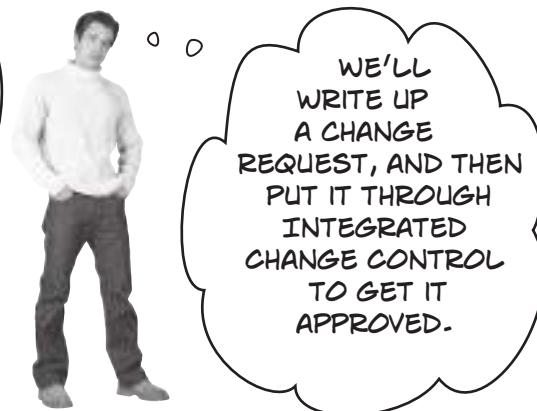
## 1 A change is needed.

Every change starts the same way. Someone realizes that if the project sticks with the plan, then the outcome will lead to problems.



## 2 Create a change request.

Before a change can be made, it needs to be approved. That means that it needs to be documented as a requested change. The only way to get a handle on a change is to write it down and make sure everyone understands it.



## 3 Get the change approved.

Remember integrated change control from Chapter 4? That's the process where the project manager takes a requested change and works with the sponsor and stakeholders to get approval to put it in place.

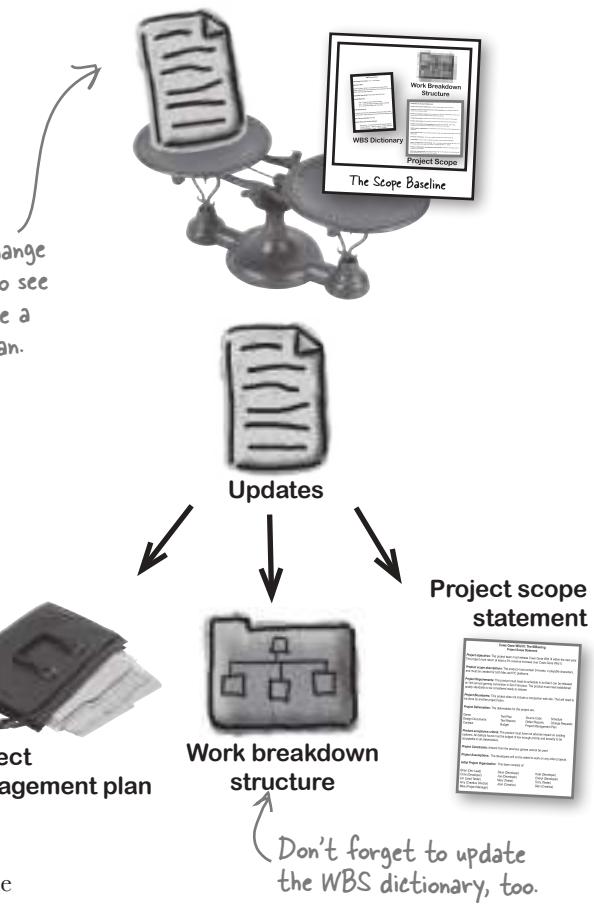
Think of integrated change control as a kind of machine that converts requested changes into approved changes.



**4****Do variance analysis.**

Take a look at the baseline and see how the change will affect it. This is where you decide whether you need to take some sort of corrective action. You compare the baseline against the change that you want to make, and figure out just how big the change really is.

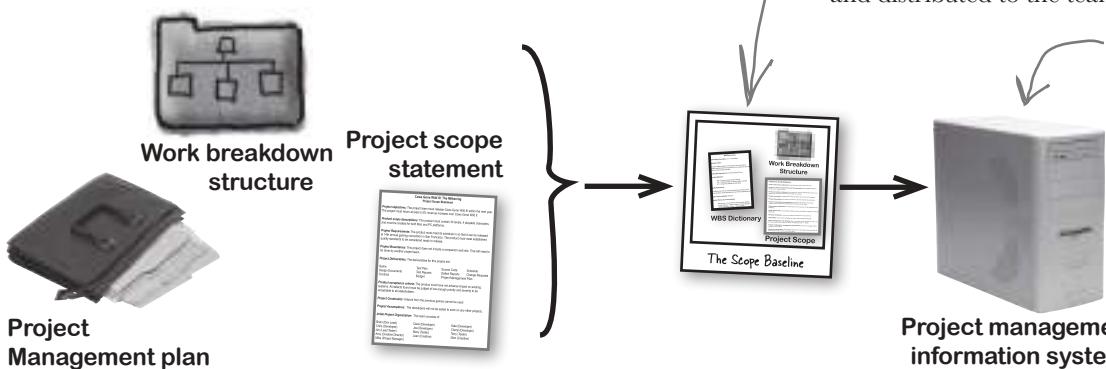
You're weighing the change against the baseline to see if it's going to require a big change to your plan.

**5****Replan the work.**

Now it's time to go back to the scope documentation and update it to reflect the change.

**6****Create a new baseline.**

Now that you've figured out that you need to change the scope, it's time to update the baseline. Go back to the scope statement, WBS, and WBS dictionary, and update them so that they reflect the change that needs to be made.



**The change is done!**

Now you can move on with the project using the new baseline that you saved and distributed to the team.

This will come in handy when you go back to put together the lessons learned!

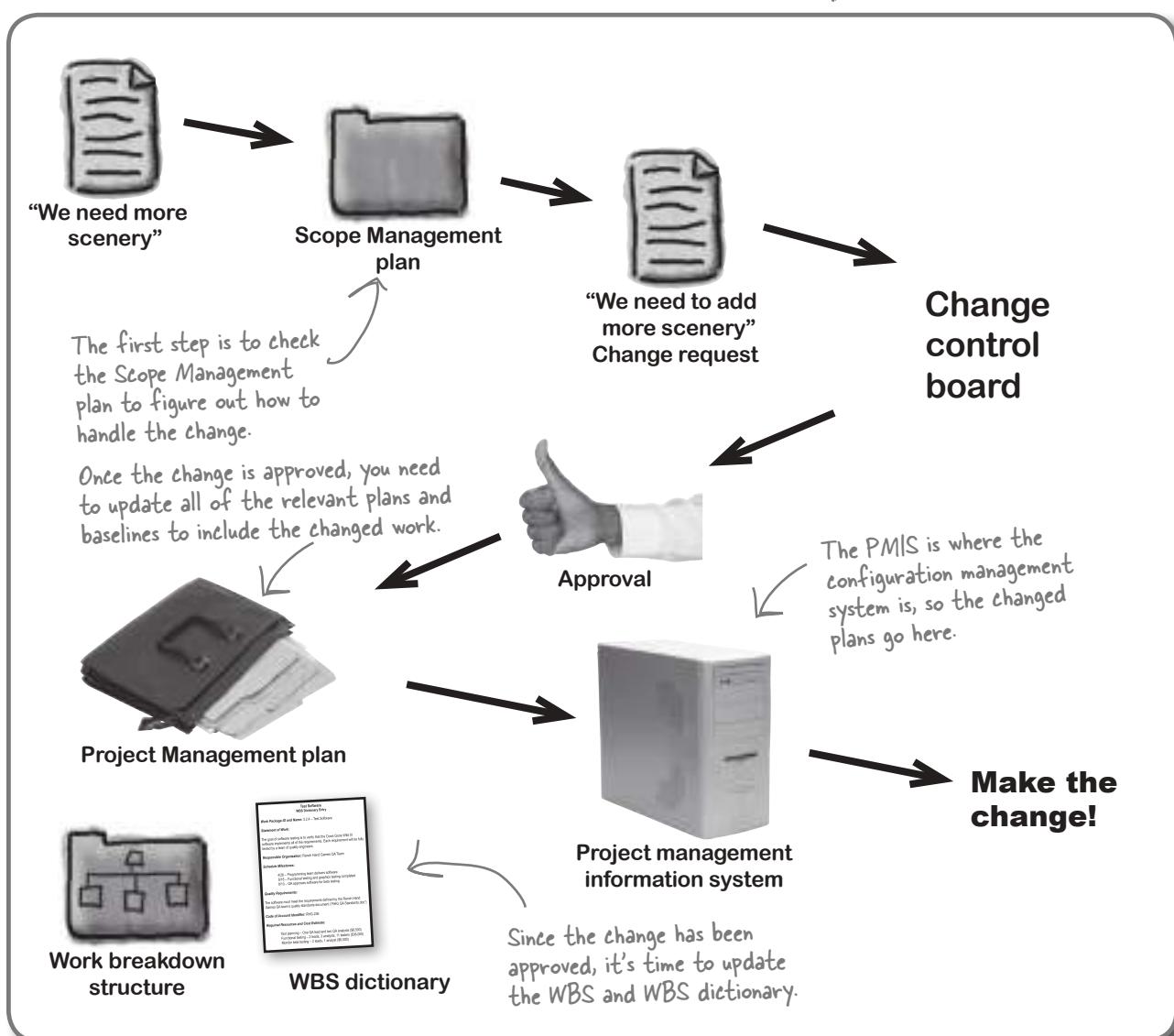
# A closer look at the change control system

One of the most important tools in any Monitoring and Controlling process is the **change control system**. Let's take a closer look at how it works.

Since the folks at Ranch Hand need a change to add more scenery to *Cows Gone Wild III*, Mike takes a look at the Scope Management plan to understand the impact before forwarding it to the change control board. Once they approve the change, he updates the Project Management plan, checks it into the configuration management system, and changes the WBS and WBS dictionary to include the new work packages.



Remember this from Chapter 4? It's exactly the same change control system tool that we already learned about.



# Just one Control Scope tool/technique

There's just one tool/technique in the Control Scope process. It's pretty intuitive: take a minute and think of what you would need to do if you had to make a change to your project's scope. You'd need to figure out how big the change is, and what needs to change. And when you do that, it's called **variance analysis**.

## Variance analysis

This means comparing the data that can be collected about the work being done to the baseline. When there is a difference between the two, that's variance.

This tool of Control Scope is all about analyzing the difference between the baseline and the actual work to figure out if the plan needs to be corrected. If so, then you recommend a corrective action and put that recommendation through change control.

**The goal of Control Scope is updating the scope, plan, baseline, and WBS info.**

## There's no "right order" for the Control Scope and Validate Scope processes

If you've got a copy of the *PMBOK Guide* handy, take a look at how it presents the Scope Management processes. Did you notice how the section on the Validate Scope process comes before Control Scope? We're putting these processes in this book in a different order, and it's the only time we deviate from the order of the *PMBOK Guide*. That's not because the *PMBOK Guide* is wrong! We could do this because there is no "right" order: Control Scope can happen at any time, because project changes can happen at any time. Validate Scope (the next process you'll learn about) is *usually* the last Scope Management process that you'll do in a project. The trick is that sometimes you'll find a scope problem while you're verifying the scope, and you'll need to do Control Scope and then go back and gather new requirements, rebuild the WBS, etc. So the Control Scope process can happen **either before or after** Validate Scope.

So why did we change the order? Because thinking about how the two processes relate to each other will help you remember this for the exam!



A lot of things can happen along the way during a project, especially when you have a lot of changes. What happens if the deliverables you and the team build don't quite match up to what your stakeholders expect?

## <sup>there are no</sup> **Dumb Questions**

**Q:** Is Control Scope always about work and project scope? Can it ever be about deliverables and product scope?

**A:** No. The Control Scope process is **always about the work that the team does**, because the whole Scope Management knowledge area is about the project scope, not the product scope. In other words, as a project manager, you manage the work that the team is doing, not the things that they're making. Now, that doesn't mean you should never pay attention to deliverables. You still need to pay attention to the scope of the product, too, since the two are pretty closely related. For example, in the CGW III project, any time somebody wants to add a new feature to the game, a programmer will need to program it, an artist will need to make new artwork, and a tester will have to test it. Any time you make changes to the project scope, it affects the product scope, and vice versa.

**Q:** What if a change is really small? Do I still have to go through all of this?

**A:** Yes. Sometimes what seems like a really small change to the scope—like just adding one tiny work package—turns out to be really complex when you take a closer look at it. It could have a whole lot of dependencies, or cause a lot of trouble in other work packages. If you don't give it careful consideration, you could find yourself watching your scope creep out of control. Each and every change needs to be evaluated in terms of impact. If there is any impact to the project constraints—time, cost, scope, quality, resources, or risk—you HAVE to put it through change control.

**Q:** How can you do variance analysis without knowing all of the changes that are going to happen?

**A:** You do variance analysis as an ongoing thing. As information comes in about your project, you constantly compare it to how you planned. If you're running a month behind, that's a good indication that there are some work packages that took longer than your team estimated—or that you missed a few altogether. Either way, you need to take corrective action if you hope to meet your project objectives.

Waiting until all possible changes are known will be too late for you to actually meet your goals. So you need to constantly check your actuals versus your baseline and correct where necessary (after putting your recommended actions through change control, of course!).

**Q:** I thought the configuration management system was part of the project management information system from Chapter 4. What does that have to do with change control?

**A:** When you write and modify documents throughout your project, you need to make sure that everybody is working with the same version of them. So you check them into a configuration management system, and that way everybody always knows where to go for the latest version.

Since you are checking all of your documents in, that's where you will keep your work performance information also. The most recent version of the schedule, any reports you have gathered on defects, and individual work performance should all be there. So, when you want to figure out what's going on in your project, you look there first.

It follows that you would modify your documents and check them back into the CMS after any change has been approved too.

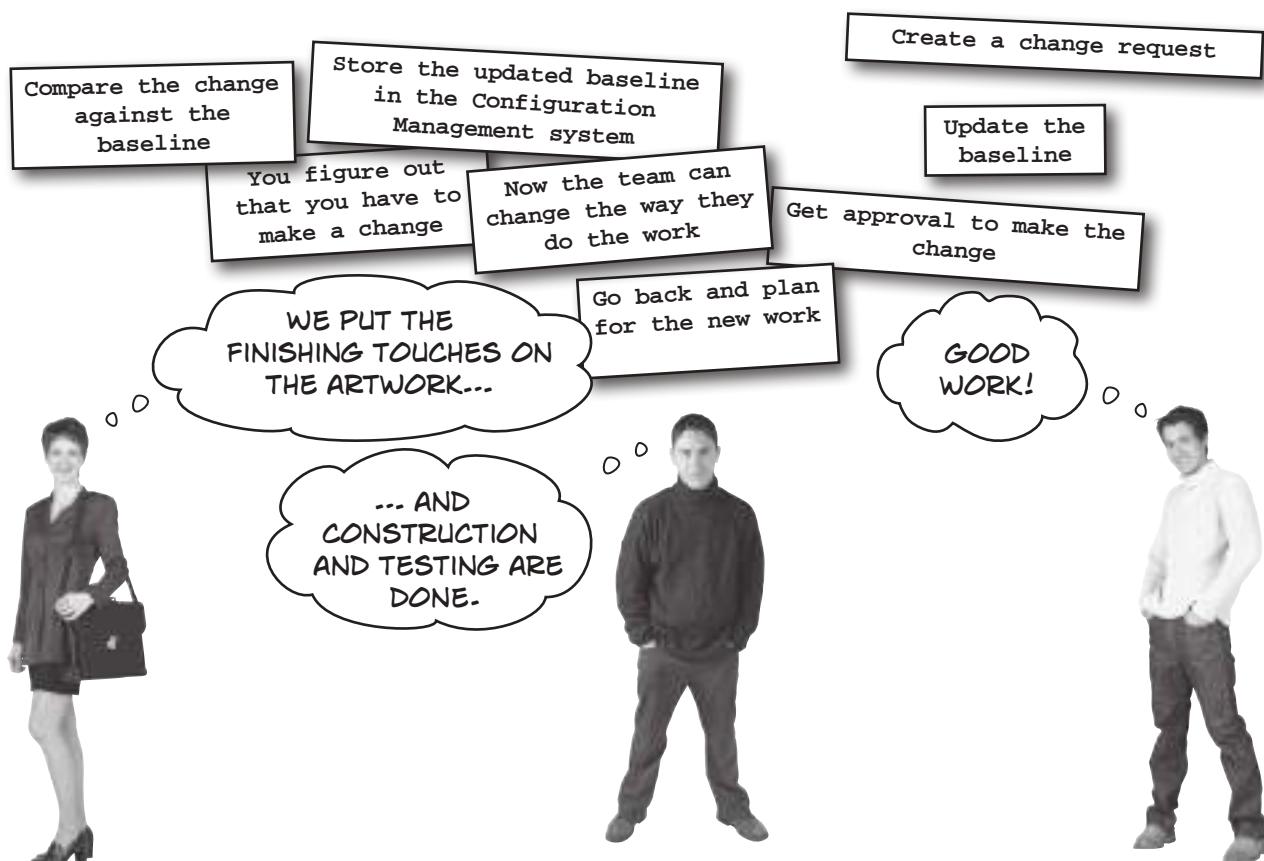
**Every scope change  
goes through the  
Control Scope process.**



## Control Scope Process Magnets

Whenever you make a scope change, you need to go through all of the steps of change control. So what are those steps? Arrange the magnets to show the order that you handle changes to the scope.

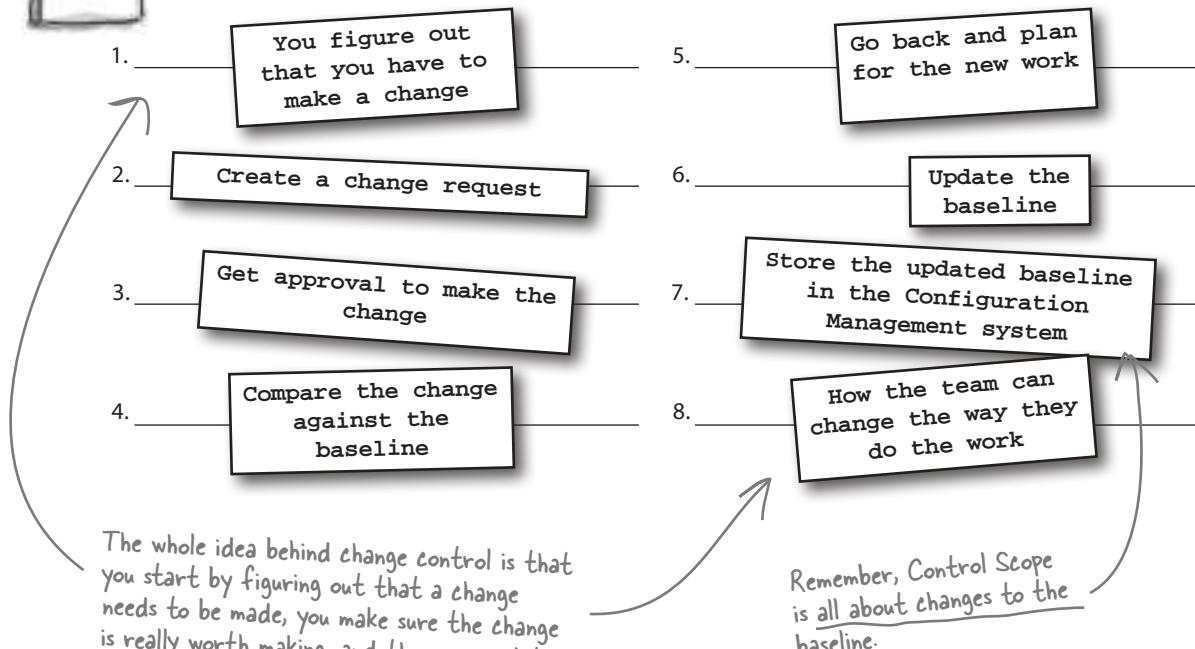
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_





## Control Scope Process Magnets Solutions

Arrange all of the activities you do to control scope in the right order.



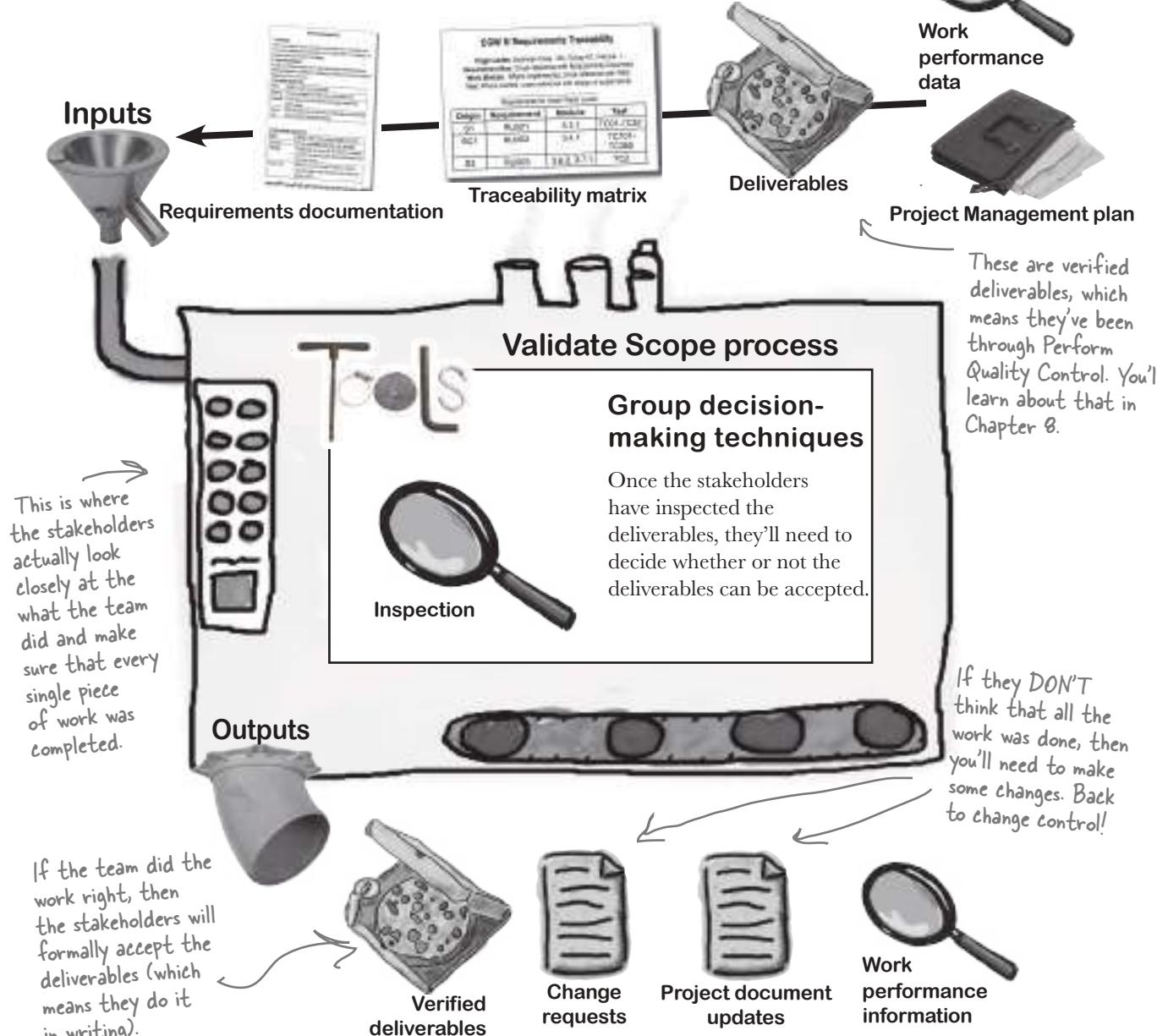
HOLD ON, IT SEEMS LIKE WE KEEP GOING AROUND IN CIRCLES WITH ALL OF THESE CHANGES. HOW DO I KNOW WHEN THE PROJECT IS DONE?

### Ask the stakeholders.

You need to go back to the stakeholders and get formal acceptance. That's what the Validate Scope process is for, and it's coming up next.

# Make sure the team delivered the right product

When the team is done, what happens? You still have one more thing you need to do before you can declare victory. You need to gather all the stakeholders together and have them make sure that all the work really was done. We call that the **Validate Scope** process.



## The stakeholders decide when the project is done

As you deliver the stuff in your scope statement, you need to make sure that each of the deliverables has everything in it that you listed in the scope statement. You inspect all of your deliverables versus the scope statement, the WBS, and the Scope Management plan. If your deliverables have everything in those documents, then they should be acceptable to stakeholders. When all of the deliverables in the scope are done to their satisfaction, *then* you're done.

**check this...**



— using this →



Requirements documentation

COW II Requirements Traceability			
Origin	Requirement	Module	Test
O1	R0001	S.2.1	T001-T003
O2	R0002	S.2.2	T004-T006
O3	R0003	S.2.3	T007

...against these

Why do you think you need the requirements documentation and the traceability matrix to verify your scope?

Inspect the deliverables and confirm that each of the acceptance criteria in the scope statement is met.

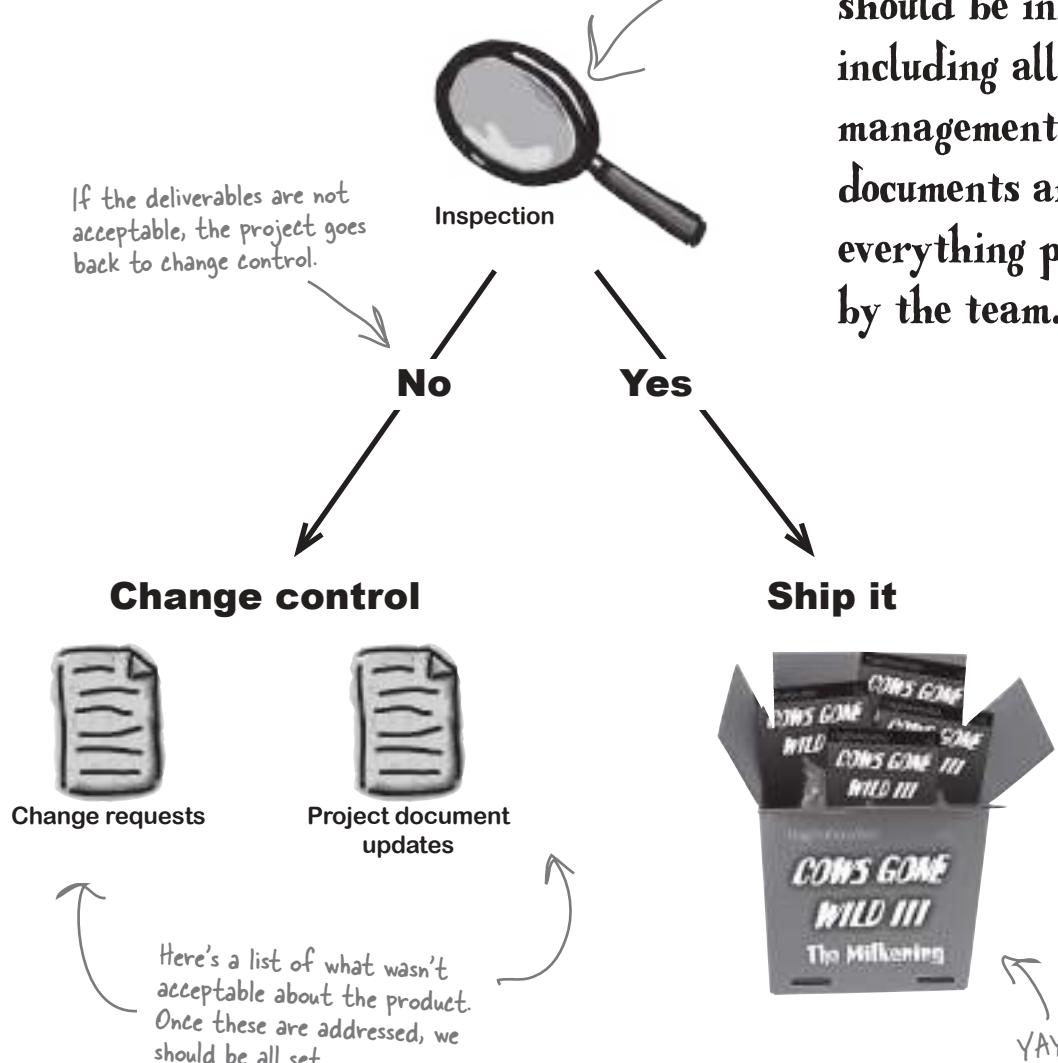
Formal acceptance means that you have written confirmation from all of the stakeholders that the deliverables match the requirements and the Project Management plan.

# Is the project ready to go?

Once the deliverables are ready for prime time, you inspect them with the stakeholders to make sure that they meet acceptance criteria. The purpose of Validate Scope is to obtain formal, written acceptance of the work products. If they are found to be unsatisfactory, the specific changes requested by the stakeholders get sent to change control so that the right changes can be made.

Inspection just means sitting down with the stakeholders and looking at each deliverable to see if it's acceptable.

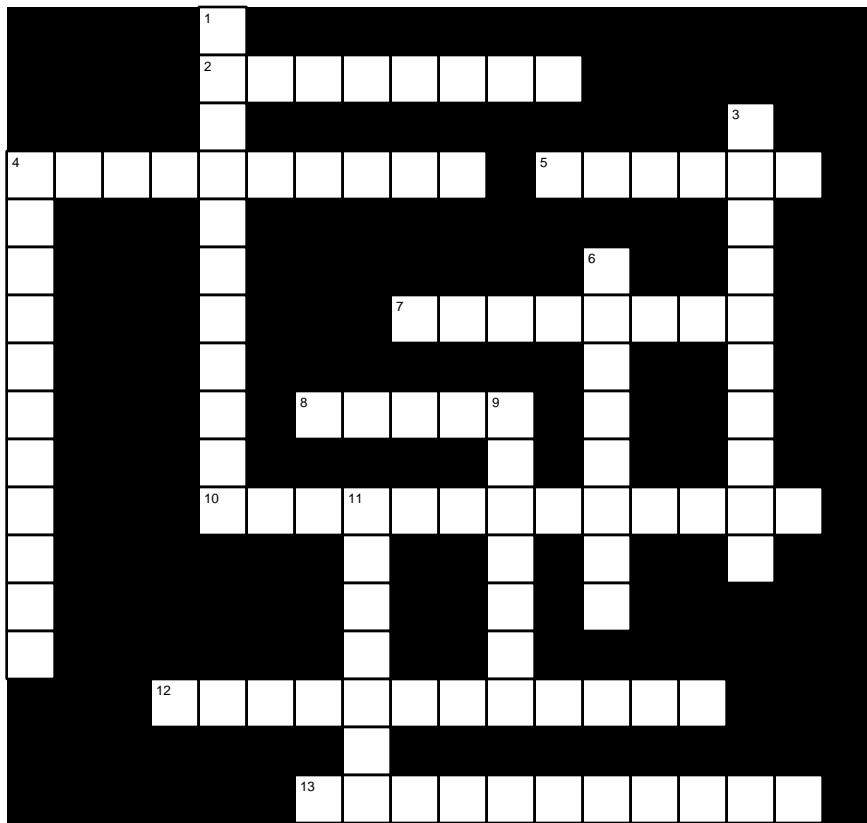
**EVERY** deliverable should be inspected, including all project management documents and everything produced by the team.





## Scopecross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



### Across

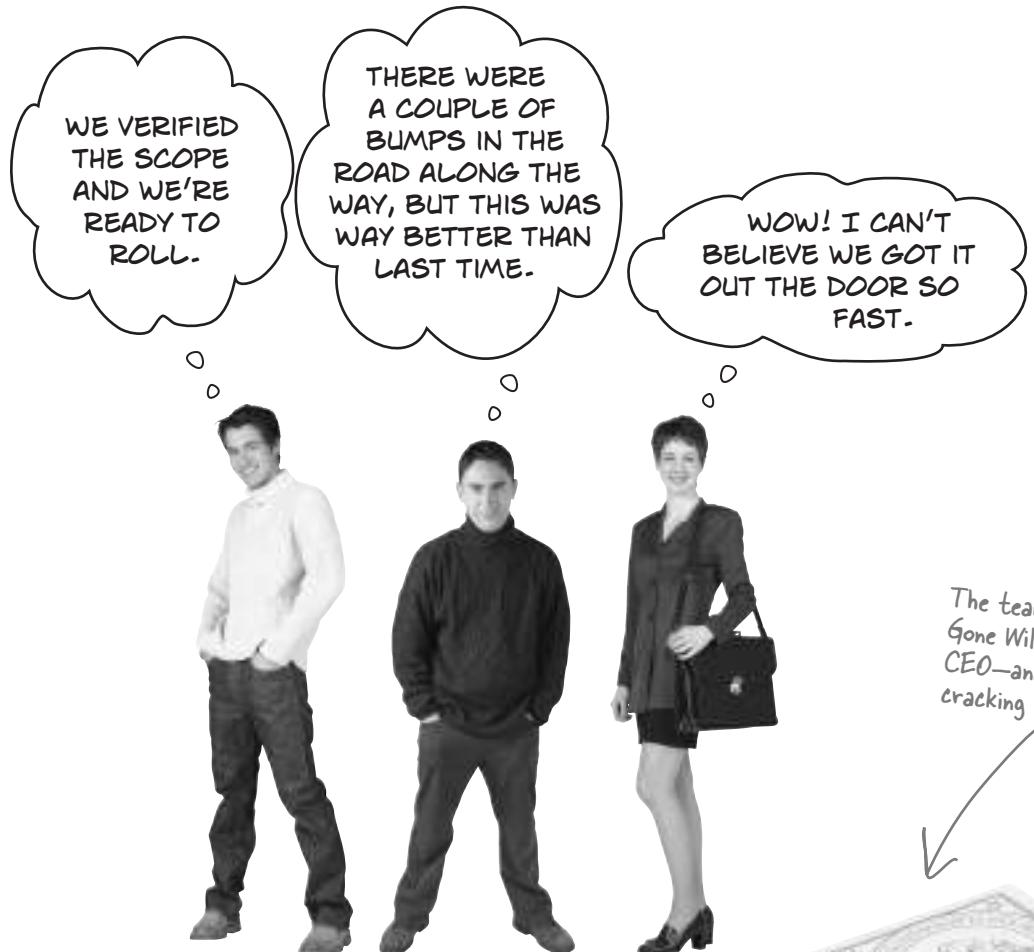
2. Bob used an \_\_\_\_\_ diagram to get a handle on all of the ideas he collected from stakeholders.
4. The details of every work package in the WBS are stored in the WBS \_\_\_\_\_.
5. The process where you write the project scope statement is called \_\_\_\_\_ Scope.
7. Figuring out how big a change is by comparing it to the baseline is called \_\_\_\_\_ analysis.
8. When one change leads to another and another and another, it's called scope \_\_\_\_\_.
10. Getting work packages out of deliverables.
12. Exploring all of the ways that you can do the work so that you can find the best way to do the work in your project is called \_\_\_\_\_ identification.
13. A quantified and documented need or expectation of a sponsor, customer, or other stakeholder.

### Down

1. A JAD session is an example of a \_\_\_\_\_ workshop.
3. Looking closely at the product to see if you completed all of the work is called \_\_\_\_\_.
4. When you're making a WBS, you can break the work down by phase or \_\_\_\_\_.
6. A version of the Scope Management plan, work breakdown structure, and product scope that you will compare your project to is called the scope \_\_\_\_\_.
9. \_\_\_\_\_ scope means the features or functions of the thing or service that you are building.
11. A good way to gather requirements is to \_\_\_\_\_ how the people who will use your deliverables perform their jobs.

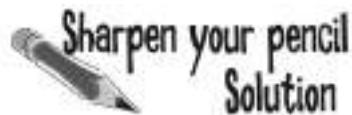
# The project is ready to ship!

There were a few unexpected changes to the scope along the way. But, for the most part, everything went according to plan. The stakeholders and the CEO got together with the team and went through everything they did—and it's ready to go. Great job, guys!



The team finally finished Cows Gone Wild III. Pizza's on the CEO—and then it's time to get cracking on CGW IV!





Here are some attributes of *Cows Gone Wild III*. Which are project scope and which are product scope?

**1. Programming**

Project scope

Product scope

Project scope

Product scope

**3. Graphic design**

Project scope

Product scope

Project scope

Product scope

**5. Great graphics**

Project scope

Product scope

Project scope

Product scope

**7. Mac and PC compatible**

Project scope

Product scope

Project scope

Product scope

**2. 34 levels in the game**

Project scope

Product scope

**4. Four playable characters**

Project scope

Product scope

**6. Testing**

Project scope

Product scope

**8. A “boss battle” milk fight level at the end**

Project scope

Product scope

## \* WHAT'S MY PURPOSE \*

Here are a few things that Mike left out of the *CGWIII* project scope statement. Can you figure out where each of them should go?

1. The game must have fewer than 15 defects per 10,000 lines of code.

2. There will be four graphic designers reporting to the art director, and six programmers and four testers reporting to the development manager.

3. No more than 15 people can be allocated to work on the game at any time.

4. Scenery artwork.

5. The product will not include bug fixes for the previous version.

6. The game needs to run on a machine with 1 GB of memory or less.

A. Project exclusions

B. Project deliverables

C. Project constraints

D. Project assumptions

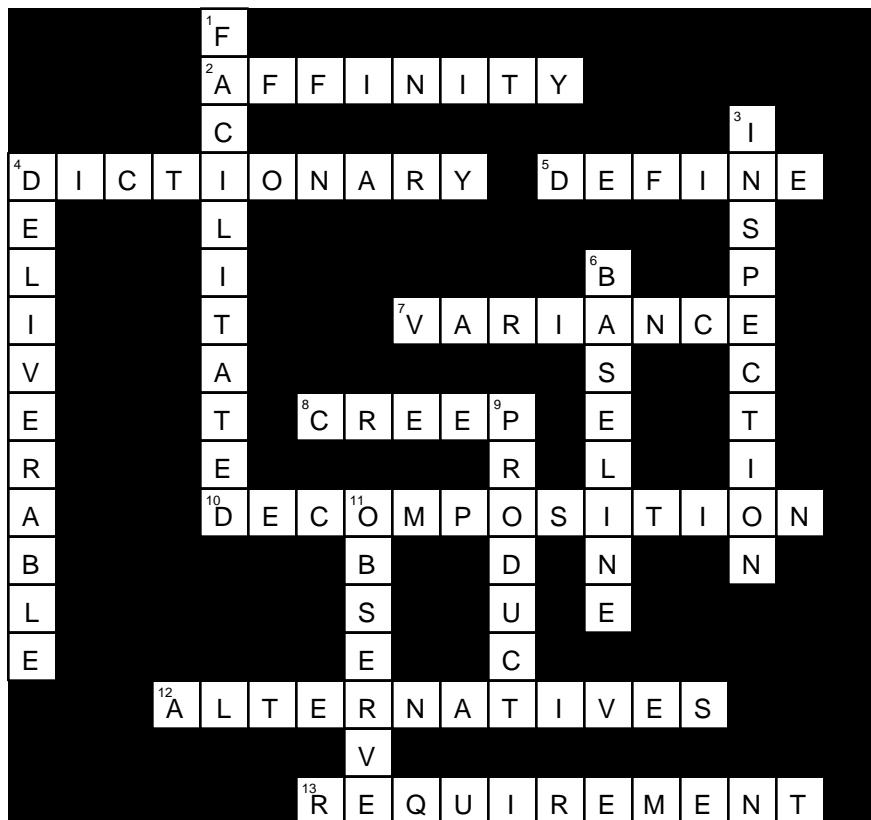
E. Project requirements

F. Acceptance criteria



## Scopercross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



# Exam Questions

1. Which of the following is TRUE about a work breakdown structure?

- A. It contains work packages that are described in a linear, unstructured list.
- B. Each item in the WBS represents a feature in the product scope.
- C. The WBS represents all of the work that must be done on the project.
- D. The WBS is created by the product sponsor and stakeholders.

2. Which is NOT an output of a Scope Management process?

- A. Business case
- B. WBS dictionary
- C. Change requests
- D. Accepted deliverables

3. Which of the following is NOT TRUE about a work breakdown structure?

- A. It describes procedures to define the scope, verify work, and manage scope changes.
- B. It contains a graphical, hierarchical list of all work to be performed.
- C. It can be broken down by project phase or deliverable.
- D. It is an important element of the baseline.

4. What is the correct order of the Scope Management processes?

- A. Plan Scope Management, Define Scope, Create WBS, Collect Requirements, Validate Scope, Control Scope
- B. Plan Scope Management, Collect Requirements, Control Scope, Create WBS, Validate Scope
- C. Plan Scope Management, Collect Requirements, Define Scope, Create WBS, Validate Scope, Control Scope
- D. Plan Scope Management, Collect Requirements, Baseline, Define Scope, Control Scope, Validate Scope

5. You are managing a software project. Your team has been working for eight weeks, and so far the project is on track. The lead programmer comes to you with a problem: there is a work package that is causing trouble. Nobody seems to know who is responsible for it, the accounting department does not know what cost center to bill it against, and it's not even clear exactly what work should be performed. Which of the following would BEST help this situation?

- A. Alternatives analysis
- B. WBS dictionary
- C. Scope Management plan
- D. Scope validation

## Exam Questions

**6. The goal of Validate Scope is:**

- A. To inspect the scope statement for defects so that it is correct
- B. To gain formal acceptance of the project deliverables from the sponsor and stakeholders
- C. To get everyone in the project working together toward a common goal
- D. To verify that all *PMBOK Guide* processes are complied with

**7. Historical information and lessons learned are part of:**

- A. Organizational process assets
- B. Enterprise environmental factors
- C. Project management information system (PMIS)
- D. Work performance information

**8. You've taken over as a project manager on a highway construction project, and the execution is already under way. Your sponsor tells you that moving forward, all asphalt should be laid down with a 12" thickness. The scope statement and the WBS call for 9" thick asphalt. What is the BEST course of action?**

- A. Look for a cheaper supplier so the cost impact is minimized.
- B. Tell the sponsor that the work is already under way, so you can't accommodate his request.
- C. Refuse to alter the plans until the change control system has been used.
- D. Tell the team to accommodate the request immediately.

**9. Which of the following BEST describes the purpose of a requirements traceability matrix?**

- A. It describes how WBS dictionary entries are traced to work packages, and how work packages are decomposed from deliverables.
- B. It's used to make sure that all of the subplans of the Project Management plan have been created.
- C. It helps you understand the source of each requirement, and how that requirement was verified in a later deliverable.
- D. It's used to trace the source of every change, so that you can keep track of them through the entire Control Scope process and verify that the change was properly implemented.

**10. It's the end of execution for a large highway construction project. The work has been done, and the workers are ready to pack up their equipment. The project manager and project sponsor have come by with specialists to check that each requirement has been met, and that all of the work in the WBS has been performed. What process is being done?**

- A. Control Scope
- B. Validate Scope
- C. Scope Testing
- D. Define Scope

## Exam Questions

11. You have just been put in charge of a project that is already executing. While reviewing the project documentation, you discover that there is no WBS. You check the Scope Management plan and discover that there should be one for this project. What is the BEST thing for you to do:

- A. Immediately alert the sponsor and make sure the project work doesn't stop.
- B. Stop project work and create the WBS, and don't let work continue until it's created.
- C. Make sure you closely manage communications to ensure the team doesn't miss any undocumented work.
- D. Mark it down in the lessons learned so it doesn't happen on future projects.

12. A project manager on an industrial design project finds that the sponsor wants to make a change to the scope after it has been added to the baseline, and needs to know the procedure for managing changes. What is the BEST place to look for this information?

- A. WBS
- B. Scope Management plan
- C. Change request form template
- D. Business case

13. You have just started work on the project scope statement. You are analyzing the expected deliverables when you discover that one of them could be delivered in three different ways. You select the best method for creating that deliverable. What is the BEST way to describe what you are doing?

- A. Alternatives analysis
- B. Decomposition
- C. Define scope process
- D. Stakeholder analysis

14. You're the project manager on a software project. Your team has only completed half of the work when the sponsor informs you that the project has been terminated. What is the BEST action for you to take?

- A. Verify the deliverables produced by the team against the scope, and document any place they do not match.
- B. Call a team meeting to figure out how to spend the rest of the budget.
- C. Work with the sponsor to see if there is any way to bring the project back.
- D. Tell the team to stop working immediately.

15. You are managing an industrial design project. One of your team members comes to you with a suggestion that will let you do more work while at the same time saving the project 15% of the budget. What is the BEST way for you to proceed?

- A. Tell the team to make the change because it will deliver more work for less money.
- B. Refuse to make the change until a change request is documented and change control is performed.
- C. Refuse to consider the change because it will affect the baseline.
- D. Do a cost-benefit analysis and then make sure to inform the sponsor that the project scope changed.

## Exam Questions

**16.** You are the project manager for a telecommunications project. You are working on the project scope statement. Which of the following is NOT included in this document?

- A. Authorization for the project manager to work on the project
- B. Requirements that the deliverables must meet
- C. A description of the project objectives
- D. The list of deliverables that must be created

**17.** Which of the following is NOT an input to Control Scope?

- A. WBS dictionary
- B. Approved change requests
- C. Requested changes
- D. Project scope statement

**18.** Which of these processes is not a part of Scope Management?

- A. Scope Identification
- B. Collect Requirements
- C. Control Scope
- D. Validate Scope

**19.** You are the project manager for a new project, and you want to save time creating the WBS. Which is the BEST way to do this?

- A. Make decomposition go faster by cutting down the number of deliverables.
- B. Use a WBS from a previous project as a template.
- C. Don't create the WBS dictionary.
- D. Ask the sponsor to provide the work packages for each deliverable.

**20.** The project manager for a design project is using the Define Scope process. Which BEST describes this?

- A. Creating a document that lists all of the features of the product
- B. Creating a plan for managing changes to the baseline
- C. Creating a document that describes all of the work the team does to make the deliverables
- D. Creating a graphical representation of how the phases or deliverables decompose into work packages

**21.** You are the project manager for a construction project. You have completed project initiation activities, and you are now creating a document that describes processes to document the scope, decompose deliverables into work packages, verify that all work is complete, and manage changes to the baseline. What process are you performing?

- A. Develop Project Management plan
- B. Define Scope
- C. Create WBS
- D. Develop Project Charter

## Exam Questions

22. You are a project manager working on a project. Your sponsor wants to know who a certain work package is assigned to, what control account to bill it against, and what work is involved. What document do you refer her to?

- A. Scope Management plan
- B. WBS
- C. WBS dictionary
- D. Scope statement

23. You are the project manager for a software project. One of the teams discovers that if they deviate from the plan, they can actually skip one of the deliverables because it's no longer necessary. They do the calculations, and realize they can save the customer 10% of the cost of the project without compromising the features in the product. They take this approach, and inform you the following week what they did during the status meeting. What is the BEST way to describe this situation?

- A. The project team has taken initiative and saved the customer money.
- B. A dispute is resolved in favor of the customer.
- C. The team informed the project manager of the change, but they should have informed the customer, too.
- D. The team did not follow the Control Scope process.

24. Which of the following BEST describes the purpose of the project scope statement?

- A. It describes the features of the product of the project.
- B. It is created before the Scope Management plan.
- C. It decomposes deliverables into work packages.
- D. It describes the objectives, requirements, and deliverables of the project, and the work needed to create them.

25. A project manager at a cable and networking company is gathering requirements for a project to build a new version of their telecommunications equipment. Which of the following is NOT something that she will use?

- A. Specific descriptions of work packages that will be developed
- B. One-on-one interviews with the senior executives who need the new equipment for their teams
- C. An early working model of the telecommunications equipment to help get feedback from stakeholders
- D. Notes that she took while being "embedded" with the team that will eventually use the equipment being developed

26. Which of the following is NOT an output of Collect Requirements?

- A. Requirements observations
- B. Requirements traceability matrix
- C. Requirements documentation
- D. Requirements Management plan

*Answers*~~Exam Questions~~**1. Answer: C**

The work breakdown structure is all about breaking down the work that your team needs to do. The WBS is graphical and hierarchical, not linear and unstructured. Did you notice that answer B was about *product scope*, not *project scope*?

**2. Answer: A**

There are two ways you can get to the right answer for this question. You can recognize that the WBS dictionary, change requests, and accepted deliverables are all Scope Management process outputs. (You'll see change requests in every knowledge area!) But you can also recognize that the business case was created by the Develop Project Charter, which is part of the Initiating process group.

**3. Answer: A**

Did you recognize that answer A was describing the Scope Management plan? Once you know what the WBS is used for and how to make one, questions like this make sense.

**4. Answer: C**

You'll need to know what order processes come in, and one good way to do that is to think about how the outputs of some processes are used as inputs for another. For example, you can't create the WBS until the scope is defined, which is why A is wrong. And you can't do change control until you have a baseline WBS, which is why B is wrong.

*Take a minute and think about how there's no "right" order for Validate Scope and Control Scope. You could have a scope change at the beginning of the project, so Control Scope would come first. But a change could happen late in the project, too! If there's a major change to the project after the scope's verified, you need to redo it.*

**5. Answer: B**

An important tactic for a lot of exam questions is to be able to recognize a particular tool, technique, input, or output from a description. What have you learned about that tells you who is responsible for a work package, tells what control account to associate with it, and describes the work associated with it? That's a good description of the WBS dictionary.

**6. Answer: B**

*Inspection isn't just done at the end of the project. You do Validate Scope on every single deliverable made by you and the team.*

There are some questions where you'll just have to know what a process is all about, and this is one of them. That's why it's really helpful to know why Validate Scope is so helpful to you on a project. You use Validate Scope to check that all of the work packages were completed, and get the stakeholders and sponsor to formally accept the deliverables.

*Answers*~~Exam Questions~~

## 7. Answer: A

It's easy to forget that organizational process assets is more than just an input. It's a real thing that's part of your company. Take a second and think about what **assets** are in your **organization** that help you carry out each **process**. Get it? Good! So what is historical information, anyway? It's stuff like reports and data that you or another project manager wrote down on a previous project and stored in a file cabinet or a database. That's an asset you can use now! What are lessons learned? Those are lessons you wrote down at the end of a previous project and stuck in a file cabinet or a database. And now those lessons are another asset you can use.



THESE  
INPUTS AND OUTPUTS  
MAKE SENSE WHEN I THINK  
ABOUT HOW I'D USE THEM ON A  
PROJECT. ORGANIZATIONAL PROCESS  
ASSETS ARE JUST THINGS THAT  
MY ORGANIZATION KEEPS TRACK  
OF TO HELP ME DO MY JOB, LIKE  
INFORMATION FROM OLD PROJECTS  
AND PROCEDURES.

The PMBOK Guide says this stuff is stored in a "corporate knowledge base," but that's just another word for a file cabinet or a folder on your network.

## 8. Answer: C

One thing to remember about change control is that if you want to make the sponsor and stakeholders happy with the project in the end, sometimes you have to tell them "no" right now. When you're doing Control Scope, the most important tool you use is the change control system. It tells you how to take an approved change and put it in place on a project, and there's no other way that you should ever make a change to any part of the baseline. That means that once everyone has approved the scope statement and WBS, if you want to make any change to them, then you need to get that change approved and put it through the change control system.

## 9. Answer: C

The requirements traceability matrix is a tool that you use to trace each requirement back to a specific business case, and then forward to the rest of the scope deliverables (like specific WBS work packages), as well as other parts of the project: the product design (like specific levels in *Cows Gone Wild*) or test strategy (like test plans that the Ranch Hand Games testers use to make sure that the game works).

The idea is that you're tracing a deliverable from its initial description all the way through the project to testing, so that you can make sure that every single deliverable meets all of its requirements.

## Answers

~~Exam Questions~~

## 10. Answer: B

When you're getting the sponsor and stakeholders to formally accept the results of the project, you're doing Validate Scope. There's only one tool for it: inspection. That means carefully checking the deliverables (in this case, what the workers built on the highway) to make sure they match the WBS.



Answer D is a good idea, but it's not as important as creating a new WBS.

## 11. Answer: B

This question is a little tricky. The most important thing about a WBS is that if your Scope Management plan says it should be there, then your project absolutely cannot be done without it. And a general rule is that if you ever find that there is no WBS, you should always check the Scope Management plan to find out why.

## 12. Answer: B

This is another question that is testing you on the definition of a specific document, in this case the Scope Management plan, which is one of the subsidiary plans of the Project Management plan. Think about what you use a Scope Management plan for. It gives you specific procedures for defining the scope, breaking down the work, verifying the deliverables, and **managing scope changes**—which is what this question is asking. All of the other answers don't have anything to do with managing changes.

## 13. Answer: A

Here's another example of how there are two correct answers but only one BEST one. Answer C is true—you are doing scope definition. But is that really the best way to describe this situation? Alternatives analysis is part of scope definition, and it's a more accurate way to describe what's going on here.



When you look at a few ways to create a deliverable and then decide on the best one, that's alternatives analysis.

## 14. Answer: A

This question is an example of how you need to rely on more than just common sense to pass the PMP exam. All four of these answers could be good ways to handle a terminated project, but there's only one of those answers that corresponds to what the *PMBoK Guide* says. When a project is terminated, you still need to complete the Validate Scope process. That way, you can document all of the work that has been completed, and the work that has not been completed.

THAT WAY, IF I NEED TO RESTART THE PROJECT LATER OR REUSE SOME OF ITS DELIVERABLES, I'LL KNOW EXACTLY WHERE MY TEAM LEFT OFF WHEN IT ENDED.



*Answers*~~Exam Questions~~**15. Answer: B**

Are you starting to get the hang of how this change control stuff works? The baseline isn't etched in stone, and you need to be able to change it, but you can't just go ahead and make changes whenever you want. You need to document the change request and then put that request through change control. If it's approved, then you can update the baseline so that it incorporates the change.

You definitely can't just make the change and inform the sponsor later. All changes need to be approved.

**16. Answer: A**

When a question asks you about what a particular document, input, or output contains, be on the lookout for answers that talk about a different document. What document do you know about that gives the project manager authorization to do the work? That's what the project charter is for.

**17. Answer: C**

Sometimes Control Scope is easiest to think about as a kind of machine that turns approved changes into updates. It sucks in the approved changes and all of the other Scope Management stuff (the scope statement, WBS, and WBS dictionary), does all the stuff that it needs to do to update those things, and then spits out updates. And sometimes it spits out new requested changes because when you're making changes to the WBS or scope statement you realize that you need to make even more changes.

**18. Answer: A**

Scope Identification is a made-up process. It didn't appear in this chapter, and even though it sounds real, it's wrong.

**19. Answer: B**

WBS templates are a great way to speed up creating the WBS, and the easiest way to create a template is to use one from a previous project. It is **not** a good idea to cut out deliverables, skip important outputs like the WBS dictionary, or make the sponsor do your job for you.

I THINK OF PERFORM INTEGRATED CHANGE CONTROL AS A MACHINE THAT TURNS CHANGE REQUESTS INTO APPROVED CHANGES, AND CONTROL SCOPE AS THE MACHINE THAT TURNS APPROVED CHANGES INTO UPDATES TO THE BASELINE.

You can also use a template for the Scope Management plan.



## Answers

~~Exam Questions~~

## 20. Answer: C

This question asked you about the Define Scope process, but all of the answers describe various outputs. Which of these outputs matches Define Scope? Well, the main output of Define Scope is the scope statement, and answer C is a good description of the scope statement.

## 21. Answer: A

*Did you guess "Create WBS" because it was a Scope Management process and the question mentioned decomposing deliverables into work packages?*

This question asked you where you defined the procedures for doing all of the Scope Management processes. Where do you find those procedures? You find them in the Project Management plan—specifically, the Scope Management subplan. And you build that in the Develop Project Management Plan process.

## 22. Answer: C

There's only one document you've seen that shows you details of individual work packages and contains a control account, a statement of work, and a resource assignment. It's the WBS dictionary.

## 23. Answer: D

*Did you notice how the question made it sound like the team did a good thing by ignoring Control Scope and making changes that were never approved?*

When you read the question, it looks like the team really helped the project, right? But think about what happened: the team abandoned the plan, and then they made a change to the project without getting approval from the sponsor or stakeholders. Maybe they discovered a useful shortcut. But isn't it possible that the shortcut the team found was already considered and rejected by the sponsor? That's why change control is so important.



# Answers

## ~~Exam Questions~~

### 24. Answer: D

Some questions are just definition questions. When that definition is a “which-is-BEST” question, there could be an answer that makes some sense, and it’s tempting to stop with it. In this case, answer A sounds like it might be right. But if you read answer D, it’s much more accurate.

### 25. Answer: A

The question asked about the tools and techniques for Collect Requirements, and answer A is the only answer that has to do with the Create WBS process. The rest of the answers were descriptions of Collect Requirements tools and techniques: interviews (answer B), prototypes (answer C), and observations (answer D).

### 26. Answer: A

The three outputs of Collect Requirements are requirements documentation and the requirements traceability matrix. “Requirements Observations” isn’t really an output.



The easiest way to make sure you get questions like this right is to think about how each of those outputs are actually used later in the project.

**Keep an eye out for questions that describe an input or output and then ask you to name it. Look at each answer and think up your own descriptions for them—one of them will match the question.**



## 6 Time management

# ***Getting it done on time***



**Time management** is what most people think of when they think of **project managers**. It's where the deadlines are set and met. It starts with **figuring out what work** you need to do, how you will do it, what **resources you'll use**, and how long it will take. From there, it's all about developing and controlling that **schedule**.

## Reality sets in for the happy couple

Rob and Rebecca have decided to tie the knot, but they don't have much time to plan their wedding. They want the big day to be unforgettable. They want to invite a lot of people and show them all a great time.

But just thinking about all of the details involved is overwhelming. Somewhere around picking the paper for the invitations, the couple realize they need help...

They've always dreamed of a June wedding, but it's already January.



EVERYTHING HAS TO  
BE PERFECT! BUT IT  
SEEMS SO HUGE. I  
DON'T KNOW WHERE TO  
START.

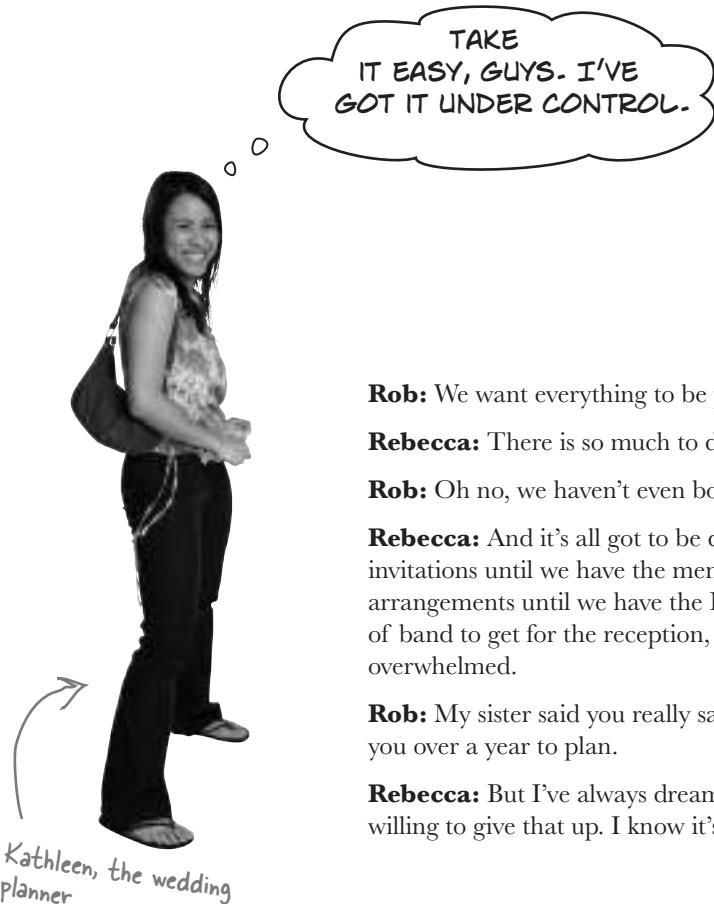
Rebecca's been  
dreaming of the big  
day since she was  
12, but it seems  
like there's so little  
time to do it all.  
She needs some help.



DON'T  
WORRY. MY  
SISTER'S WEDDING  
PLANNER WAS  
GREAT. LET ME  
GIVE HER A CALL.



## Meet the wedding planner



**Rob:** We want everything to be perfect.

**Rebecca:** There is so much to do! Invitations, food, guests, music...

**Rob:** Oh no, we haven't even booked the place.

**Rebecca:** And it's all got to be done right. We can't print the invitations until we have the menu planned. We can't do the seating arrangements until we have the RSVPs. We aren't sure what kind of band to get for the reception, or should it be a DJ? We're just overwhelmed.

**Rob:** My sister said you really saved her wedding. I know she gave you over a year to plan.

**Rebecca:** But I've always dreamed of a June wedding, and I'm not willing to give that up. I know it's late, but can you help us?

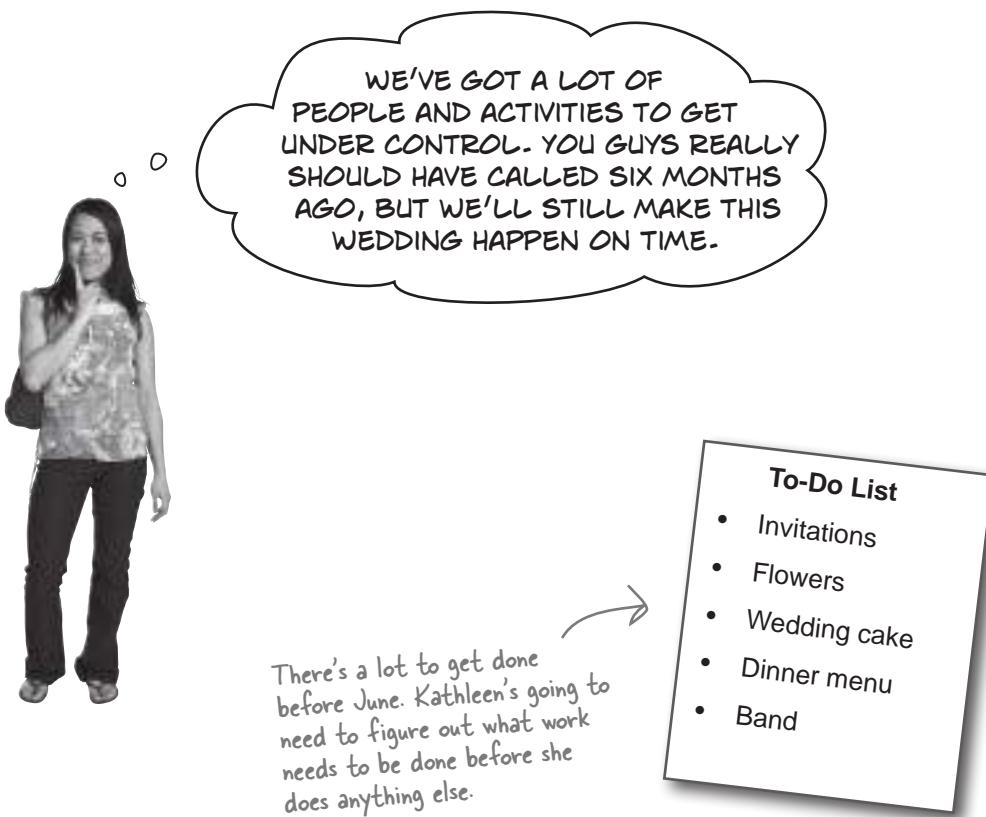


What should Kathleen do first to make sure they have time to get everything done?

## Time management helps with aggressive timelines

Since there are so many different people involved in making the wedding go smoothly, it takes a lot of planning to make sure that all of the work happens in the right order, gets done by the right people, and doesn't take too long. That's what the **Time Management** knowledge area is all about.

Initially, Kathleen was worried that she didn't have enough time to make sure everything was done properly. But she knew that she had some powerful time management tools on her side when she took the job, and they'll help her make sure that everything will work out fine.





## Time Management Magnets

You need to know the order of the Time Management processes for the exam. Luckily, they are pretty intuitive. Can you figure out the order?

1

Control Schedule

2

Estimate Activity Durations

3

Develop Schedule

4

Sequence Activities

5

Define Activities

6

Estimate Activity Resources

7

Plan Schedule Management



## Time Management Magnets Solution

Here are the correct order and the main output for each of the Time Management processes.

### 1 Plan Schedule Management



Schedule Management plan

First you define the processes you'll use to plan and control your schedule.

### 2 Define Activities



Activity list

Next you come up with a list of all of the activities that will need to be completed.



The activity list is the basis for the network diagram that you create in the next process.

### 3 Sequence Activities



Project schedule network diagram

Next, you figure out which activities need to come before others, and put them in the right order. The main output here is a **project schedule network diagram**, a picture of how activities are related.

Knowing the stuff that needs to happen and the sequence is half the battle. Now you need to figure out who will do the work.

### 4 Estimate Activity Resources



Activity resource requirements

First you estimate the resources you'll need to do the job, and create a list of them...



Once you have the network diagram, you can start to figure out who and what are needed to get the project done.

**5**

## Estimate Activity Durations



Activity duration estimates

...and then estimate the time it will take to do each activity.



You can use lots of different estimation techniques to determine how long the project will take.

The last process, Control Schedule, is in the Monitoring and Controlling process group.



Monitoring & Controlling process group

**6**

## Develop Schedule



Then you build a schedule from all of the estimates and the resource and activity information you've created.



The schedule pulls all of the information together to predict the project end date.

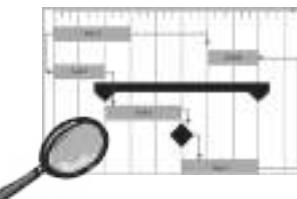


Planning process group

The first six Time Management processes are in the Planning process group because they're all about coming up with the schedule—and you need that before you can start executing your project.

**7**

## Control Schedule



Finally, you monitor and control changes to the schedule to make sure that it is kept up to date.



Keeping track of the issues that require schedule changes and dealing with them is as important in Time Management as it was in Scope Management.

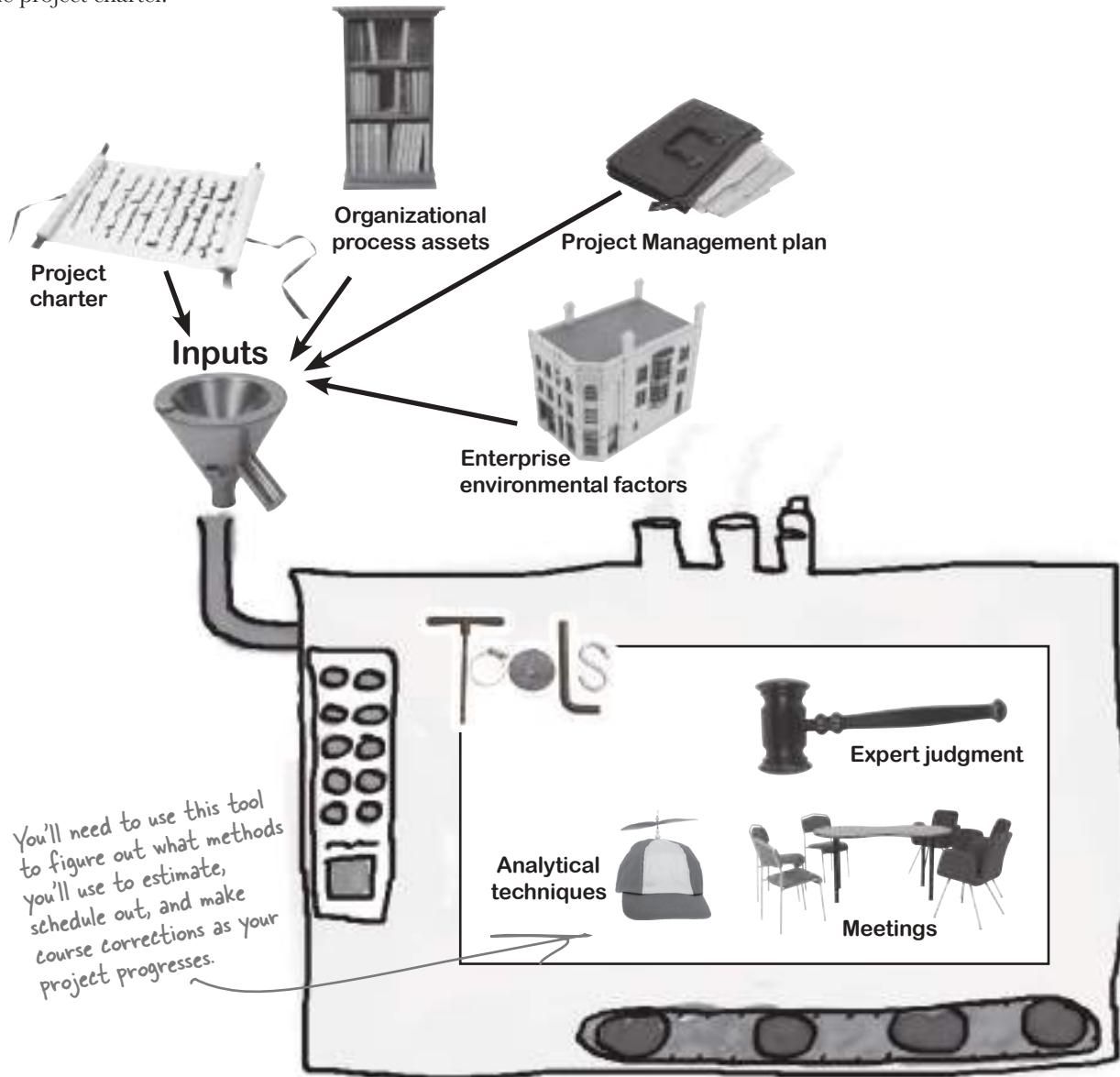


Time Management is all about breaking the work down into activities, so you can put them in order and come up with estimates for each of them.

What do you need to know before you can figure out what activities are needed for a project?

# Plan your scheduling processes

The **Plan Schedule Management** process is just like all of the other planning processes you've seen so far. In fact, you've already seen all of the inputs and tools that are used to create it in previous processes. Just like with the Plan Scope Management process from Chapter 5, your goal is to build a Schedule Management plan from the other project management plans, your company's culture and existing documents, and the project charter.



# Now you know how you'll track your schedule

The only output of the Plan Schedule Management process is the Schedule Management plan. It describes the way you'll estimate your work, track your progress, and report on it.

## Outputs



### Rob and Rebecca's Wedding Schedule Management Plan

**Project Schedule Model Development:** Kathleen will create a schedule model for the wedding using Microsoft Project. It will be stored in an open document repository and updated on a weekly basis. The initial schedule will be based on high-level estimates that will be refined at set intervals as requirements are defined for the project. The schedule will be baselined whenever a change request is approved, and also at the following milestones:

- Scope Statement Complete
- Venue Booked
- Invitations Sent
- RSVPs Received
- Bridesmaids

**Level of Accuracy:** The initial schedule model is expected to be accurate by +/- 10%. As each week passes, the schedule update increases the level of accuracy because the team knows more and more about the project. At the time of RSVPs received, the schedule model will be +/- 3% accurate. This possible 15% overage will be included in the team's overall estimate as a contingency to assist in risk mitigation.

**Units of Measure:** All estimates will be provided in calendar days.

**Organizational Procedures Links:** The project schedule model will follow the organizational outline provided by the WBS. All schedule status reports will follow the format provided in the WBS as well.

**Project Schedule Model Maintenance:** On a weekly basis, Kathleen will update the project schedule model with individual % complete numbers on tasks to keep the schedule up to date.

**Reporting Formats:** Every Thursday, Kathleen will host a weekly status meeting to discuss how the project is tracking to its estimates with Rob and Rebecca. The status report for this meeting will follow the standard wedding planning status report template.

# Use the Define Activities process to break down the work

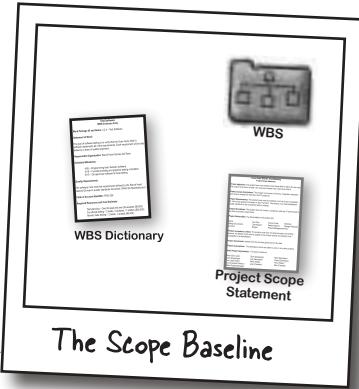
Define Activities uses everything we already know about the project to divide the work into activities that can be estimated. The inputs for this process all come from the processes in the Scope Management and Integration Management knowledge areas. The first step in Time Management is figuring out how the project work breaks down into activities—and that's what the **Define Activities process** is for.



You might want to look at all of the lessons from similar projects your company has done to get a good idea of what you need to do on the current one.



The WBS and WBS dictionary have the work explained to the work package level. That's more detailed than the scope statement, but still too high to estimate well.



The Scope Baseline

This plan was the output of the last process. It tells you the methods to use when you define the activities in your schedule.



Schedule Management plan

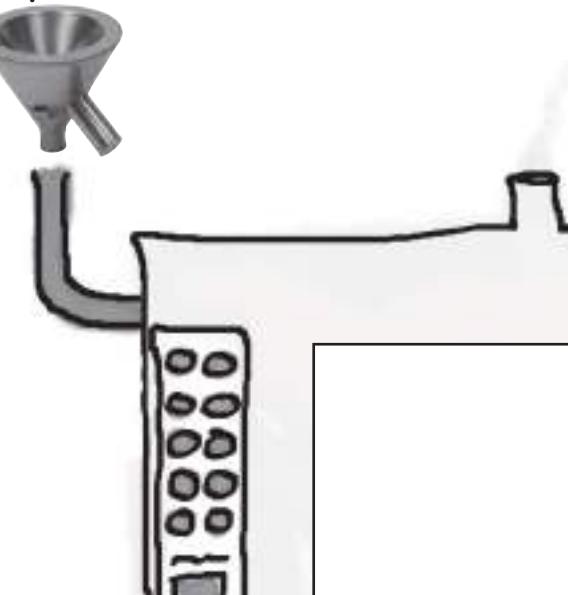


Enterprise environmental factors

You'll need the project management information system (PMIS), because that's where you store information about your activities. But that's not the only thing you need to know about your working environment. Can you think of other environmental factors that influence the way you break down the work?

## Inputs

The project scope statement is still the main place to go to figure out what the project is supposed to produce.



# Tools and techniques for Define Activities

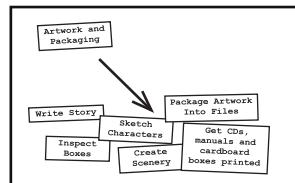
Kathleen wrote down everything she knew about the project. She used the activity list from her last wedding as a guide and then thought about the things that Rob and Rebecca wanted that were different from her past projects. She broke those things down into activities and pulled everything together into an activity list.



This "Tools" icon means we're showing you the tools and techniques for the process. Get the picture?

## Decomposition

This means taking the work packages you defined in the Scope Management processes and breaking them down even further into activities that can be estimated.



## Expert judgment

Ask somebody who has done this before to give an opinion on what activities will be needed to get the job done.



## Rolling wave planning

When you plan this way, you decompose only the activities that you need to plan for because they're coming up soon. You leave everything else planned at the milestone level until it gets closer to the time when you'll do it.



Flip the page for an example of this tool!

## Rolling wave planning lets you plan as you go

Sometimes you start a project without knowing a lot about the work that you'll be doing later. **Rolling wave planning** lets you plan and schedule only the stuff that you know enough about to plan well.

If Kathleen were using rolling wave planning, she might write a schedule for only the tasks it takes to do the invitations, and leave the planning for the menu and the seating up in the air until she knows who will RSVP.

Rob and Rebecca probably wouldn't be happy hearing that Kathleen was only going to plan for the invitations to be sent, though. They want to know that their wedding is going to happen on time. That's why rolling wave planning should only be used in cases where it's not possible to plan any other way.

Think back to the definition of a project in Chapter 2. Remember how projects are **progressively elaborated**? Rolling wave planning takes advantage of the fact that you know more about the project as you go to make plans more accurate.



---

### *there are no* Dumb Questions

---

**Q:** How would you use experts to help you define tasks?

**A:** A wedding is something that a lot of people have experience with, but some projects are not as easy to get a handle on. If you were asked to manage a project in a new domain, you might want to ask an expert in that field to help you understand what activities were going to be involved.

Even in Kathleen's case, access to a catering expert might help her think of some activities that she wouldn't have planned for on her own.

It could be that you create an activity list and then have the expert review it and suggest changes. Or, you could involve the expert from the very beginning and ask to have a Define Activities conversation with him before even making your first draft of the activity list.

**Q:** I still don't get rolling wave planning.

**A:** One way to develop a project is to divide it up into phases of work, and gather requirements for each phase as the previous one is completed. Sometimes projects are done iteratively, where you divide the work up into phases and then plan out each phase before you execute on it. Rolling wave planning is all about committing to planning out one portion of the work that you'll do, executing it, and then moving on to the next portion.

Software projects using **agile methodologies** use a form of rolling wave planning to make sure that everything they sign on to do gets done. They might do user stories for a release of the software up front, build it, and deliver it, and then gather more requirements based on the users' ideas after working with the released version.



## Activity Magnets

Here is part of a WBS. Arrange the activities underneath the WBS to show how the work items decompose into activities.

This is one work package from the wedding WBS. How does it decompose into activities?



This is part of the WBS that Kathleen made for the wedding project.

1. ....

1. ....

1. ....

2. ....

2. ....

2. ....

3. ....

3. ....

3. ....

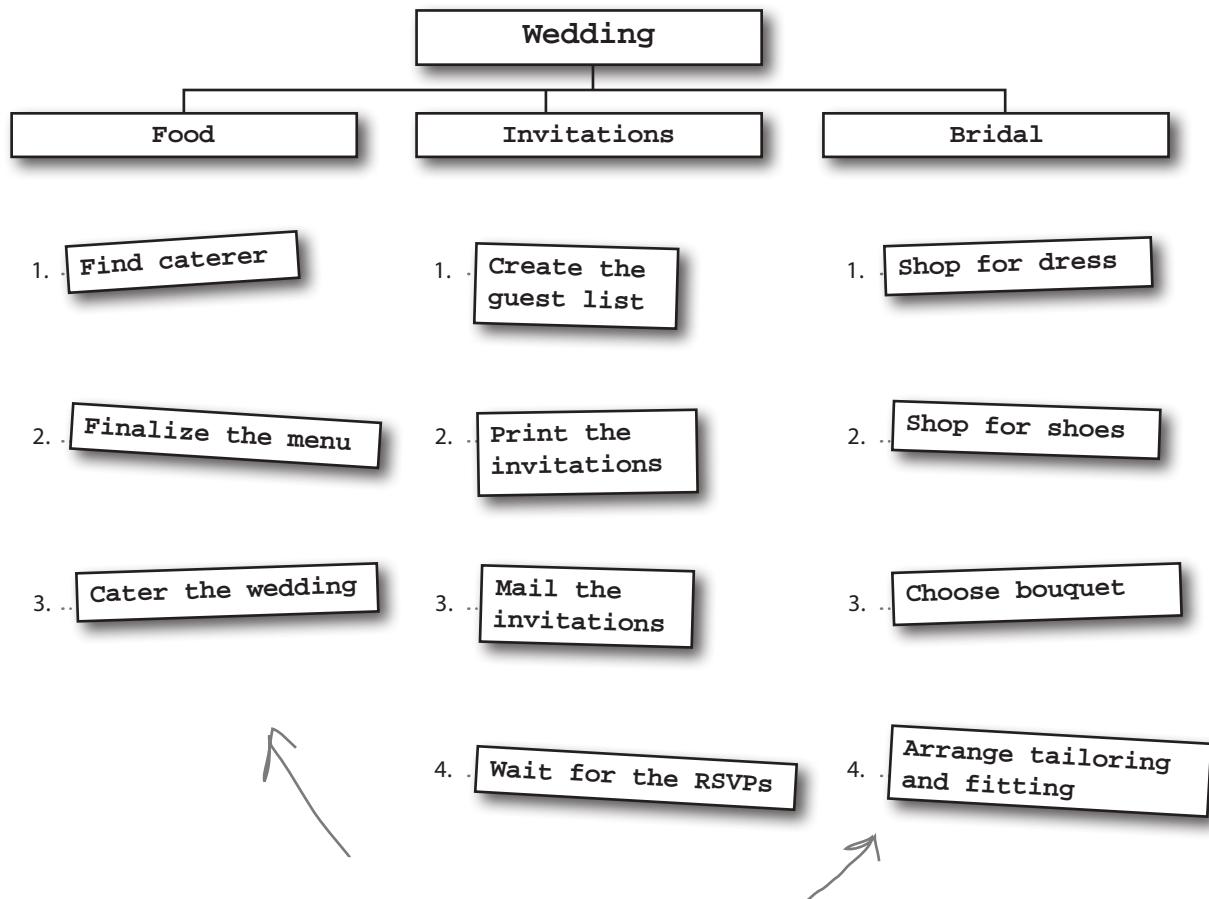
4. ....





## Activity Magnets Solution

Here is part of a WBS. Arrange the activities underneath the WBS to show how the work items decompose into activities.



There are lots of other activities that could be defined for the three work packages in Kathleen's WBS.

The important thing to remember about activities, though, is that they are broken down to the level at which they can be estimated accurately.

# Define activities outputs

The main output of this process is the **activity list**. It's the basis for all of the estimation and scheduling tasks you will do next. But there are a few other outputs that go along with it, and help to make the estimates more detailed and accurate.

## Outputs



### Activity list

This is a list of everything that needs to be done to complete your project. This list is lower-level than the WBS. It's all the activities that must be accomplished to deliver the work packages.

### Activity attributes

Here's where the description of each activity is kept. All of the information you need to figure out the order of the work should be here, too. So any predecessor activities, successor activities, or constraints should be listed in the attributes, along with descriptions and any other information about resources or time that you need for planning.

### Milestone list

All of the important checkpoints of your project are tracked as milestones. Some of them could be listed in your contract as requirements of successful completion; some could just be significant points in the project that you want to keep track of. The milestone list needs to let everybody know which are required and which are not.

Some milestones for the wedding:

- \* Invitations sent
- \* Menu finalized
- \* Church booked
- \* Bridesmaids' dresses fitted



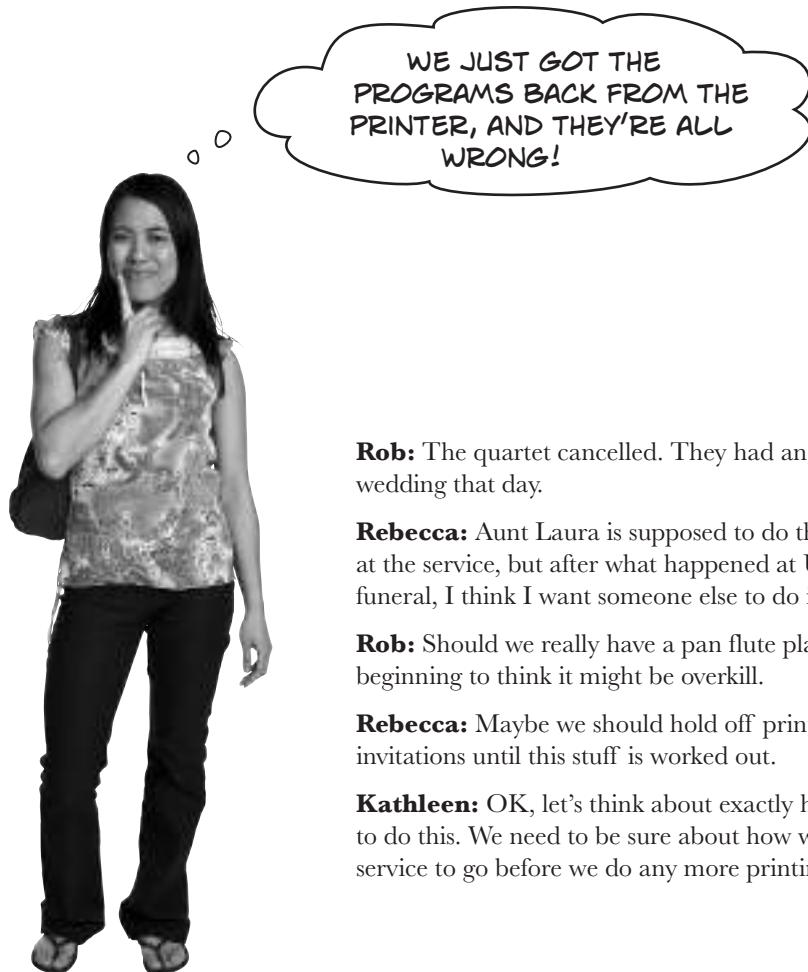
Activity list



Activity attributes



Milestone list



**Rob:** The quartet cancelled. They had another wedding that day.

**Rebecca:** Aunt Laura is supposed to do the reading at the service, but after what happened at Uncle Stu's funeral, I think I want someone else to do it.

**Rob:** Should we really have a pan flute player? I'm beginning to think it might be overkill.

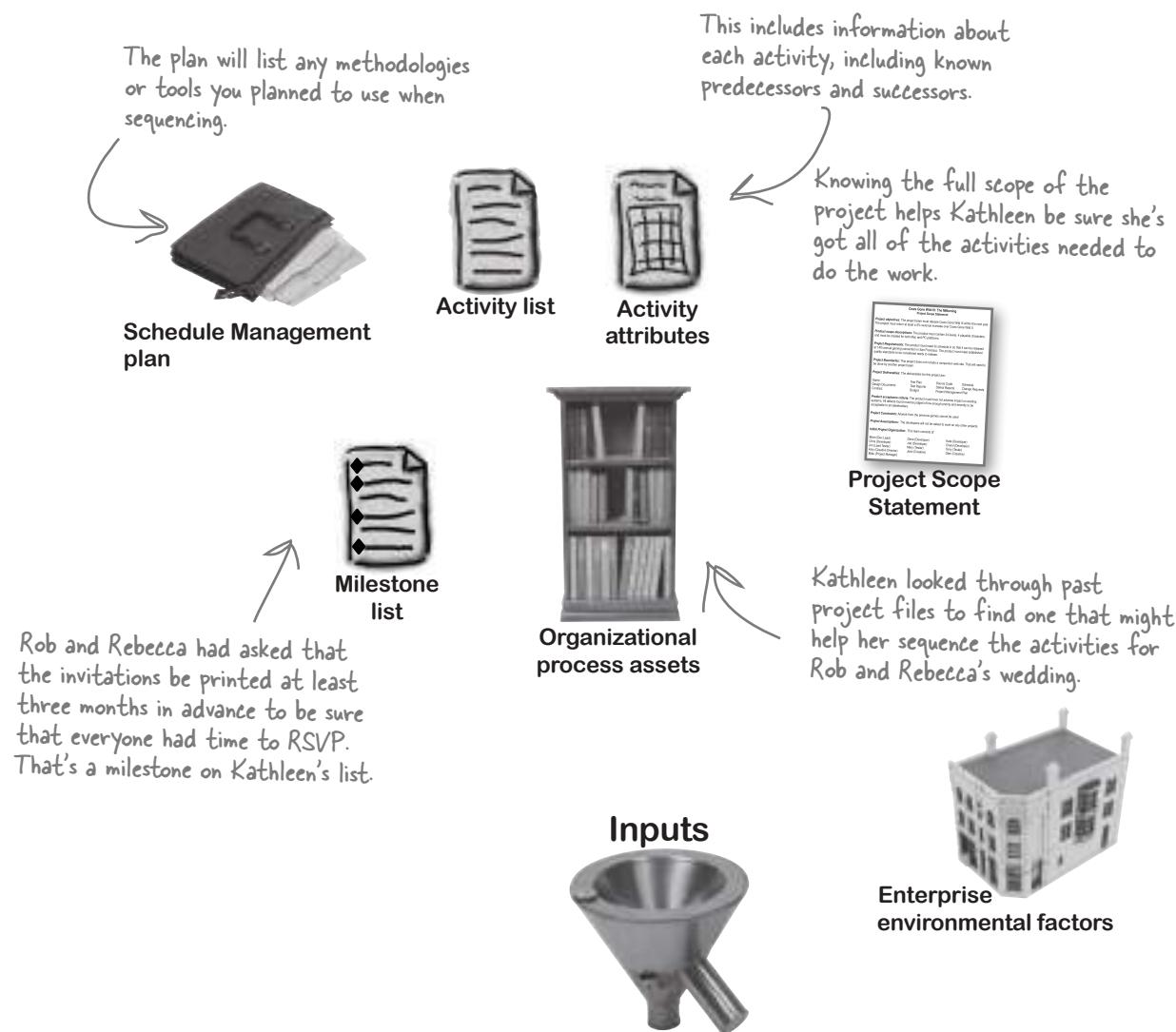
**Rebecca:** Maybe we should hold off printing the invitations until this stuff is worked out.

**Kathleen:** OK, let's think about exactly how we want to do this. We need to be sure about how we want the service to go before we do any more printing.

# The Sequence Activities process puts everything in order

Now that we know what we have to do to make the wedding a success, we need to focus on the order of the work. Kathleen sat down with all of the activities she had defined for the wedding and decided to figure out exactly how they needed to happen. That's where she used the **Sequence Activities** process.

The **activity attributes** and the **activity list** she had created had most of the predecessors and successors written in them. Her **milestone list** had major pieces of work written down, and there were a couple of changes to the scope she had discovered along the way that were approved and ready to go.



# Diagram the relationship between activities

One way to visualize the way activities relate is to create a network diagram. Kathleen created this one to show how the activities involved in producing the invitations depend on one another.

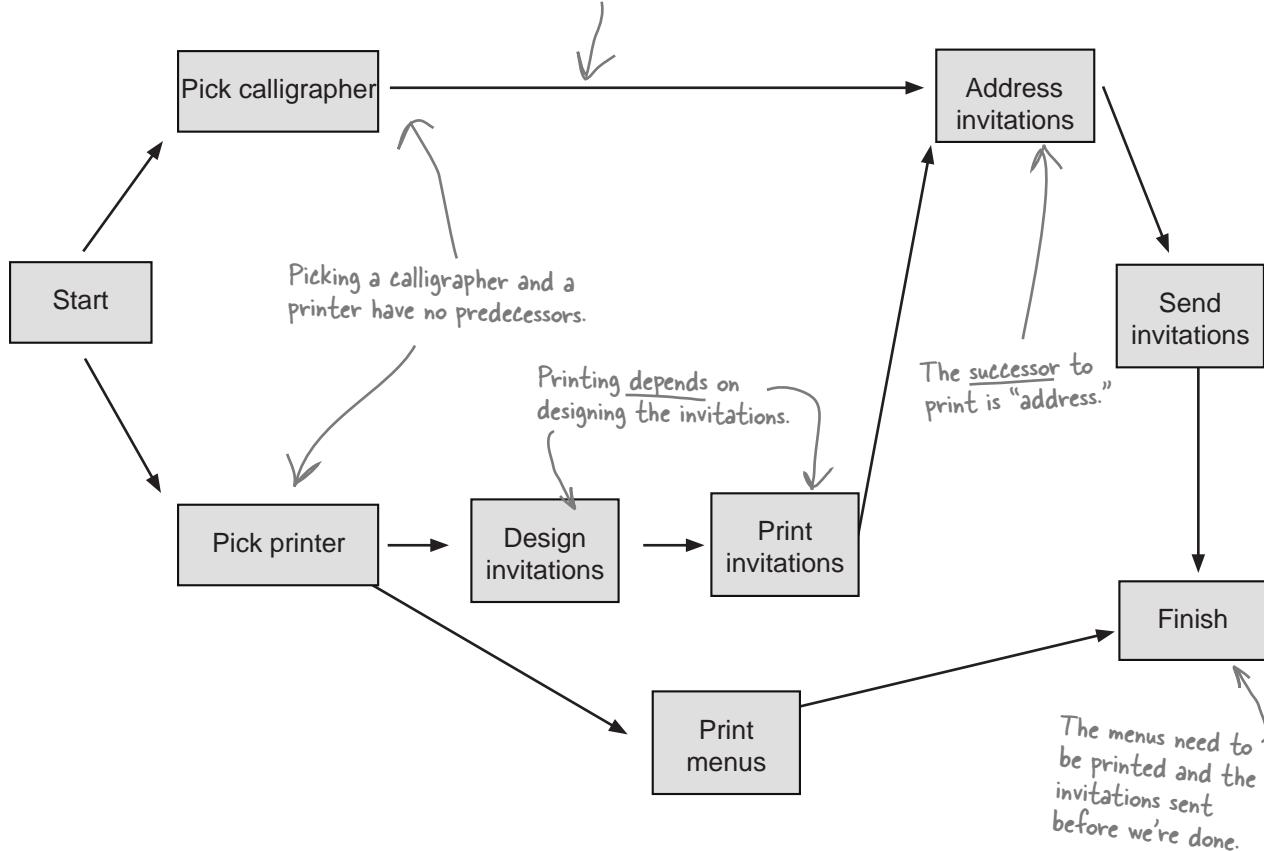
For example, the calligrapher is the person who's hired to write the addresses on the invitations, so Rob and Rebecca need to pick a calligrapher before the invitations can be addressed. But the invitations also need to be printed before they can be addressed, because otherwise the calligrapher won't have anything to write on! See how predecessors can get all complicated? Luckily, a diagram makes sense of them!

Showing the activities in rectangles and their relationships as arrows is called a **precedence diagramming method (PDM)**.



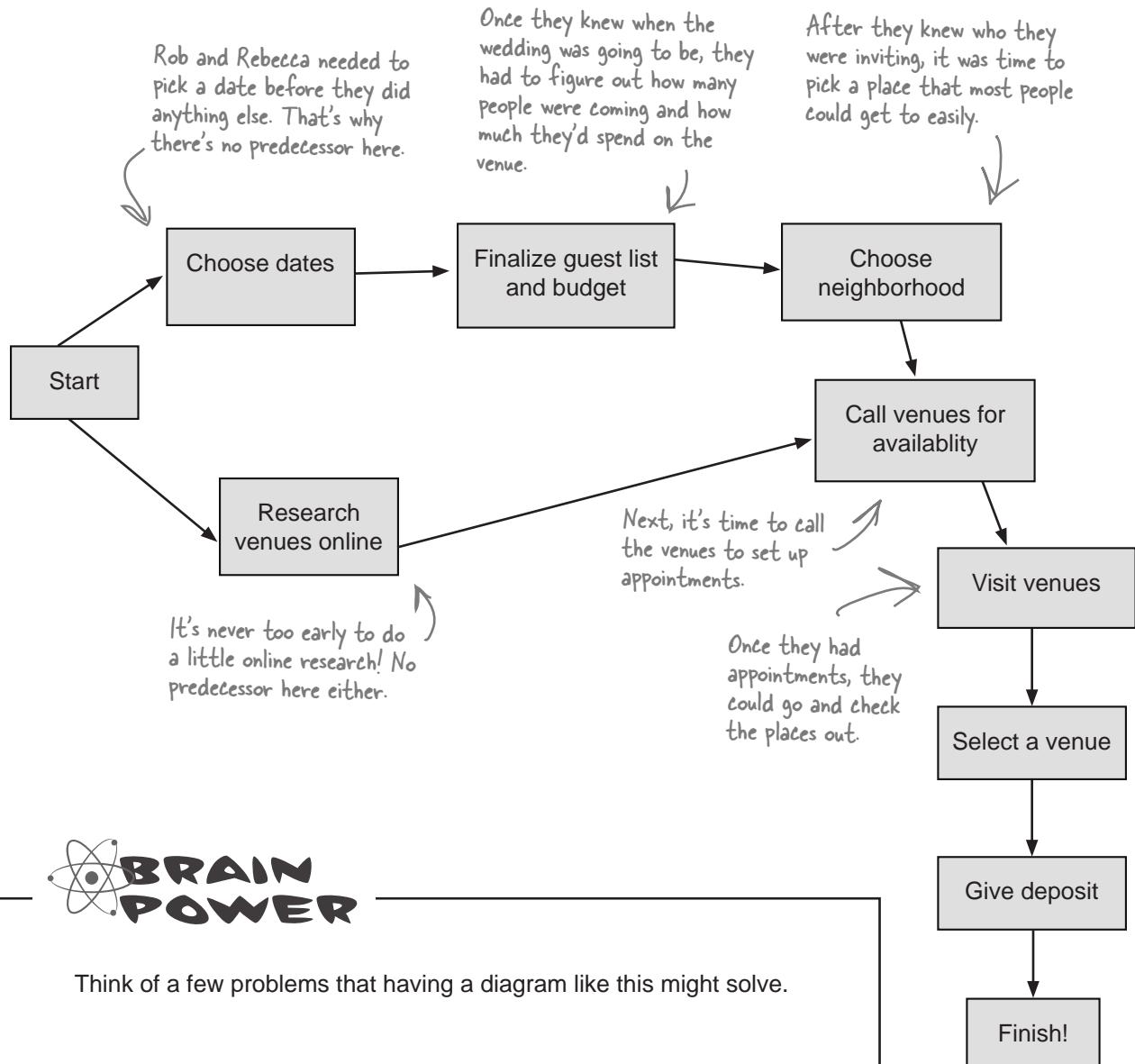
This kind of diagram is also called activity on node (AON).

This arrow shows a finish-to-start predecessor between the "pick calligrapher" and "address" activities.



# Network diagrams put your tasks in perspective

Just looking at the way all of these tasks relate to one another can help you figure out what's important at any time in the project. Once Rob and Rebecca looked at the network diagram below, they realized they needed to get online and start looking for a venue for their wedding right away, even before they'd figured out their budget and guest list.



Think of a few problems that having a diagram like this might solve.



You'll need to know how to turn a table of nodes into a network diagram, so here's your chance to get some practice! Here's a list of nodes for a PDM network diagram. Try drawing the diagram based on it:

Name	Predecessor
Start	—
A	Start
B	A
C	B
D	Start
E	D
F	B
G	C
H	D
I	E, H
Finish	F, G, I

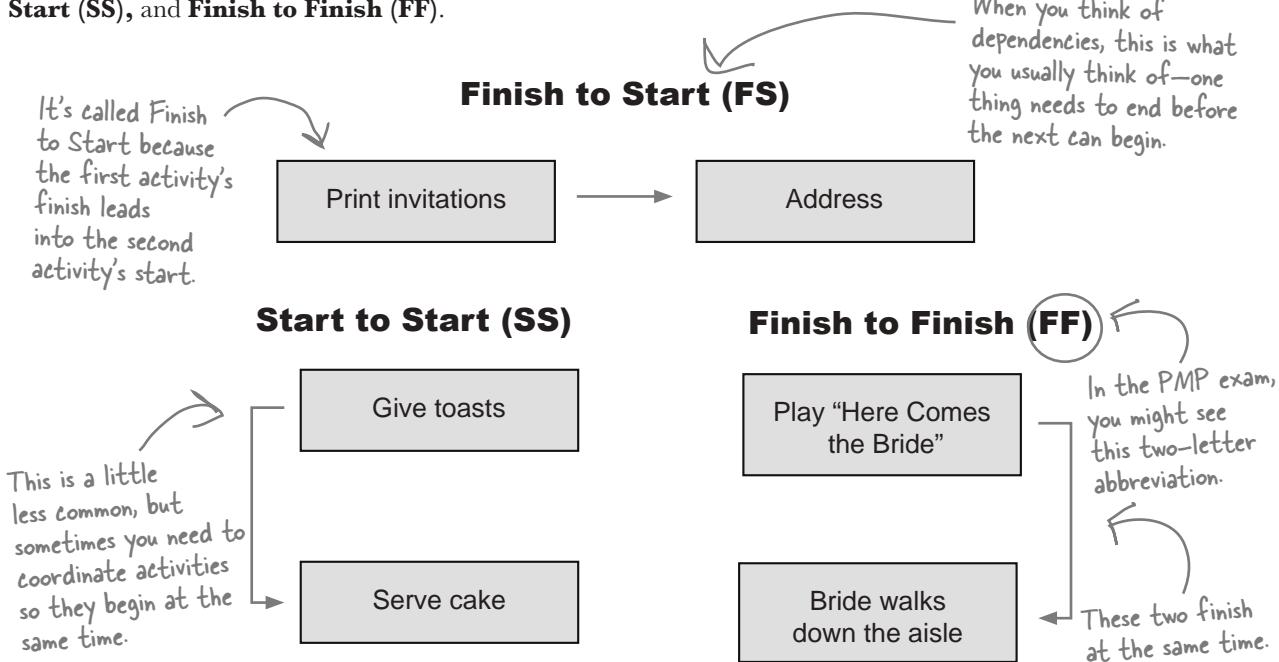
Now try another one!

Name	Predecessor
Start	—
1	Start
2	1
3	2
4	Start
5	3
6	Start
7	6
Finish	7, 4, 5

—————> Answers on page 322.

## Dependencies help you sequence your activities

The most common kind of predecessor is the Finish to Start. It means that one task needs to be completed before another one can start. There are a few other kinds of predecessors, though. They can all be used in network diagrams to show the order of activities. The three main kinds of dependency are **Finish to Start (FS)**, **Start to Start (SS)**, and **Finish to Finish (FF)**.



### External dependencies

Sometimes your project will depend on things outside the work you are doing. For the wedding, we are depending on the wedding party before us to be out of the reception hall in time for us to decorate. The decoration of the reception hall then depends on that as an external dependency.

### Discretionary dependencies

Rob and Rebecca really want the bridesmaids to arrive at the reception before the couple. There's no necessity there—it's just a matter of preference. For the exam, know that you should set discretionary dependencies based on your knowledge of the best practices for getting the job done.

### Mandatory dependencies

You can't address an invitation that hasn't been printed yet. So, printing invitations is a mandatory predecessor for addressing them. Mandatory predecessors are the kind that have to exist just because of the nature of the work.

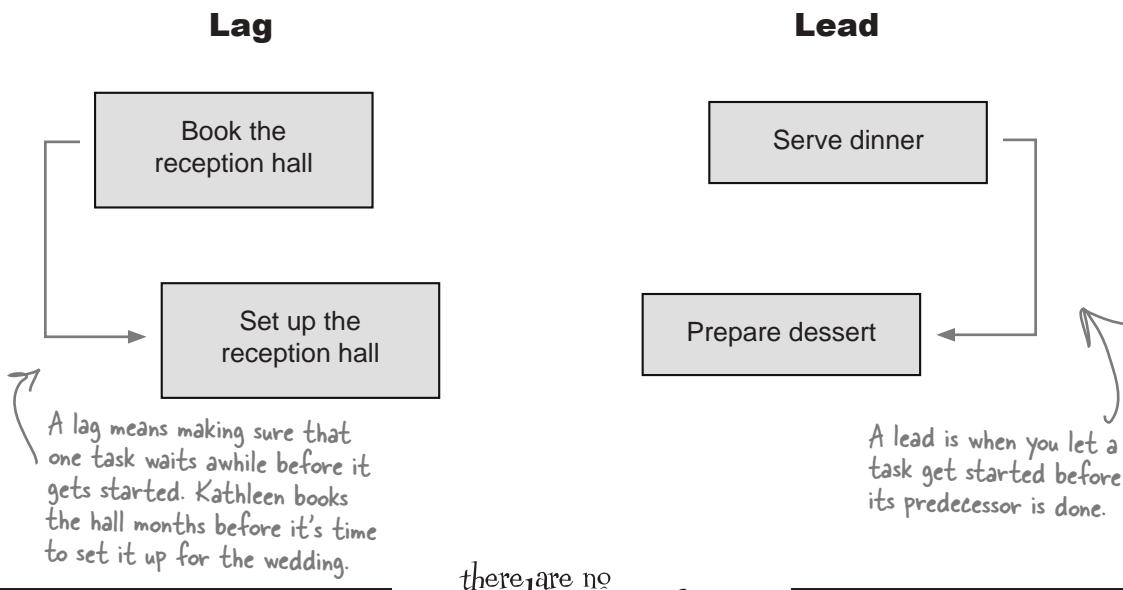
### Internal dependencies

The rehearsal dinner can't begin until the happy couple leaves the church. Some dependencies are completely within the team's control.

# Leads and lags add time between activities

Sometimes you need to give some extra time between activities. **Lag time** is when you purposefully put a delay between the predecessor task and the successor. For example, when the bride and her father dance, the guests wait awhile before they join them.

**Lead time** is when you give a successor task some time to get started before the predecessor finishes. So you might want the caterer preparing dessert an hour before everybody is eating dinner.



## there are no Dumb Questions

**Q:** Where do you get the dependency information to figure out your network diagram?

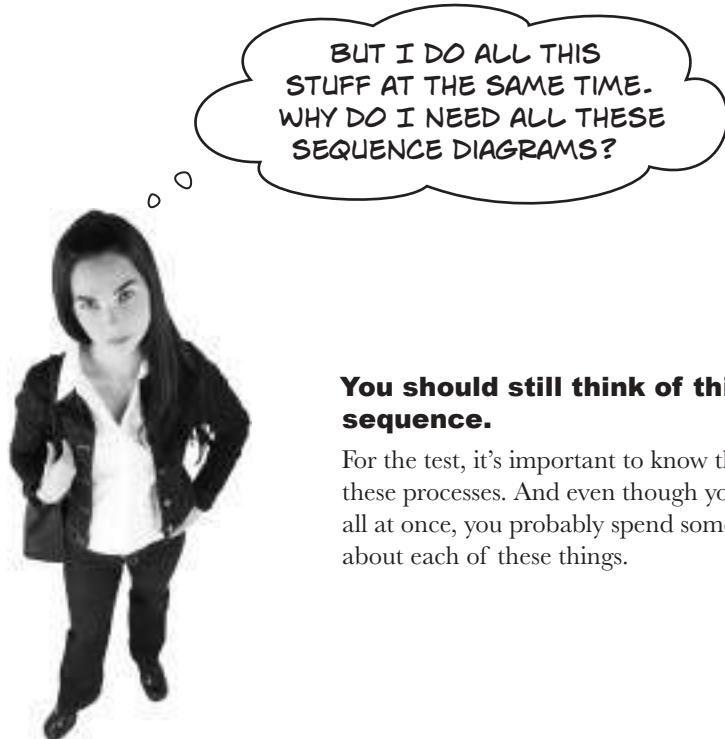
**A:** Your **activity attributes** should list the predecessors and successors for each activity. As you build the network diagram, you might discover new dependencies as well. Your project team will determine the dependencies necessary for each of the activities.

**Q:** What about Start to Finish dependencies?

**A:** It's possible for activities to require that a task has been started before it can finish. An example might be that singing couldn't start until after the music had started. But tasks like that are pretty rare and almost never show up in network diagrams.

**Q:** My scheduling software makes network diagrams for me. Why do I need to know this?

**A:** Most scheduling software does create one of these diagrams automatically. But spending the time to think through your dependencies and examine them visually can really help you find places where you might need to give some tasks more priority if you want to get your project done on time. So you should know how to make them too.



**You should still think of things in sequence.**

For the test, it's important to know the order of these processes. And even though you might do it all at once, you probably spend some time thinking about each of these things.



What's the advantage of thinking about Define Activities and Sequence Activities separately?

# Create the network diagram

As you sequence the activities, you will find new activities that need to be added and new attributes for activities that you didn't know about. So, while the main product of this process is the network diagram, you also produce updates to some of the Define Activities documents and outputs of other processes, too.

## Outputs



### Project schedule network diagram

Here's where you work out how all of the tasks fit together based on their predecessors and determine the critical path through the project.

For the test, you won't need to know exactly which documents change as an output to this process. All you need to know is that project document updates are an output.



### Project document updates

When you've sequenced your activities, you might find that some of the documents you've created as part of other processes need to be updated. The *PMBOK Guide* calls documents like these "project document updates." The pictures to the right are some examples, but there could be other documents that require updates as well.



### Activity attributes updates



### Risk Register Updates



### Activity list updates

Sometimes sequencing will show that two tasks rely on each other. If you find new predecessors or successors, their attributes will need to be changed.

When you sequence your activities, you can find activities that carry a lot of risk to the project. Any risks you find in the process need to be added to your risk register. You'll read more about that in Chapter 11.

If you find a new activity while sequencing, updates need to be made to the activity list.

## Rob and Rebecca have resource problems

Getting a handle on all of the tasks that have to be done is a great start. But it's not enough to know the tasks and the order they come in. Before you can put a schedule together, you need to know who is going to do each job, and the things they need available to them in order to do it! Those are **resources**, and getting a handle on them is a very important part of Time Management.



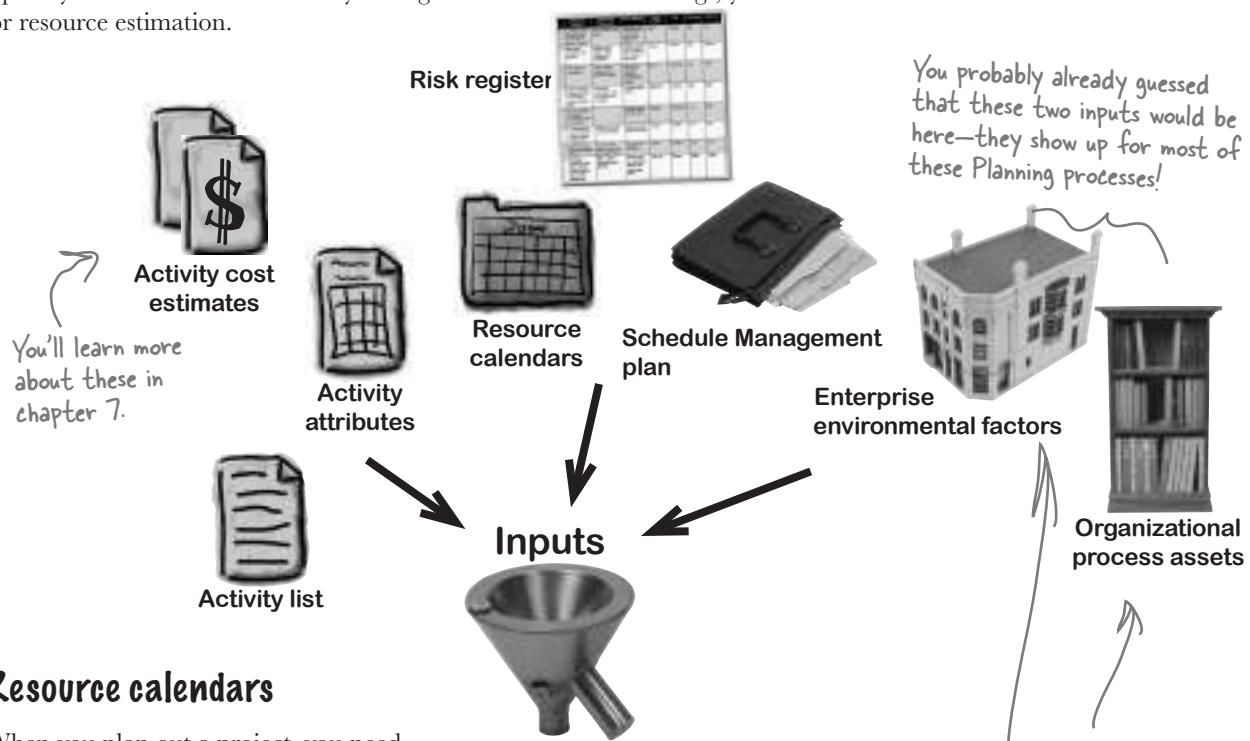
Resources are people, equipment, locations, or anything else that you need in order to do all of the activities that you planned for. Every activity in your activity list needs to have resources assigned to it.



What do you need to know about a project before you can assign resources?

# What you need to estimate resources

Good news: you've already seen most of the inputs to the **Estimate Activity Resources process** already! Before you can assign resources to your project, you need to know which ones you're authorized to use on your project. That's an input, and it's called **resource calendars**. You'll also need the activity list that you created earlier, and you'll need to know about how your organization typically handles resources. Once you've got a handle on these things, you're set for resource estimation.



## Resource calendars

When you plan out a project, you need information about what resources you can use for various activities, and when they're available to you. That's what **resource calendars** are for. Don't forget that some resources, like consultants or training rooms, have to be scheduled in advance, and they might only be available at certain times. You'll need to know this before you can finish planning your project.

**Resource calendars are the only new input to the Estimate Activity Resources process. You've already seen the rest of the inputs.**

# Estimating the resources

The goal of **Estimate Activity Resources** is to assign resources to each activity in the activity list. There are **five tools and techniques** for the Estimate Activity Resources process. Some of them have technical-sounding names, but they're all actually pretty sensible when you think about it. They should all make sense to you when you think about what you have to do to figure out what resources your project needs.



**Expert judgment** means bringing in experts who have done this sort of work before and getting their opinions on what resources are needed.

**Alternative analysis** means considering several different options for how you assign resources. This includes varying the number of resources as well as the kind of resources you use.

**Published estimating data** is something that project managers in a lot of industries use to help them figure out how many resources they need. They rely on articles, books, journals, and periodicals that collect, analyze, and publish data from other people's projects.

**Project management software**

like Microsoft Project will often have features designed to help project managers play around with resources and constraints and find the best combination of assignments for the project.

**Bottom-up estimating** is a technique that you may have used before without even knowing it! It means breaking down complex activities into pieces, and working out the resource assignments for each of those simpler pieces using the other four tools and techniques.

---

*there are no*  
**Dumb Questions**

---

**Q:** In my company, I'm given my resources—I don't get to assign them myself. How do these tools help me?

**A:** When you work in a functional organization or some matrix organizations, you don't have as much freedom in selecting resources as you do in a projectized organization. But that doesn't mean these tools aren't important! Whoever is doing the resource selection and assignment should be using them. And they'll be on the PMP exam, so you need to understand them all.

**Q:** Is choosing a consultant, contractor, or vendor to do project work part of resource estimation?

**A:** When you're working with a resource outside your company, like a contractor or consultant, you consider that resource the same way you consider any other resource. But actually negotiating the contract and selecting the vendor is not part of the Estimate Activity Resources process. There's a whole other knowledge area for that—Procurement Management.

**Q:** What if I need a resource that isn't available when my project needs it?

**A:** This is one of the reasons that project management is a tough job! When you need a resource that isn't available, you need to negotiate for it. Think about it...your project depends on getting this resource, and without it your project won't get done. You need it, or you'll face delays! You have to do whatever you can to get that resource for your project.



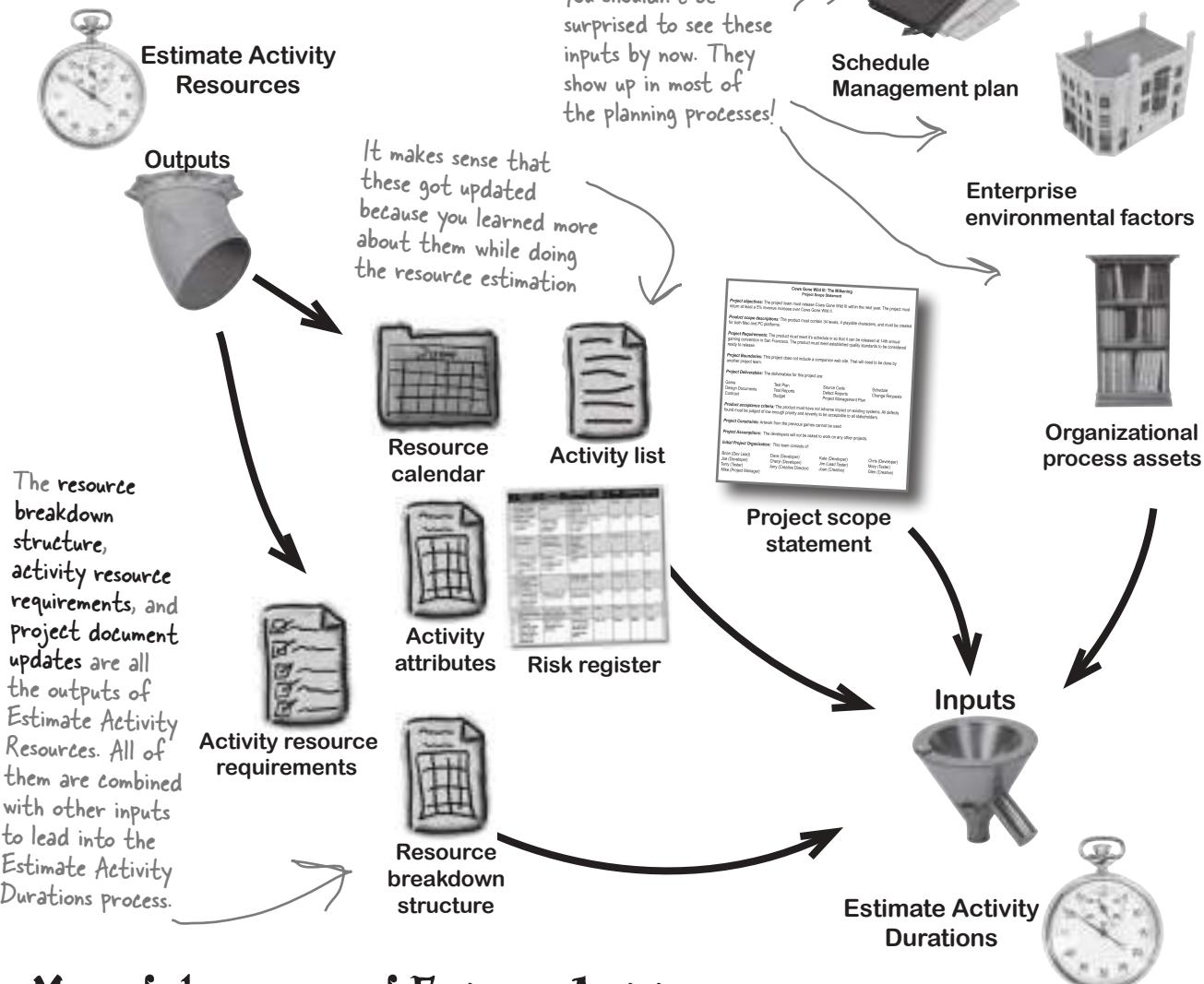
You'll need to understand the different Estimate Activity Resources tools and techniques for the exam. Look at each of these scenarios and write down which of the five activity resource estimation tools and techniques is being used.

1. Kathleen has to figure out what to do for the music at Rob and Rebecca's wedding. She considers using a DJ, a rock band, or a string quartet.
2. The latest issue of *Wedding Planner's Journal* has an article on working with caterers. It includes a table that shows how many waiters work with various guest-list sizes.
3. There's a national wedding consultant who specializes in Caribbean-themed weddings. Kathleen gets in touch with her to ask about menu options.
4. Kathleen downloads and fills out a specialized spreadsheet that a project manager developed to help with wedding planning.
5. There's so much work that has to be done to set up the reception hall that Kathleen has to break it down into five different activities in order to assign jobs.
6. Kathleen asks Rob and Rebecca to visit several different caterers and sample various potential items for the menu.
7. Kathleen calls up her friend who knows specifics of the various venues in their area for advice on which one would work best.

→ Answers on page 319.

# Figuring out how long the project will take

Once you're done with Estimate Activity Resources, you've got everything you need to figure out how long each activity will take. That's done in a process called **Estimate Activity Durations**. This is where you look at each activity in the activity list, consider the scope and the resources, and estimate how long it will take to perform.



Most of the outputs of Estimate Activity Resources are immediately used as inputs for Estimate Activity Durations.



You'll need to understand the various inputs and outputs for each process for the exam. Here's a list of some of the inputs for Estimate Activity Durations. Write down what you think each of them will be used for when you actually sit down and estimate how long each activity will take.

1. Activity list and activity attributes

2. Activity resource requirements

3. Resource calendar

4. Project scope statement

5. Enterprise environmental factors

6. Organizational process assets



You'll need to understand the various inputs and outputs for each process for the exam. Here's a list of some of the inputs for Estimate Activity Durations. Write down what you think each of them will be used for when you actually sit down and estimate how long each activity will take.

1. Activity list and activity attributes

**Contains information about the activities that are being estimated**

You need these because the goal of this process is to estimate the duration of each activity.

2. Activity resource requirements

The more resources you add to an activity, the less time it takes.

But sometimes adding people won't get the job done any faster! Remember, nine women can't have a baby in one month.

**Shows which resources are assigned to each activity**

3. Resource calendar

You need to know when the resources are available, because that's going to impact the final estimate for the activity.

**Shows the availability, capabilities, and skills of each human resource, or the quantity and availability of equipment and other resources**

4. Project scope statement

**Lists constraints and assumptions for each activity**

You're probably not the first person in your company to do this sort of project. Information from people around you will be very valuable when you're creating estimates.

5. Enterprise environmental factors

**Other people or databases in my company can help with estimation**

This input is always about looking elsewhere in your organization for information.

6. Organizational process assets

**Contains historical information and records from past projects**

Any time you see this, think about historical information and project records!

The more you know about how past projects went, the more accurate your estimates will be.

# Estimation tools and techniques

Estimating the duration of an activity means starting with the information you have about that activity and the resources that are assigned to it, and then working with the project team to come up with an estimate. Most of the time you'll start with a rough estimate and then refine it (maybe a few times!) to make it more accurate. You'll use these five tools and techniques to create the most accurate estimates.



**Expert judgment** will come from your project team members who are familiar with the work that has to be done. If you don't get their opinion, then there's a huge risk that your estimates will be wrong!

**Parametric estimating** means plugging data about your project into a formula, spreadsheet, database, or computer program that comes up with an estimate. The software or formula that you use for parametric estimating is built on a database of actual durations from past projects.

**Reserve analysis** means adding extra time to the schedule (called a *contingency reserve* or a *buffer*) to account for extra risk.

**Analogous estimating** is when you look at activities from previous projects that were similar to this one and look at how long it took to do similar work before. But this only works if the activities and the project team are similar!

**Three-point estimates** are when you come up with three numbers: a **most likely** estimate that probably will happen, an **optimistic** one that represents the best-case scenario, and a **pessimistic** one that represents the worst-case scenario. The final estimate is the average.

**Group decision techniques** help the team decide on the best estimates for the activities they've defined.



Each of these scenarios describes a different tool or technique from Estimate Activity Durations. Write down which tool or technique is being described.

1. Kathleen comes up with three estimates (one where everything goes wrong, one where some things go wrong, and one where nothing goes wrong) for printing invitations, and averages them together to come up with a final number. ....
2. There will be two different catering companies at the wedding. Kathleen asks the head chef at each of them to give her an estimate of how long it will take to do the job. ....
3. There's a spreadsheet Kathleen always uses to figure out how long it takes guests to RSVP. She enters the number of guests and their ZIP codes, and it calculates an estimate for her. ....
4. Kathleen's done four weddings that are very similar to Rob and Rebecca's, and in all four of them it took exactly the same amount of time for the caterers to set up the reception hall. ....

Answers on page 319.



## Three-Point Estimates Up Close



**PERT (Program Evaluation Review Technique)** is the most common form of three-point estimation. It's a technique that was developed in the 1960s by consulting firms working with the U.S. government as a way of getting more accurate project duration predictions up front. To do a PERT estimate, you start with three estimates—pessimistic, most likely, and optimistic estimates. Since the pessimistic and optimistic estimates are less likely to happen than the normal estimate, the normal estimate is weighted (multiplied by 4) and added to the optimistic and pessimistic estimates, and then the whole thing is divided by 6 to give an expected duration. The formula looks like this:

$$(\text{Optimistic duration} + 4 \text{ Most likely duration} + \text{Pessimistic duration}) \div 6 = \text{Expected duration}$$

Kathleen used a PERT estimate for all of the wedding planning activities to make sure that she could get it all done in time for Rob and Rebecca's big day. They only have six months until the wedding, so all of the planning needs to be done within the month to leave enough time to actually get everything done. She wrote down the **assumptions** she made for each estimate, coming up with all of the reasons she could think of that she took into account when coming up with her estimates.

When Kathleen assumed the best-case scenario, these assumptions led her to her 9 day estimate.

$$(9 + 4(15) + 30) \div 6 = 16.5$$

An assumption is a decision that you make to account for things you don't know when you make an estimate.

Optimistic = 9 days	Most likely = 15 days	Pessimistic = 30 days
All guests RSVP early.	Half of the guests won't RSVP until the very last week; a few won't RSVP at all but will still show up.	Nobody RSVPs and many bring guests unannounced.
The couple settles on the first venue they visit.	They'll visit four or five and spend weeks negotiating with venue operators.	They'll comb the neighborhood and visit every possible place for weeks.
The printer can get the invitations done in two weeks.	They'll want to talk to a few printers and most of them will ask for at least a month.	All the printers will be booked, so we'll have to use somebody from out of town and it'll take six work weeks (30 business days).



Here are some examples of three-point estimates. Use the formula to figure out the expected time for each of these.

1. A software team gathered estimates for all of the work they'd have to do to build the next major release of their flagship product. Last time it took them around 45 days, but they're hoping that the lessons learned from the past release could bring the time down to 30 days. However, the infrastructure team needs to upgrade their servers, and they are concerned that procurement delays could potentially extend the project out to 90 days.

Expected duration = \_\_\_\_\_      Optimistic duration = \_\_\_\_\_      Most Likely duration = \_\_\_\_\_  
 Pessimistic duration = \_\_\_\_\_

2. A construction team gathered estimates for all of the work they'd have to do to build a garage. In general, they can build a garage in 20 days, but rain or cooler temperatures could stretch the project out to 30 days. If, however, the forecast is correct, warm, sunny weather might bring the duration down to just 12 days.

Expected duration = \_\_\_\_\_      Optimistic duration = \_\_\_\_\_      Most Likely duration = \_\_\_\_\_  
 Pessimistic duration = \_\_\_\_\_

3. A project manager used data from past projects to come up with an estimate for an upcoming software system replacement project. She felt confident about a 25-day duration, but also noted that adding an extra resource could bring the schedule down to 10 days. The test team felt that the complexity of some completely new features would add additional test cases, adding a few weeks for a 40-day estimate.

Expected duration = \_\_\_\_\_      Optimistic duration = \_\_\_\_\_      Most Likely duration = \_\_\_\_\_  
 Pessimistic duration = \_\_\_\_\_

4. A project manager in charge of a big civil engineering project came up with an estimate for a highway re-paving project. The worst-case scenario was 82 days, but the team felt more certain based on past experience that they could get it done in 49 days. If all went well with their equipment and materials, it might be done in 33 days instead.

Expected duration = \_\_\_\_\_      Optimistic duration = \_\_\_\_\_      Most Likely duration = \_\_\_\_\_  
 Pessimistic duration = \_\_\_\_\_

Answers on page 318.

## Create the duration estimate

You've got a list of activities, you know what resources are needed to actually do each activity, and you've got your estimation tools and techniques...now you have enough to create the estimates! That's the whole point of the **Estimate Activity Durations** process, and it's also the main output.

You don't always know exactly how long an activity will take, so you might end up using a range (like 3 weeks +/- 2 days).

### Outputs



The **activity duration estimates** are estimates of how long each activity in the activity list will take. The estimate can be in hours, days, weeks...any work period is fine, and you'll use different work periods for different jobs. A small job (like booking a DJ) may just take a few hours; a bigger job (like catering—including deciding on a menu, ordering ingredients, cooking food, and serving guests on the big day) could take days.

You'll also learn more about the specific activities while you're estimating them. That's something that always happens—you have to really think through all of the aspects of a task in order to estimate it. So the other output of Estimate Activity Durations is **updates to the project documents**.

You may have guessed from the name that the activity duration estimates are always **duration estimates**, not effort estimates, so they show you calendar time and not just person-hours.



Activity duration estimates



Project document updates

**The activity duration estimate consists of estimates for each activity. It's the main output of the Estimate Activity Durations process.**

### there are no Dumb Questions

**Q:** When you use parametric estimation, how does the program or formula know how much to estimate?

**A:** When people design a system for parametric estimation, they collect a lot of data from past projects and condense it into a table or a database. And then they come up with a **heuristic** (like a rule of thumb) that lets you boil your estimation down into just a few parameters that you need to enter. Most successful parametric estimation systems need a lot of time to develop.

**Q:** Since reserve analysis lets me use buffers, why can't I just put everything I don't know about into the reserve?

**A:** The idea behind reserve analysis is that there are always unknowns on any project, but you can account for these unknowns by taking your best guess at what's going to go wrong and inserting a buffer. But you can't just make an enormous reserve, because then there's no reason to ever do any estimation! The entire project becomes one big unknown, and that's not particularly useful to anyone.

**Q:** Wait a minute! I don't quite get the difference between a duration estimate and an effort estimate. Can you explain?

**A:** Duration is the amount of time that an activity takes, while effort is the total number of person-hours expended. If it takes two people six hours to carve the ice sculpture for the centerpiece of a wedding, the duration is six hours. But since 2 people worked on it for the whole time, it took 12 person-hours of effort to create!

## Back to the wedding

Kathleen's really got a handle on how long things are going to take, but that's not enough to get the job done. She's still got some work to do before she's got the whole project under control.

**Rob and Rebecca know where they want to get married, and they've got the place booked now.**



**But what about the caterer? They have no idea who's going to be providing the food.**



**And what about the band that they want? Will the timing with their schedule work out?**



IF THE CATERERS COME TOO EARLY, THE FOOD WILL SIT AROUND UNDER HEAT LAMPS! BUT TOO LATE, AND THE BAND WON'T HAVE TIME TO PLAY. I JUST DON'T SEE HOW WE'LL EVER WORK THIS ALL OUT.

O O



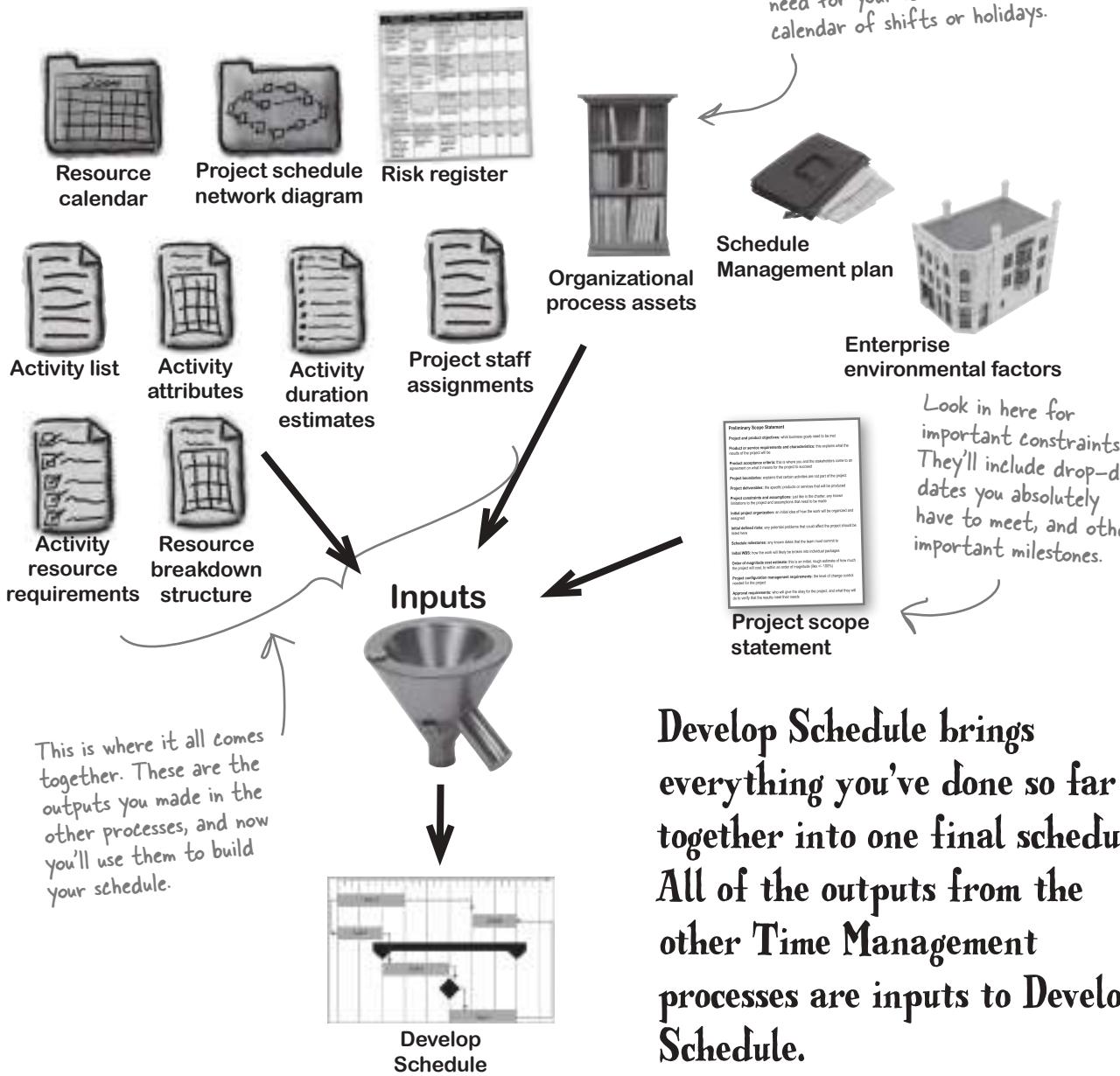
It's not easy to plan for a lot of resources when they have tight time restrictions and overlapping constraints. How would you figure out a schedule that makes everything fit together?

# Bringing it all together

The **Develop Schedule process** is the core of Time Management. It's the process where you put it all together—where you take everything you've done so far and combine it into one final schedule for the whole project. A lot of project managers consider this the most important part of their job. The schedule is your most important tool for managing a project.



There are some assets that you'll need for your schedule, like a calendar of shifts or holidays.



**Develop Schedule brings everything you've done so far together into one final schedule. All of the outputs from the other Time Management processes are inputs to Develop Schedule.**



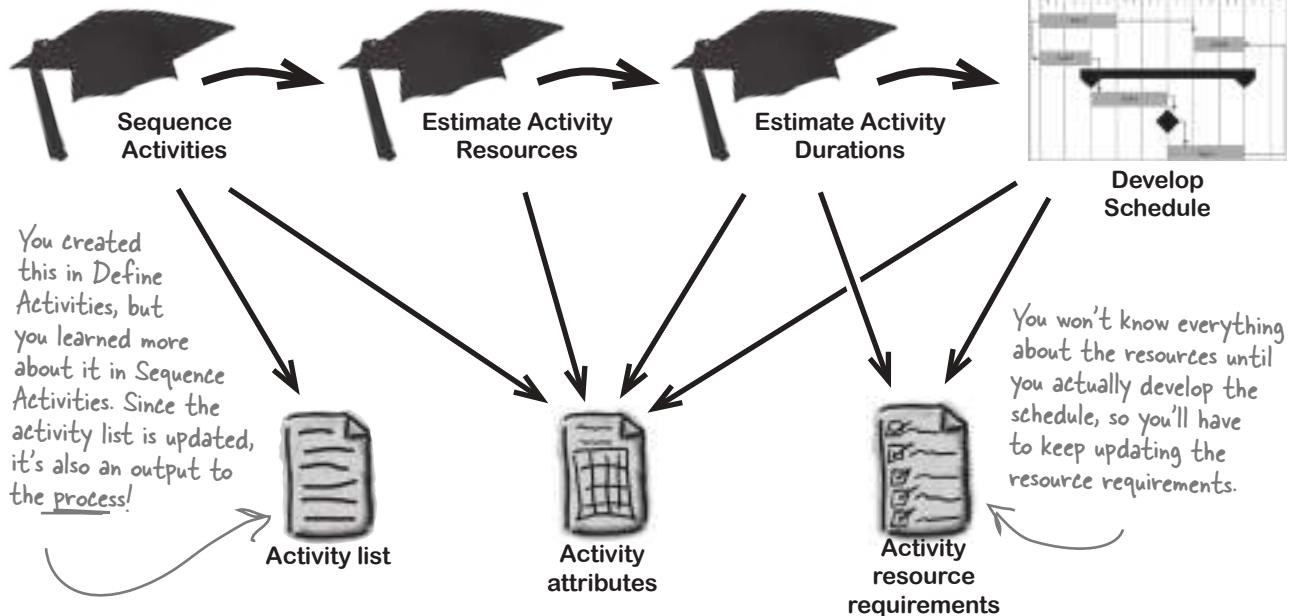
HOLD ON! I DON'T REALLY WORK LIKE THAT ALL THE TIME WHEN I'M MANAGING PROJECTS! I FIGURE SOME THINGS OUT, THEN GO BACK AND MAKE CHANGES. LIKE WHAT IF I'M WORKING ON THE SCHEDULE AND I REALIZE I NEED TO CHANGE MY RESOURCES? THIS SAYS I SHOULD HAVE FIGURED THAT ALL OUT BY NOW, RIGHT?

**Don't worry, even though you're done with the Estimate Activity Resources process, you're not done with the resources.**

You're never going to have the complete resource picture until you're done building the schedule. And the same goes for your activity list and duration estimates, too! It's only when you lay out the schedule that you'll figure out that some of your activities and durations didn't quite work.

You're not done with activity attributes yet. When you estimate resources, you'll learn more about some activities and update their attributes.

That's why the processes have the word "Estimating" in their names! Because you're taking an educated guess, but you won't know for sure until you've actually developed the schedule.



# Question Clinic: The "which-comes-next" question



IF YOU WANT TO PASS THE PMP EXAM, YOU'LL NEED TO HAVE A GOOD FEEL FOR THE ORDER THAT THE PROCESSES ARE PERFORMED IN, BECAUSE YOU'LL BE ASKED A LOT OF "WHICH-COMES-NEXT" QUESTIONS! THESE ARE QUESTIONS THAT QUIZ YOU ON HOW THE PROCESSES FIT TOGETHER INTO ONE BIG FRAMEWORK. THESE QUESTIONS AREN'T HARD, BUT THEY CAN BE A LITTLE MISLEADING.

Hold on—this question doesn't look like it's asking about the order of the processes! But a lot of which-comes-next questions describe a situation and ask you what you'd do.

Don't be thrown if the question asks about an industry you don't know much about. All projects follow the same processes.

In other words, you've used decomposition and created an activity list. These are part of the Define Activities process.

27. You're the project manager for a highway construction project. You've analyzed the work that has to be done and come up with a list of activities. You consulted with the project sponsor in order to find out any important milestones that you need to meet. What's the next thing that you do?

- A. Create the project schedule.
- B. Perform the Define Activities process.
- C. Consult your Project Management plan to figure out how to handle any schedule changes.
- D. Figure out the dependencies between activities and create a diagram of the activity network.

The Develop Schedule process needs more than an activity list and resource availability.

You only do this during Control Schedule, but since there's no schedule yet, there's nothing to control.

The milestone list is an input that you've seen before.

The question described the Define Activities process, so you've already performed it.

This answer describes Sequence Activities, which happens after Define Activities and takes the activity list and milestone list as inputs. That's the right answer.

Did you notice the question said "diagram of the activity network" and not "project network diagram"? The exam might not use the exact same phrasing as the PMBOK Guide. That's why you're learning how these things are used, not just memorizing their names.

THE WHICH-COMES-NEXT QUESTION DOESN'T ALWAYS LOOK LIKE IT'S ASKING ABOUT THE ORDER OF THE PROCESSES! KEEP AN EYE OUT FOR QUESTIONS THAT DESCRIBE INPUTS, OUTPUTS, TOOLS, OR TECHNIQUES AND ASK YOU WHAT YOU'RE SUPPOSED TO DO NEXT.



# HEAD LIBS

Fill in the blanks to come up with your own “which-comes-next” question! Start by thinking of a process to be the correct answer, and then figure out which process came right before it—that’s the one you’ll describe in the question!

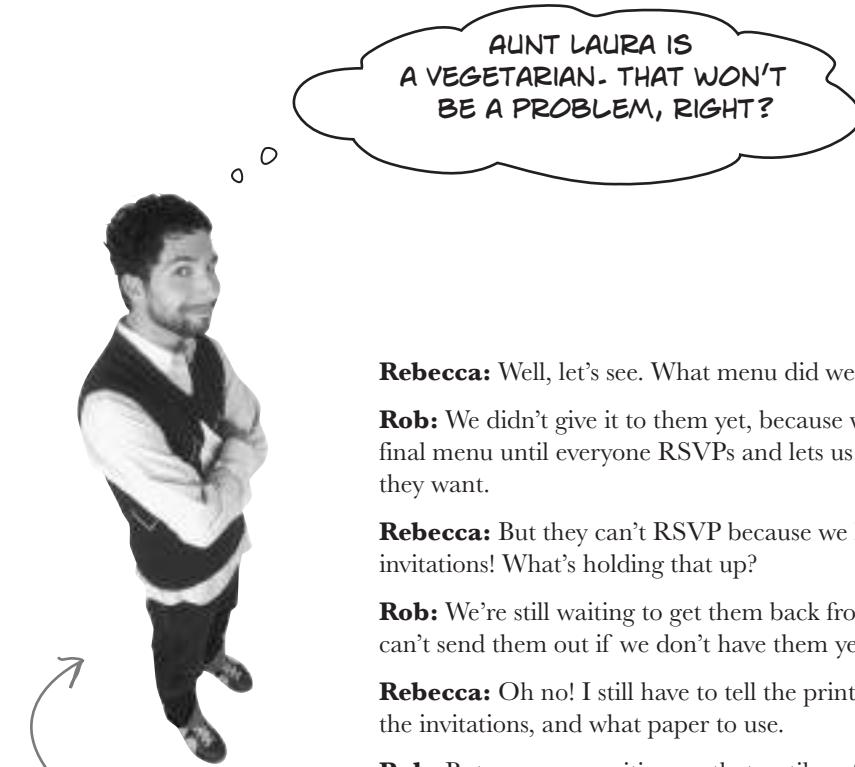
You are managing a \_\_\_\_\_ . You’ve finished creating the  
(an industry or the name of a project) \_\_\_\_\_ , you’ve come up with \_\_\_\_\_  
(an output from the previous process) , and you’ve just finished \_\_\_\_\_ . What’s the next thing you do?  
(a tool or technique from the previous process)

- A. \_\_\_\_\_  
(the correct answer—a brief description of what happens during the process)
- B. \_\_\_\_\_  
(a description of a different process)
- C. \_\_\_\_\_  
(the name of a tool or technique that’s part of a totally different process)
- D. \_\_\_\_\_  
(the name of an irrelevant process)



Join the Head First PMP community at <http://www.headfirstlabs.com/PMP>  
You can add your Head Libs answer, and see what Head Libs other project managers  
came up with!

## One thing leads to another



AUNT LAURA IS  
A VEGETARIAN. THAT WON'T  
BE A PROBLEM, RIGHT?

Rob thought this was  
just a little problem...

**Rebecca:** Well, let's see. What menu did we give to the caterers?

**Rob:** We didn't give it to them yet, because we won't have the final menu until everyone RSVPs and lets us know which entrée they want.

**Rebecca:** But they can't RSVP because we haven't sent out the invitations! What's holding that up?

**Rob:** We're still waiting to get them back from the printer. We can't send them out if we don't have them yet!

**Rebecca:** Oh no! I still have to tell the printer what to print on the invitations, and what paper to use.

**Rob:** But you were waiting on that until we finished the guest list.

**Rebecca:** What a mess!

...but it turns out to be a lot bigger than either Rob or Rebecca realized at first! How'd a question about one guest's meal lead to such a huge mess?



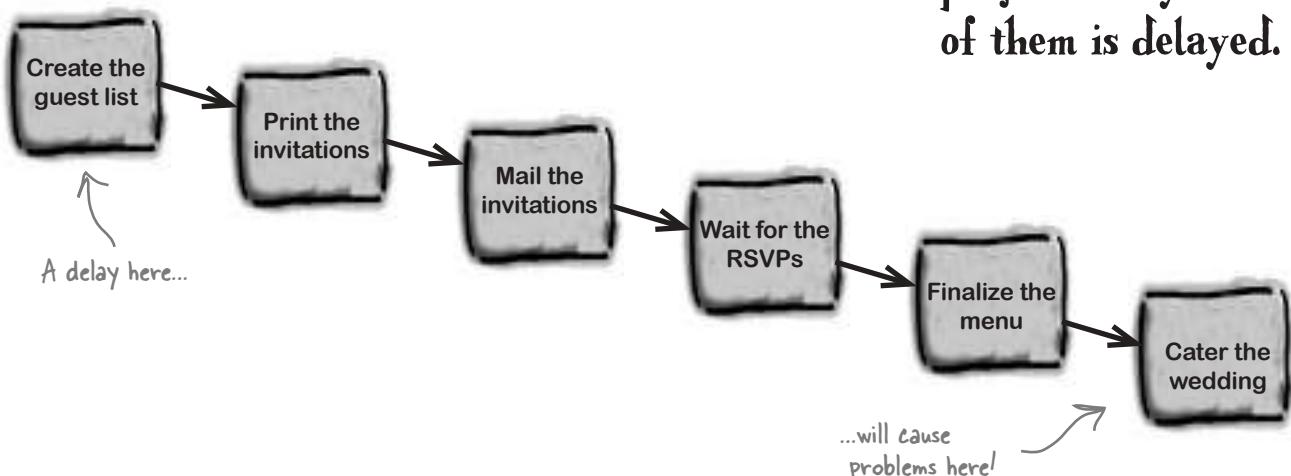
Can you think of a situation where a delay in an activity early on in a project can lead to a problem in a later activity, which leads to another problem in another activity, leading to a cascade of problems that makes the project late?

# Use the critical path method to avoid big problems

The **critical path method** is an important tool for keeping your projects on track. Every network diagram has something called the **critical path**. It's the string of activities that, if you add up all of the durations, is longer than any other path through the network. It usually starts with the first activity in the network and usually ends with the last one.

The reason that the critical path is, well, *critical*, is that every single activity on the path must finish on time in order for the project to come in on time. A *delay in any one of the critical path activities* will cause the **entire project to be delayed**.

**The critical path is the string of activities that will delay the whole project if any one of them is delayed.**



## How does knowing your critical path help?

Knowing where your critical path is can give you a lot of freedom. If you know an activity is *not* on the critical path, then you know a delay in that activity may not *necessarily* delay the project.

This can really help you handle emergency situations. Even better, it means that if you need to bring your project in earlier, you know that adding resources to the critical path will be much more effective than adding them elsewhere.

# How to find the critical path

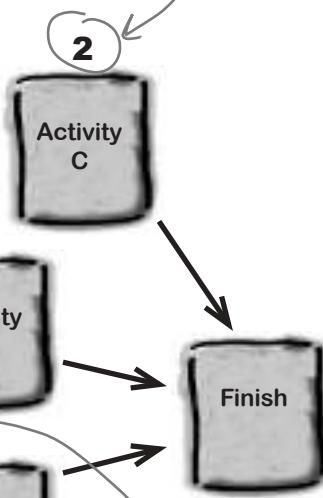
It's easy to find the critical path in any project! With a little practice, you'll get the hang of it. Of course, on a large project with dozens or hundreds of tasks, you'll probably use software like Microsoft Project to find the critical path for you. But when it does, it's following the same exact steps that you'll follow here.

You'll usually write the duration above each node in the diagram.

- Start with an activity network diagram.

Look for paths by starting here and moving to the right.

Each time you see a branch in the activity diagram, that means you've found another path!



Two branches means two additional paths.

- Find all of the paths in the diagram. A path is any string of activities that goes from the start of the project to the end.



- Find the duration of each path by adding up the durations of each of the activities on the path.

Start → → → **11**

Start → Activity A → Activity C → Finish =  $4 + 2 = 6$

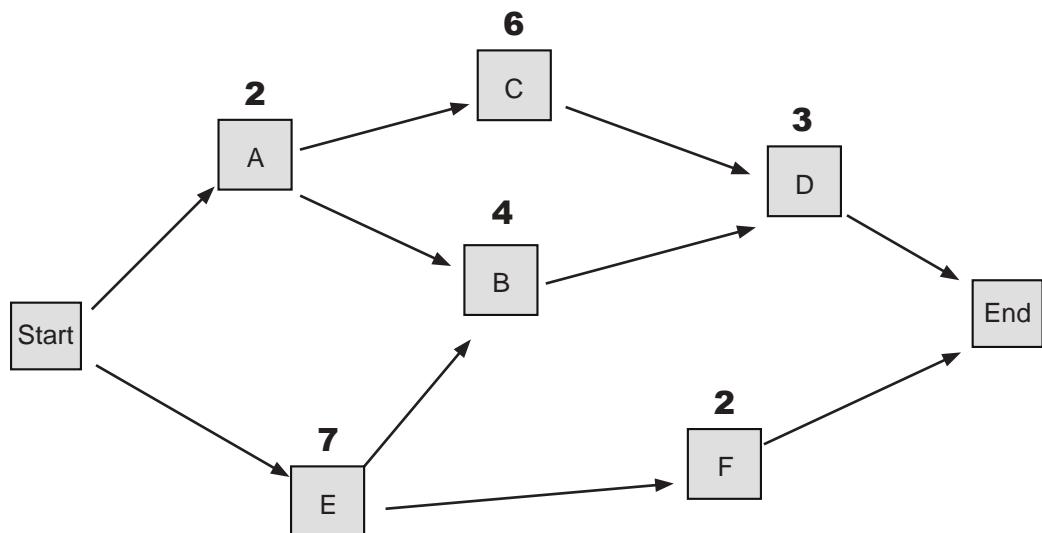
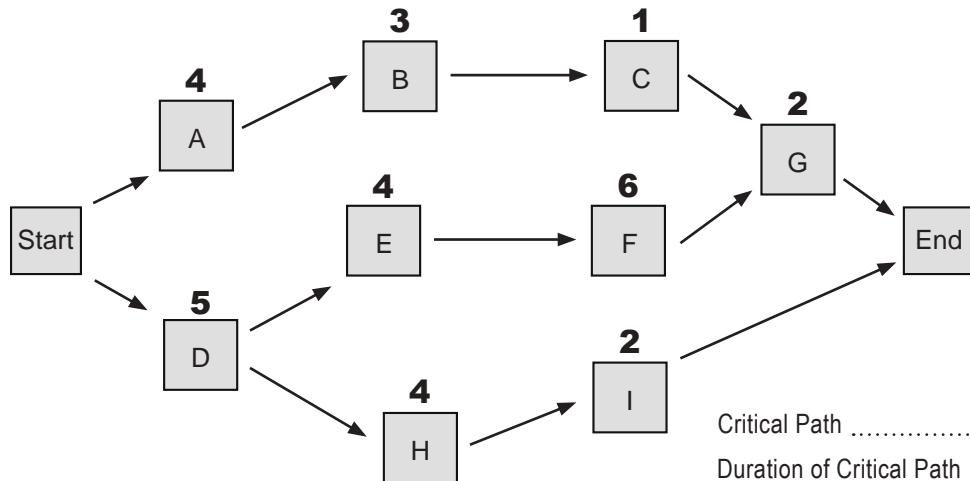
Start → Activity D → Finish =  $3 + 5 = 8$

This path has a duration of 11, which is longer than the other two (6 and 8). So it's the critical path!

**The critical path is the one with the longest duration!**



You may get questions on the exam asking you to identify the critical path in a network diagram. Here's some practice for doing that! Find the critical path and duration for this PDM.



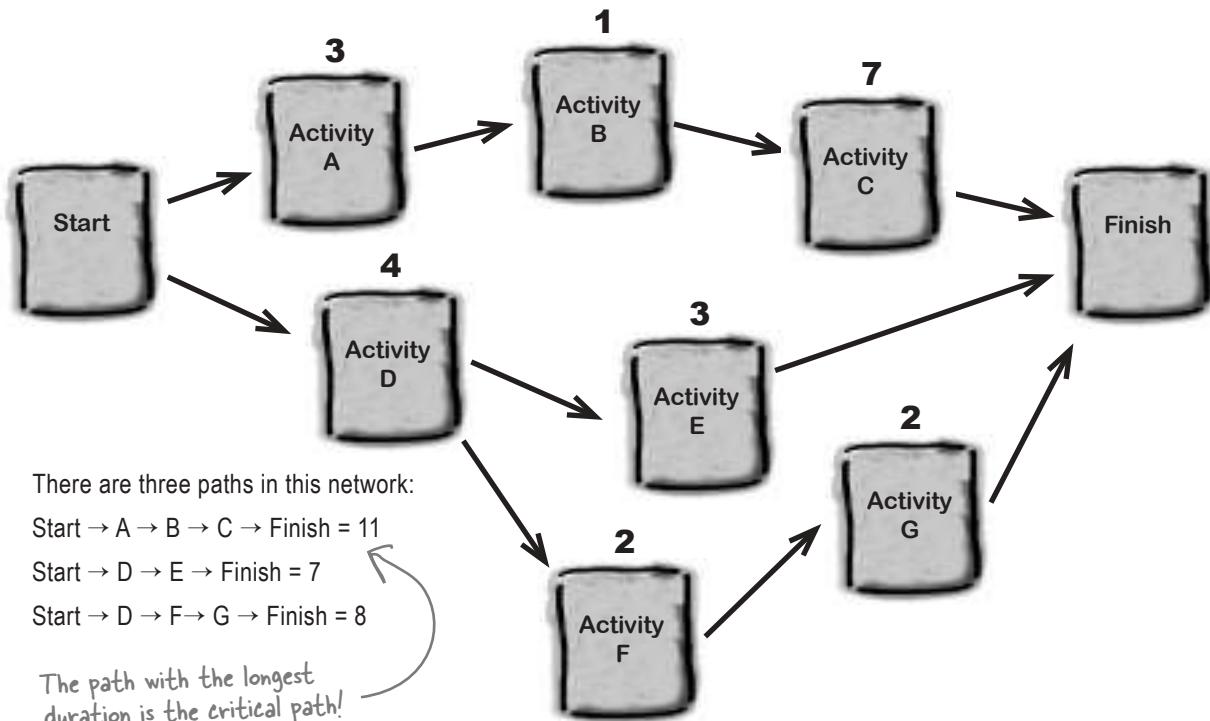
→ Answers on page 320.

# Finding the float for any activity

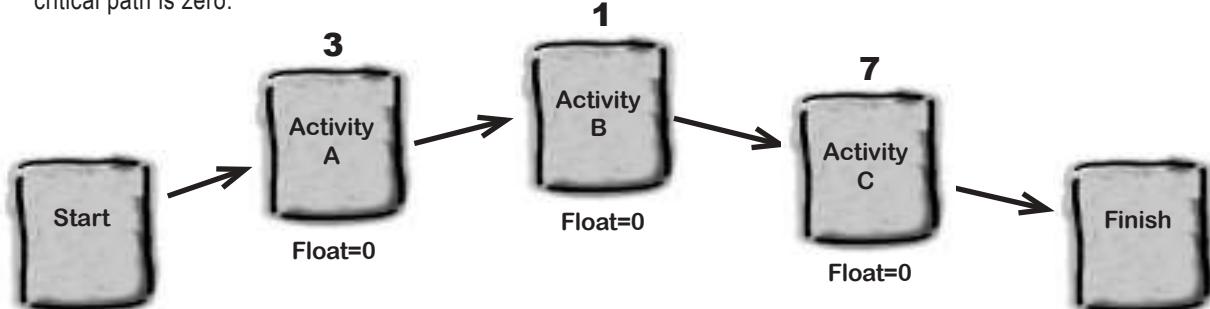
Once you've figured out the critical path, there's all sorts of useful stuff you can do with it. One of the most useful things you can do is calculate the **float**. The float for any activity is the amount of time that it can slip before it causes your project to be delayed. You might also see the word *slack*—it's the same thing.

Luckily, it's not hard to figure out the float for any activity in a network diagram. First you write down the list of all of the paths in the diagram, and you identify the critical path. The float for every activity in the critical path is zero.

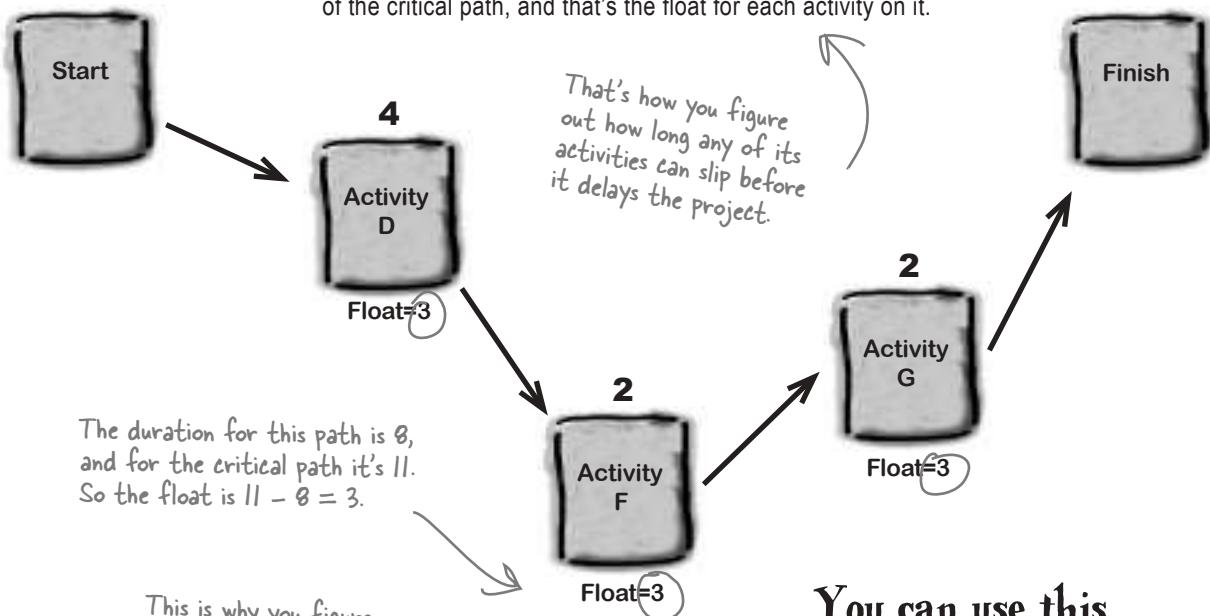
The goal is to find the float for each activity. We're not really concerned with finding a total float for each path—we're looking at the activities independently.



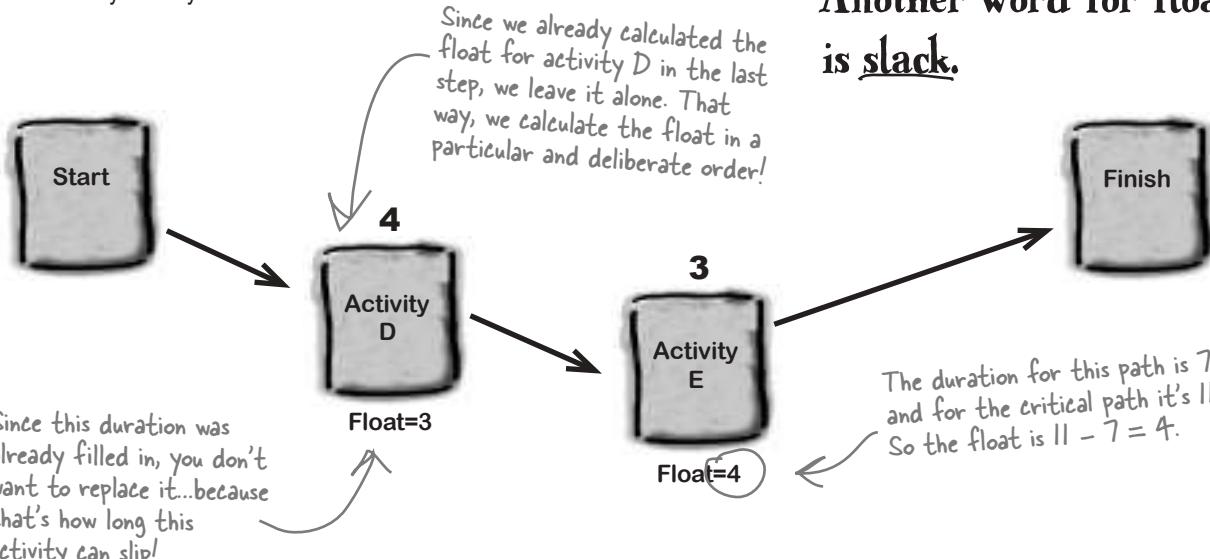
- 2** The float for each of the activities on the critical path is zero.



- ③ Find the next longest path. Subtract its duration from the duration of the critical path, and that's the float for each activity on it.



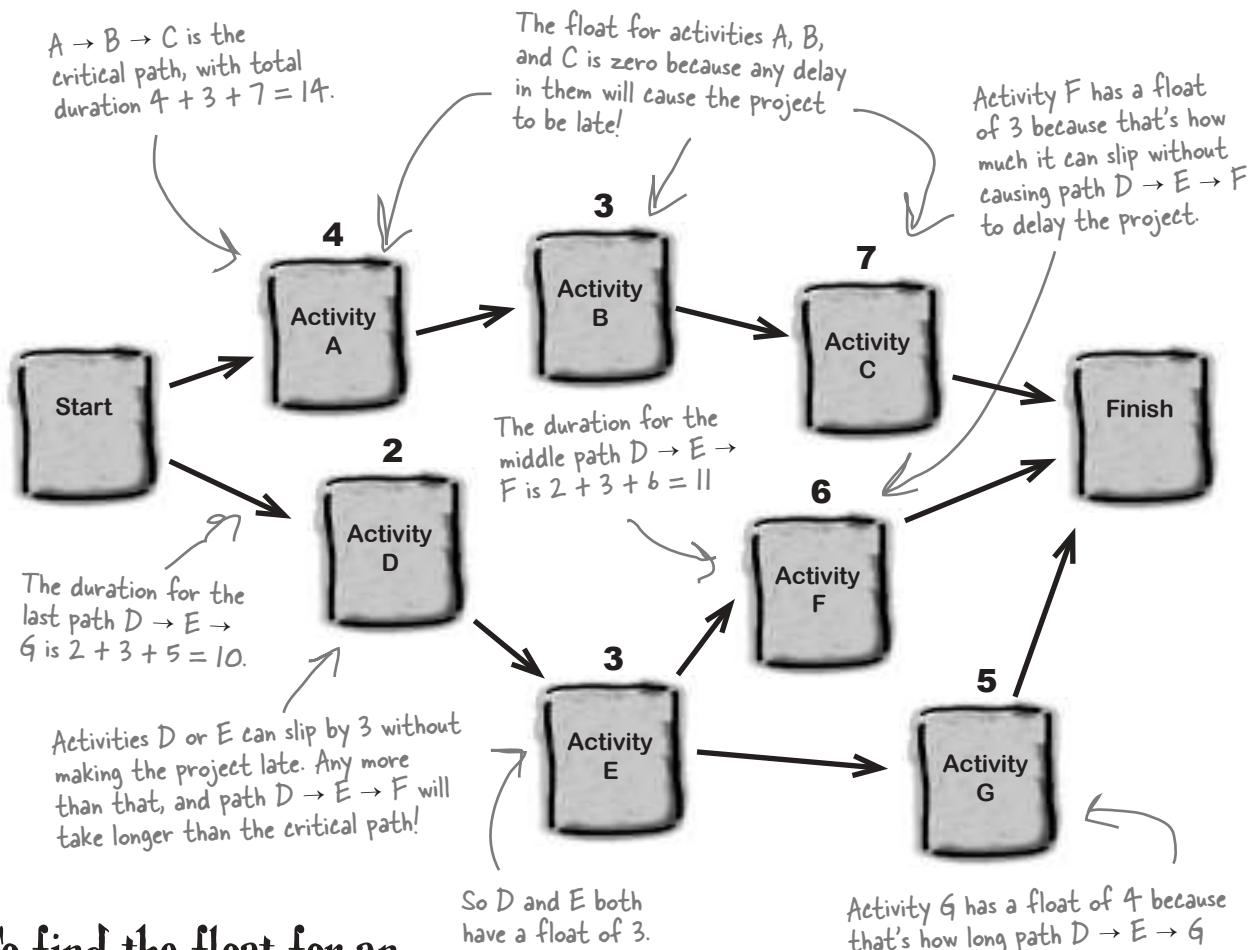
- ④ Do the same for the next longest path, and so on through the rest of the network diagram. Pretty soon, you'll fill in the float for every activity!



You can use this method to find the float for every activity in a network diagram. Another word for float is slack.

## Float tells you how much extra time you have

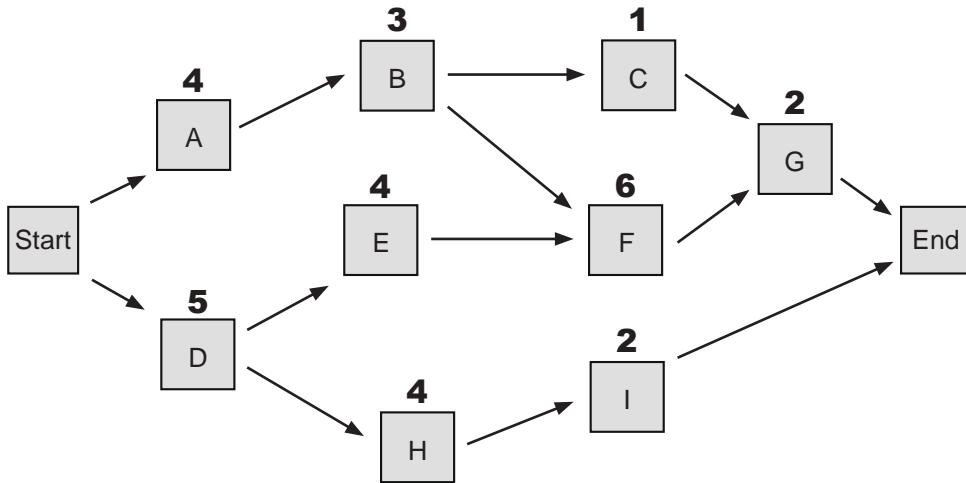
Once you know the float, you know how much play you have in your schedule. If an activity has a float of 2 days, it can slip by that much without affecting the end date.



To find the float for an activity, figure out how much it can slip before it makes the project late. The float for any activity on the critical path is ZERO!



You'll need to be able to calculate the float of an activity in a network diagram for the exam. Take another look at this PDM from the last exercise. Can you calculate the float for each activity?



1. What is the float for each activity on the critical path? .....

2. What is the total duration for path A → B → C → G? .....

3. What is the total duration for path A → B → F → G? .....

4. What is the total duration for path D → E → F → G? .....

5. What is the total duration for path D → H → I? .....

6. Which path is the critical path? ..... → ..... → ..... → .....

7. Write down the float for each activity:

A ..... B ..... C ..... D ..... E .....

F ..... G ..... H ..... I .....

Hint: First fill in the float for the critical path activities. Then move on to the next-longest path, and then the next-longest one, filling in any float that hasn't been filled in yet.

→ Answers on page 321.

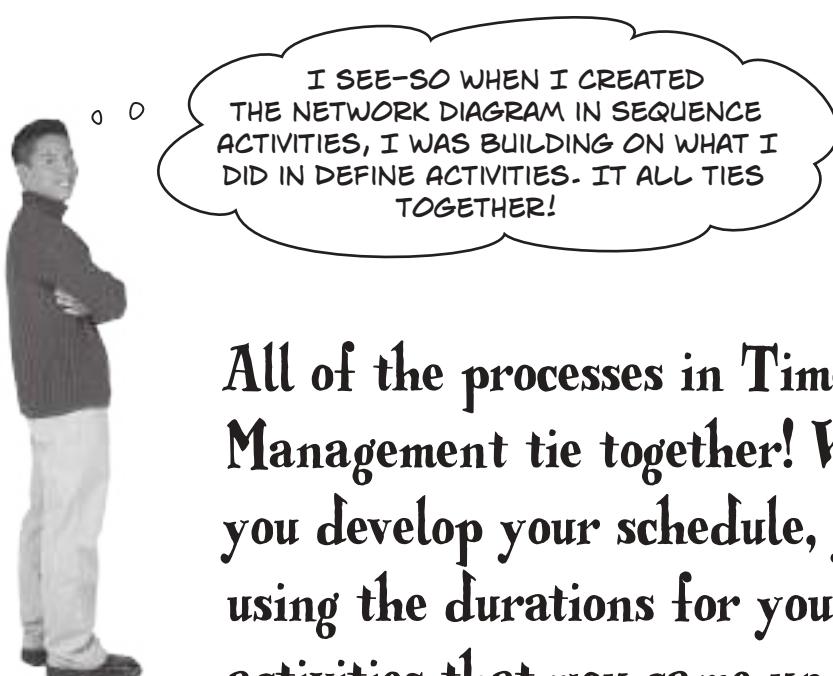
*there are no*  
**Dumb Questions**

**Q:** Where do the duration numbers come from on each activity?

**A:** A lot of people ask that question. It's easy to forget that everything you do in Sequence Activities builds on the stuff you did in the other Time Management processes. Remember the estimates that you came up with Estimate Activity Durations? You used techniques like three-point estimates, analogous estimating, and parametric estimating to come up with an estimate for each activity. Those are the estimates that you use on your network diagrams!

**Q:** What if there's a path that's not critical, but where even a small slip in one activity would delay the project?

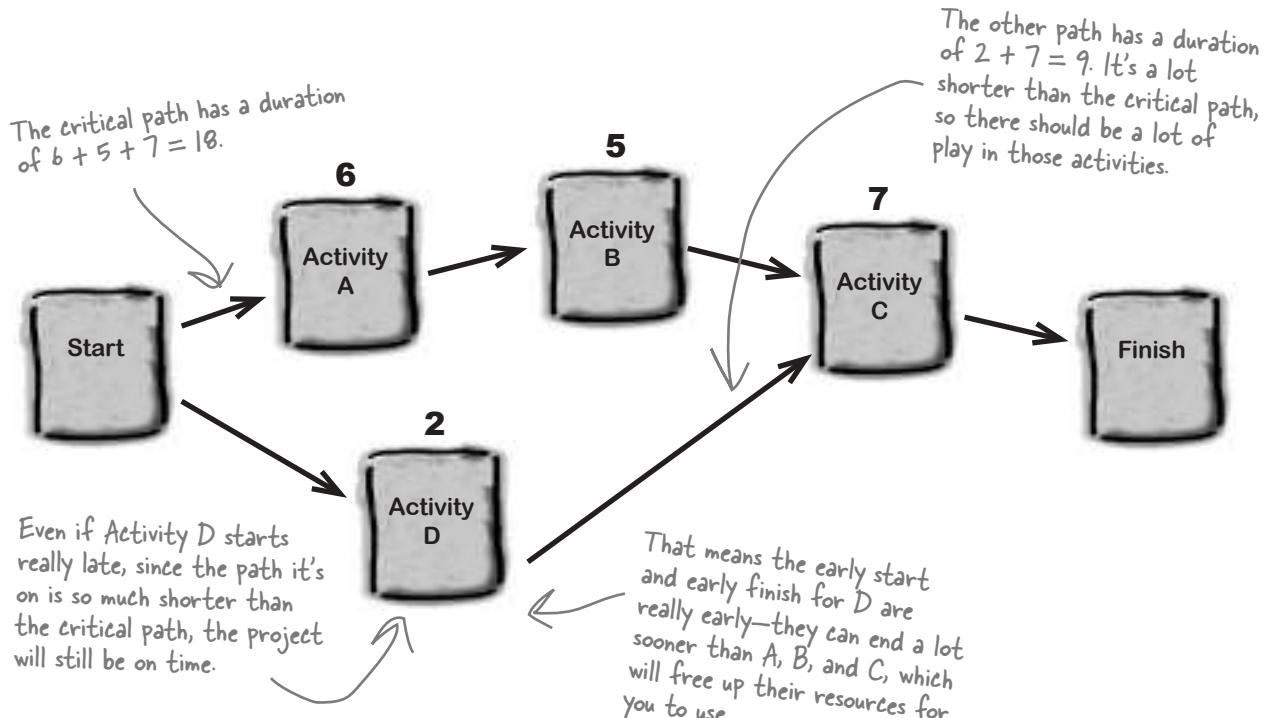
**A:** This is exactly why it's important to know the float for each of your activities. When you're managing your project, it's not enough to just pay attention to the activities on the critical path. You need to look for any activity with a low float. And don't forget that there may be some activities that aren't on the critical path but still have a float of zero! These are the ones where you really want to pay attention and watch out for potential resource problems.



**All of the processes in Time Management tie together! When you develop your schedule, you're using the durations for your activities that you came up with in Estimate Activity Durations.**

# Figure out the early start and early finish

Coming up with the float for each activity is useful, but you can actually do better! When you have a long critical path, but the other paths in your network diagram are short, then you have a lot of freedom in when you can start and finish each of the activities that are not on the critical path. You can use **early start** and **early finish** to get a handle on exactly how much freedom you have in your schedule.



## Early start

Is the earliest time that an activity can start. An activity near the end of the path will only start early if all of the previous activities in the path also started early. If one of the previous activities in the path slips, that will push it out.

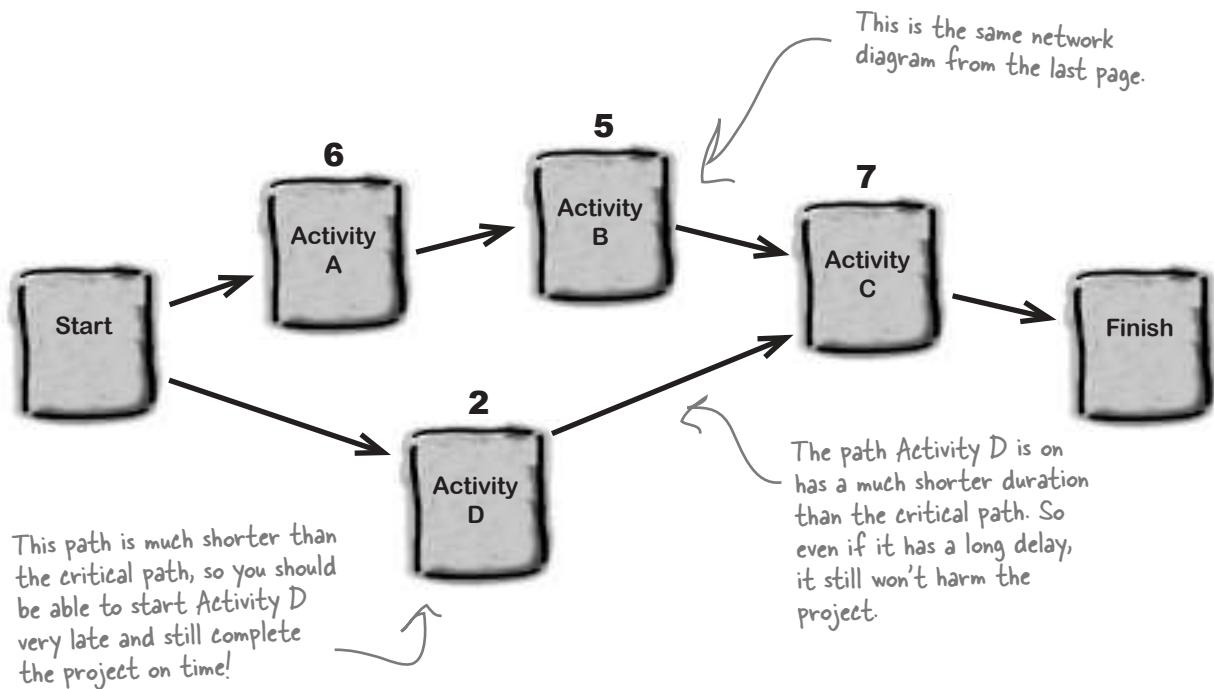
## Early finish

Is the earliest time that an activity can finish. It's the date that an activity will finish if all of the previous activities started early and none of them slipped.

**When you find the early start and early finish for each task, you know exactly how much freedom you have to move the start dates for those activities around without causing problems.**

## Figure out the latest possible start and finish

It's also important to know how late any activity can run before it delays the project. That's what **late start** and **late finish** are for! They let you figure out how late you can start a certain task and how much it can slip before it delays your project.



### Late start

Is the latest time that an activity can start. If an activity is on a path that's much shorter than the critical path, then it can start very late without delaying the project—but those delays will add up quickly if other activities on its path also slip!

### Late finish

Is the latest time that an activity can finish. If an activity is on a short path and all of the other activities on that path start and finish early, then it can finish very late without causing the project to be late.

**Figuring out the late start and late finish will help you see how much "play" you have in your schedule. An activity with a large late start or late finish means you have more options.**

# Add early and late durations to your diagrams

You can use a method called **forward pass** to add the early start and finish to each path in your network diagram. Once you've done that, you can use **backward pass** to add the late start and finish. It makes your network diagrams look a little more complicated, but it gives you a lot of valuable information.

Early start and finish go in the upper corners. Write the name of the activity above it, and the duration and float inside the box.

You can use this special node in your network diagram to write down the early and late start and finish.

The early start for this activity is 4.

Write the late start in the lower-left-hand corner. As long as the invitation design starts by day 7, it won't delay the critical path.

## Design Invitations

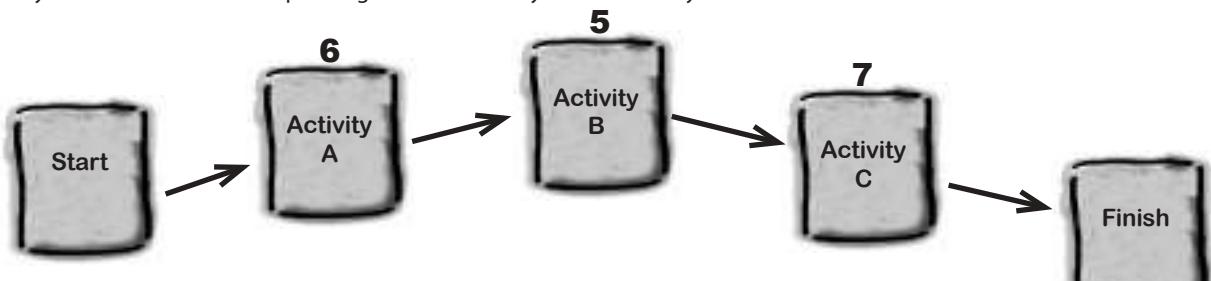
Duration = 5  
Float = 3

The early finish for this activity is 8. There's no way it can end before day 8.

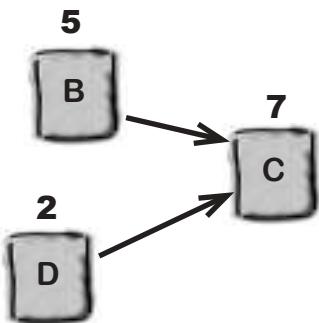
The late finish for the Design Invitations activity is 11, which means the latest it can finish without delaying the schedule is on day #11. If it hasn't finished by then, Kathleen should worry!

## Take a forward pass through the network diagram.

Start at the beginning of the critical path and move forward through each activity. Follow these three steps to figure out the early start and early finish!



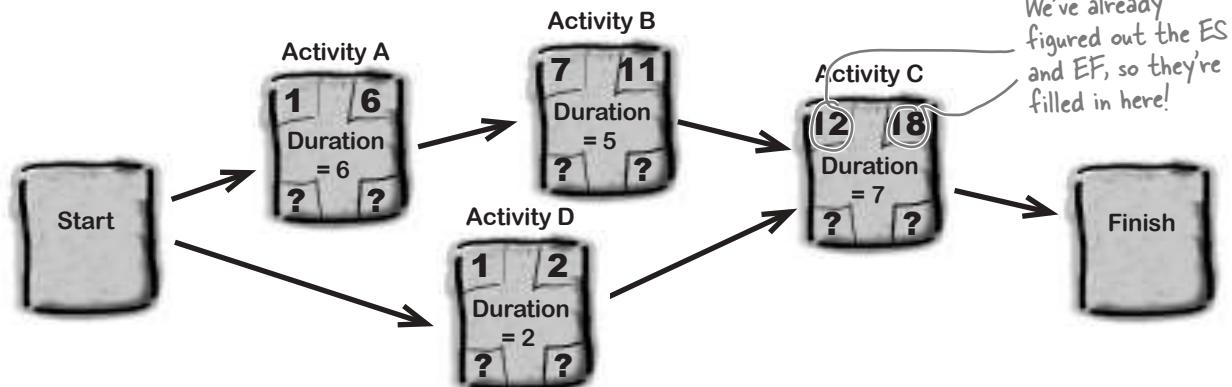
- 1 The ES (early start) of the first activity in the path is 1. The EF (early finish) of any task is its ES plus its duration minus one. So start with Activity A. It's the first in the path, so  $ES = 1$ , and  $EF = 1 + 6 - 1 = 6$ .
- 2 Now move forward to the next activity in the path, which is Activity B in this diagram. To figure out ES, take the EF of the previous task and add one. So for Activity B, you can calculate  $ES = 6 + 1 = 7$ , and  $EF = 7 + 5 - 1 = 11$ .
- 3 Uh-oh! Activity C has two predecessors. Which one do you use to calculate EF? Since C can't start until both B and D are done, use **the one with the latest EF**. That means you need to figure out the EF of Activity D (its ES is 1, so its EF is  $1 + 2 - 1 = 2$ ). Now you can move forward to Activity C and calculate its EF. The EF of Activity D is 2, which is smaller than B's EF of 11, so for Activity C the  $ES = 11 + 1 = 12$ , and  $EF = 12 + 7 - 1 = 18$ .



## Take a backward pass to find late start and finish

You can use a **backward pass** through the same network diagram to figure out the late finish and start for each activity.

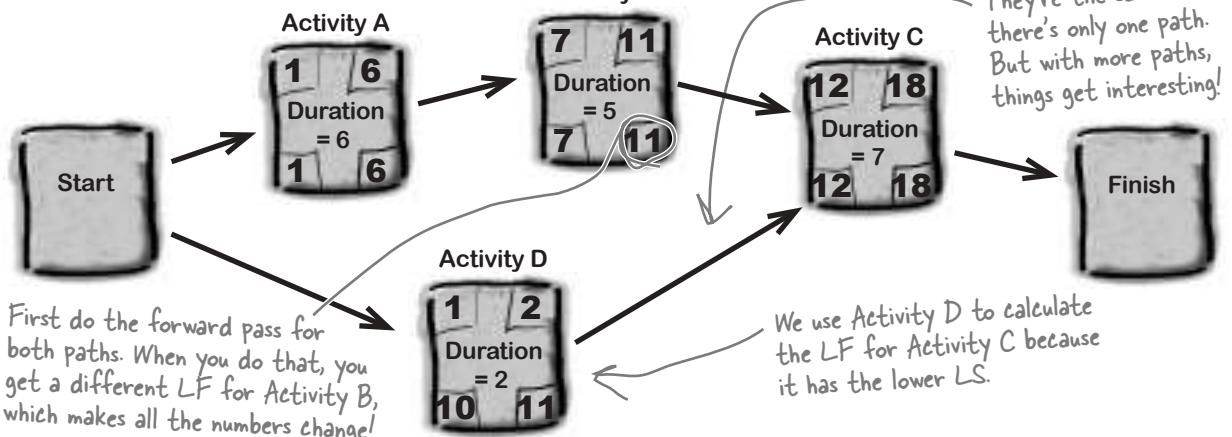
The backward pass is just as easy as the forward pass. Start at the end of the path you just took a pass through and work your way backward to figure out the late start and finish.



### Start with the critical path.

You're calculating the latest any activity can start and finish, so it makes sense that you need to start at the end of the project and work backward—and the last activity on the critical path is always the last one in the project. Then do these three steps, working backward to the next-longest path, then the next-longest, and so on, until you've filled in the LS and LF for all of the activities. Fill in the LF and LS for the activities on each path, but **don't replace** any LF or LS you've already calculated.

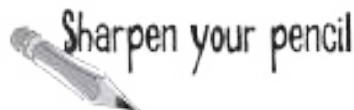
- 1 Start at the end of the path, with Activity C. The LF (late finish) of the last activity is the same as the EF. Calculate its LS (late start) by subtracting its duration from the LF and adding one.  $LS = 18 - 7 + 1 = 12$ .
- 2 Now move backward to the previous activity in the path—in this case, Activity B. Its LF is the LS of Activity C minus one, so  $LF = 12 - 1 = 11$ . Calculate its LS in the same way as step 1:  $LS = 11 - 5 + 1 = 7$ .
- 3 Now do the same for Activity A. LF is the LS for Activity B minus one, so  $LF = 7 - 1 = 6$ . And LS is LF minus duration plus one, so  $LS = 6 - 6 + 1 = 1$ .
- 4 Now you can move onto the next-longest path, Start-D-C-Finish. If there were more paths, you'd then move on to the next-longest one, and so on, filling in LF and LS for any nodes that **haven't already been filled in**.



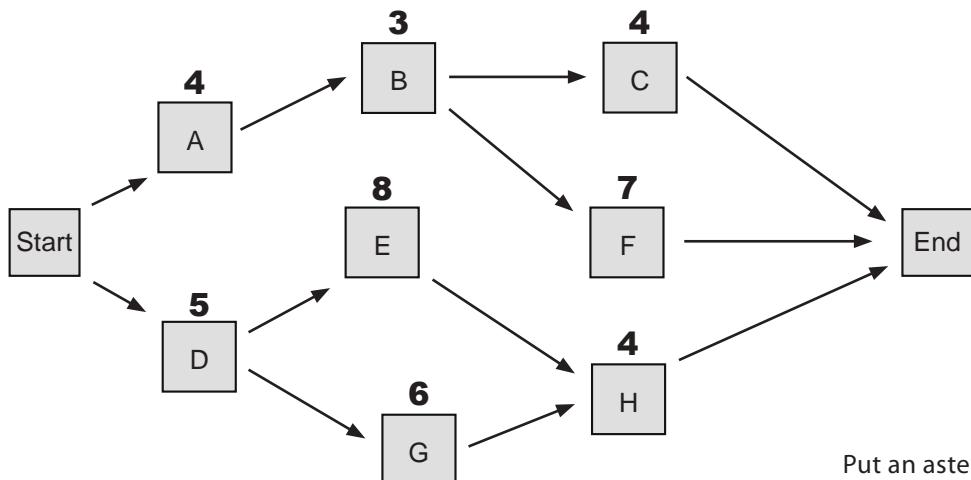
# Let's take some time out to walk through this!

All of this critical path stuff seems pretty serious, right? It's one of the toughest concepts on the exam. But don't sweat it, because it's actually not hard! It just takes a little practice. Once you do it yourself, you'll see that there's really nothing to worry about.

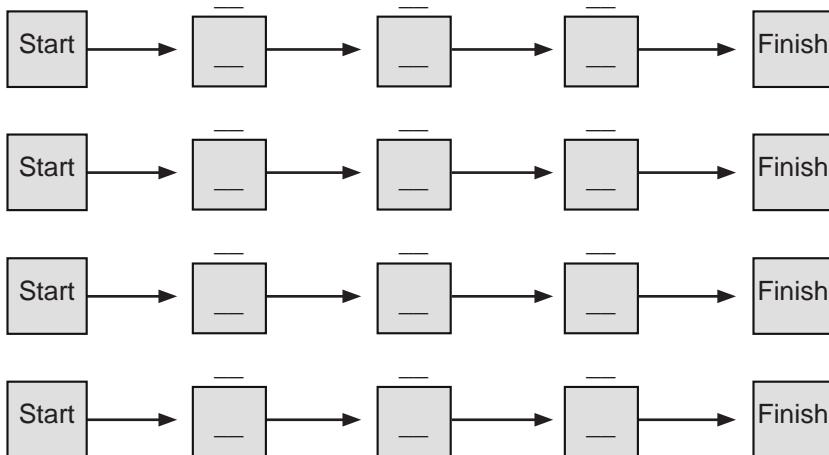
Calculating the ES, EF, LS, and LF may seem complicated, but it only takes a little practice to get the hang of it. Once you walk through it step by step, you'll see that it's actually pretty easy!



There are four paths in this network diagram. Fill in each of the activity names and durations for each of the paths.



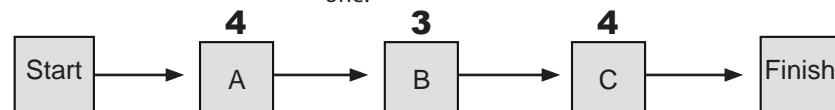
Put an asterisk (\*) next to the critical path.



We're not done yet! There's more on the next page...



Take a forward pass through each of the four paths in the diagram and fill in the early starts and early finishes for each activity. Start with the first one.



Remember, the early start of the first activity in a path is one.

$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

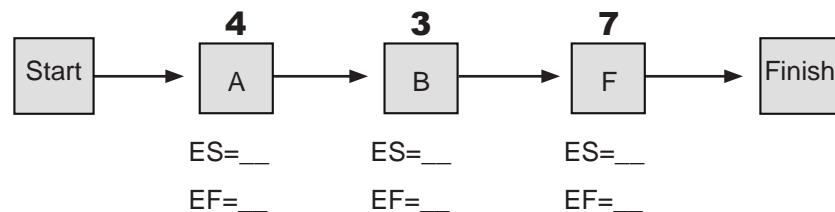
$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

The early finish of an activity is its ES plus its duration minus one.

The early start of an activity is the early finish of the previous activity plus one.

Let's move on to the second path.



$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

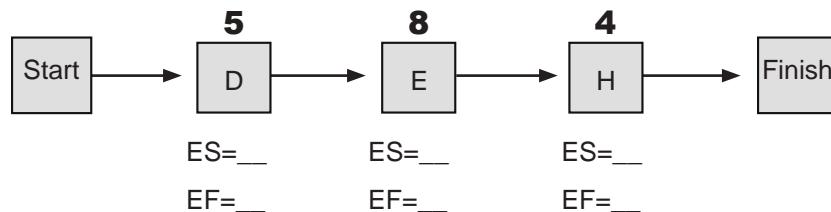
$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

The next path isn't as straightforward as it looks. Start by filling in its values.



$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

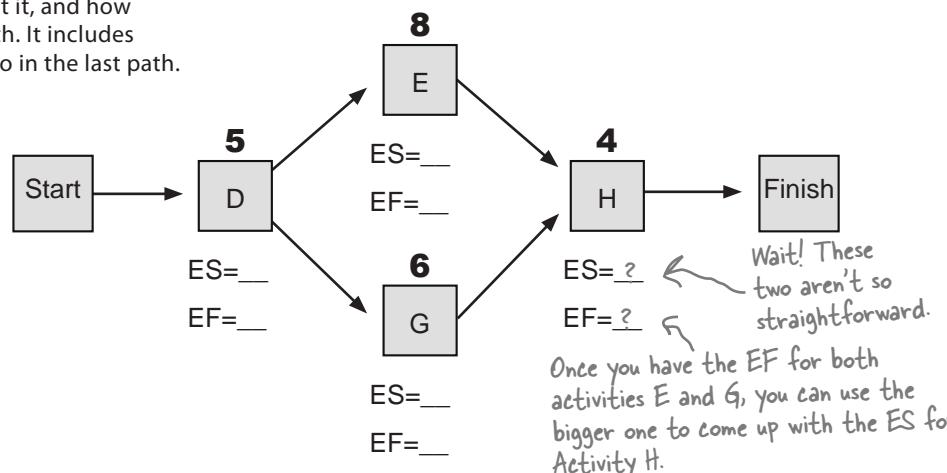
$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

Now take another look at it, and how it mixes with the last path. It includes Activity H, which was also in the last path. H will have a different ES depending on which path you use! So which predecessor do you use: E or G? The idea here is that you **use the predecessor with the larger EF value** when you calculate the ES for activity H (because you want the **latest possible** start date).



$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

$$\text{ES} = \underline{\hspace{2cm}}$$

$$\text{EF} = \underline{\hspace{2cm}}$$

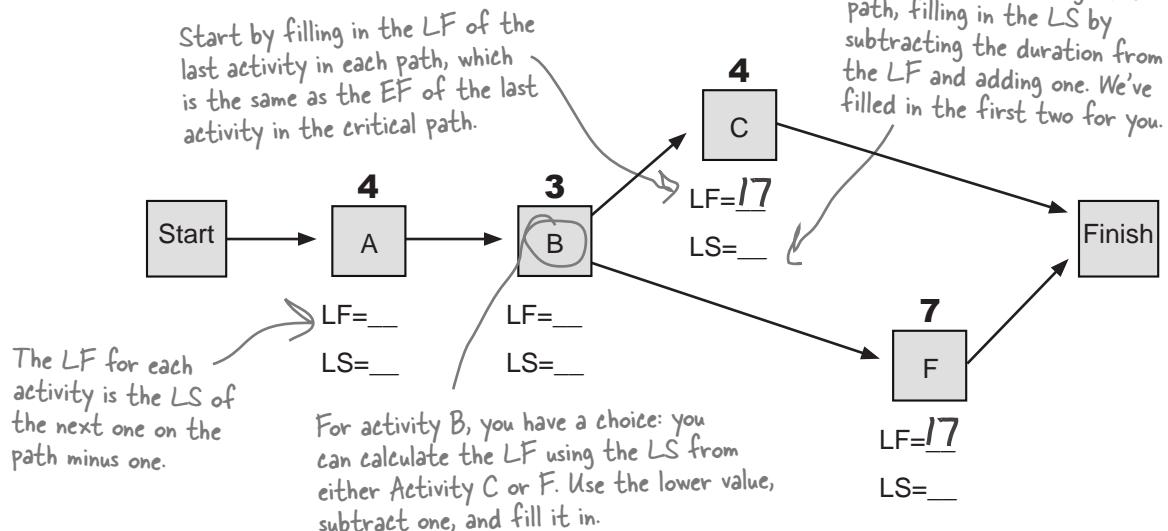
Wait! These two aren't so straightforward.

Once you have the EF for both activities E and G, you can use the bigger one to come up with the ES for Activity H.

You've calculated the ES for each activity. Use that information and take a backward pass through the paths, starting with the first two paths.

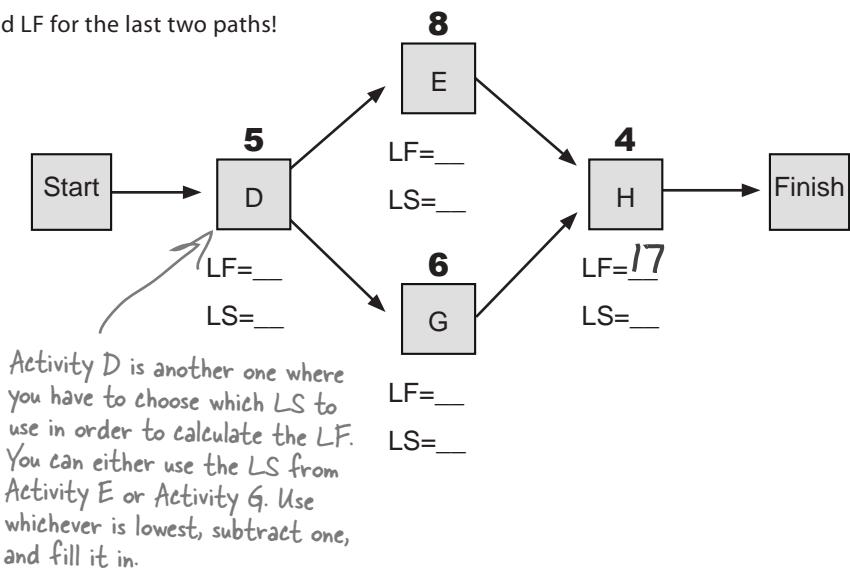
**First start with the critical path.** Take the EF of the last activity in the critical path and use it as the LF for the last activity in **every** path. If you take a minute to think about it, it makes sense to do that. The point of LF is to figure out the absolute latest that the activity can end without making the project late. And as long as every non-critical-path activity ends before the last activity in the critical path, then it won't be late.

We'll start by giving you the LF of critical path, Start-D-E-H-Finish, which is 17.



Finish up by calculating the LS and LF for the last two paths!

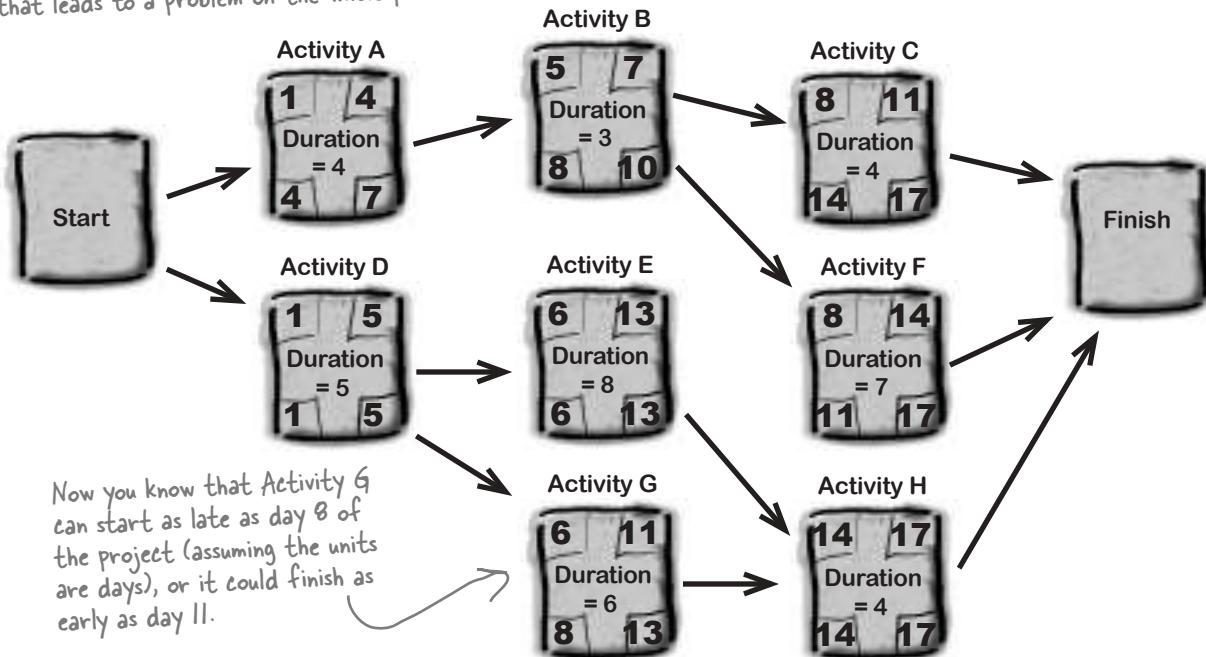
Activities B and D have two possible choices for which LS to use for the calculation. For Activity B, do you use the LS of C or the LS of F? And for Activity D, do you use Activity E or G? The answer is that you always **use the lowest value of LS to calculate the LF**. The reason is that you're trying to find the latest possible start date that *won't make the project late*. If you use an activity with a later LS, and the activity really is delayed by that much, then it'll cause a delay in both following activities. And that will make the one with the lower LS start too late.



## Sharpen your pencil Solution

If you got a few of these wrong, don't worry. It's easy to miss one calculation, and that leads to a problem on the whole path.

For the exam, you'll only have to do one or two of these calculations, not a whole string of them like this. You'll definitely be able to handle the exam questions now!



WAIT A MINUTE...I'VE NEVER HAD TO DO THIS FOR MY PROJECTS AT WORK! I'VE GOT PROJECTS WITH DOZENS OF ACTIVITIES, AND THIS WOULD TAKE ALL DAY!

**You won't have to do this kind of thing on the job...that's what computers are for!**

Project management software like Microsoft Project will do these calculations for you. But you need to know how to do it yourself, because when the computer is doing critical path analysis, this is exactly how it figures it out!

there are no  
**Dumb Questions**

**Q:** Would I really use this critical path stuff in real life, or is it just something I need to memorize for the PMP exam?

**A:** Yes, critical path analysis really is important in real life! Sure, for a small project with a dozen or so activities, it's pretty easy to figure out which activities are critical and which can slip by a little bit. But what happens if you've got a project with dozens of team members and hundreds of activities? That's where critical path analysis can come in very handy. For a project like that, you'd probably be using project management software rather than calculating the critical path yourself, and the software will be able to highlight that path for you. Pay special attention to all of the activities that are on the critical path—those are the ones that could potentially delay the project.

**Q:** What about the other numbers? How do I use float?

**A:** Float is a very powerful planning tool that you can use to figure out how well your

project is going, and to predict where your trouble spots might be. Any activity with a low or zero float absolutely must come in on time, while the people performing an activity with a larger float have more freedom to slip without delaying the project. So you might want to assign your "superstar" resources to the low-float activities, and those people who need a little more mentoring to the ones with higher float.

**Q:** OK, but what about late start, early finish, and those other numbers? Do those do me any good?

**A:** Early and late start and finish numbers are also very useful. How many times have you been in a situation where you've been asked, "If we absolutely had to have this in two months, can we do it?" Or, "How late can this project realistically be?" Now you can use these numbers to give you real answers, with actual evidence to back them up.

Here's an example. Let's say you've got an activity in the middle of your project, and

one of your team members wants to plan a vacation right at the time that the activity will start. Do you need to find someone to fill in for him? If he'll be back before the late start date, then your project won't be late! But that comes at a cost—you'll have used up the extra slack in the schedule.

**Q:** I can see how the critical path is useful on its own, but what does it have to do with the rest of Time Management?

**A:** If you start putting together your schedule but the activities are in the wrong order, that's really going to cause serious problems...and sometimes doing critical path analysis is the only way you'll really figure out that you've made that particular mistake. That's why you need to pay a lot of attention to the Sequence Activities tools and techniques. If you've come up with an inefficient or inaccurate sequence, with too many or incorrect predecessors and dependencies, then your entire critical path analysis will be useless.

## BULLET POINTS: AIMING FOR THE EXAM



- The **critical path** is the path that has the longest duration.
- You should be able to figure out the number of paths in a **project network diagram**, and the duration of each path.
- The **float** for an activity is the amount that its duration can slip without causing the project to be delayed. The float for any activity on the critical path is zero.
- You'll need to know how to calculate the **early start, late start, early finish, and late finish** for an activity in a network diagram using the forward pass and backward pass. This is the core of critical path analysis.
- You may see a **PDM** (or **activity-on-node**) diagram with special nodes that have extra boxes in the corners for the ES, EF, LF, and LS.
- Don't forget that when two paths intersect, you have to decide which ES or LF value to take for the calculation in the next node. For the **forward pass**, use the larger value; for the **backward pass**, use the smaller one.

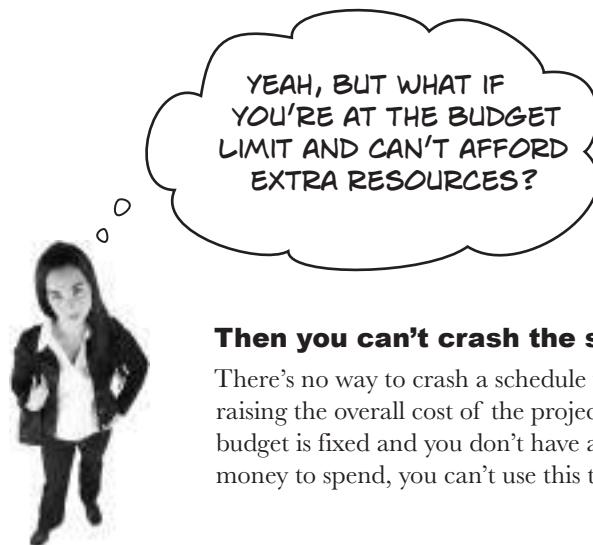
## Crash the schedule

There are two important **schedule compression** techniques that you can use to bring in your project's milestone dates...but each has its own cost.

When you absolutely have to meet the date and you are running behind, you can sometimes find ways to do activities more quickly by adding more resources to critical path tasks. That's called **crashing**.



**Crashing the schedule means adding resources or moving them around to shorten it. Crashing **ALWAYS** costs more and doesn't always work!**



**Then you can't crash the schedule.**

There's no way to crash a schedule without raising the overall cost of the project. So, if the budget is fixed and you don't have any extra money to spend, you can't use this technique.

## Fast-tracking the project

Another schedule compression technique is called **fast-tracking**.

Sometimes you've got two activities planned to occur in sequence, but you can actually do them at the same time. On a software project, you might do both your UAT testing and your functional testing at the same time, for example. This is pretty risky, though. There's a good chance you will need to redo some of the work you have done concurrently.

On the exam, if you see something about "overlapping activities," it's talking about fast-tracking.



WE CAN SAVE TIME BY  
HAVING THE FLORIST WORK  
ON THE RECEPTION HALL FLOWERS  
WHILE WE FIGURE OUT THE REST  
OF THE DECORATIONS.

If the decorations  
don't match the flowers  
well enough, we'll have to  
do some rework.

**Crashing and  
fast-tracking  
are SCHEDULE  
COMPRESSION  
tools.**



Each of these scenarios describes a schedule compression technique. Pick which are examples of fast-tracking and which are crashing.

1. Kathleen guesses that 70% of the invitees will RSVP. Instead of waiting for all of them to come in, she goes ahead and reserves the tables and chairs now.

Fast-tracking       Crashing

2. Rebecca is taking a really long time to choose the decorations, so Kathleen brings in a professional decorator to help, even though it will cost more.

Fast-tracking       Crashing

3. Kathleen needs to get the invitations out quickly, so she hires two temps to come in and help her stuff envelopes for a few days.

Fast-tracking       Crashing

→ Answers on page 321.



## Modeling techniques

It's always a good idea to think about all of the things that could go wrong on your project in advance. Trying to think through all of the possible problems your project could run into is called **what-if analysis**.

- What if the limo breaks down?
- What if the florist cancels at the last minute?
- What if the dress doesn't fit?
- What if the band gets sick?
- What if the guests get food poisoning?
- What if there's a typo in the church address on the invitation?
- What if the bridesmaids don't show up?
- What if the cake tastes horrible?
- What if we lose the rings?

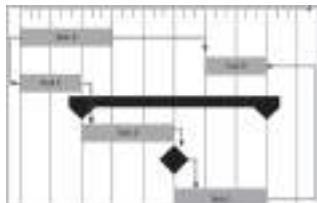


That way, you can figure out how to deal with any problems that might come your way. Sometimes there's no way to still meet your dates and deal with these scenarios. But it always makes sense to try to understand the impact they will have on your schedule.



### Simulation

This is a specific kind of what-if analysis where you model uncertainty using a computer. There are some packages that will help to calculate risk using random numbers and **Monte Carlo analysis** algorithms. While this is not a commonly used technique, there might be a question or two about it on the PMP exam, and you should know what it is.



### Scheduling tool

Using a project management software package to create a model of the schedule and adjusting various elements to see what might happen is another technique for analyzing network diagrams.

# Other Develop Schedule tools and techniques

There are just a few more tools and techniques in the Develop Schedule process that you should know.

## Critical chain method

In this method, resource dependencies are used to determine the critical path. Then, you add buffers, working backward from the delivery date into the schedule at strategic points, and managing the project so that each milestone is hit on time.



## Resource optimization techniques

Sometimes only one resource can do a given activity. If that resource is busy doing another activity on the critical path, the path itself needs to change to include that dependency. That's the point of resource leveling. It evaluates all of the resources to see if the critical path needs to change to accommodate resource assignments.



## Adjusting leads and lags

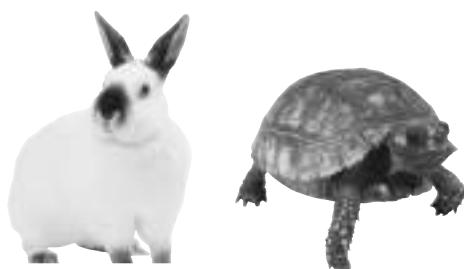
If you made any mistakes in your leads and your lags, you might be able to adjust them to change the projected end date.

And don't forget...



## Schedule compression and schedule network analysis

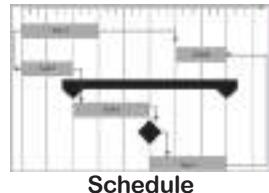
The last two tools and techniques in the Develop Schedule process are the ones you just learned over the last few pages: **schedule compression** and **schedule network analysis** using critical path, float, and the other schedule analysis techniques you just learned.



# Outputs of Develop Schedule

Of course, the main product of Develop Schedule is the schedule. But there are a few other supporting documents that help you understand how the work will get done as well.

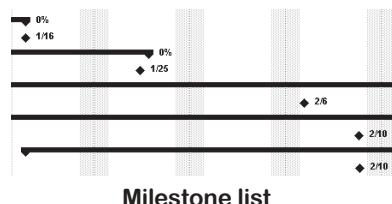
## Outputs



The reason you go through all of that what-if analysis is to make sure everybody agrees that this schedule is achievable!

## Project schedule

All of that analysis and modeling should produce a schedule that everyone can get behind. After thinking your way through everything that can go wrong and assigning resources, you should have a pretty accurate prediction of the work required to complete the project.



Milestone list



The main thing to remember here is that milestones are usually used to track stuff that will be used by people outside the project.

## Milestone chart

Technically, the milestone chart is a part of the project schedule (so they're really all part of the same output), but it's very important. All of the major chunks of work can be marked with milestones to track their completion. Usually this list is published for other teams or stakeholders who are depending on parts of the work to be accomplished by a certain time.

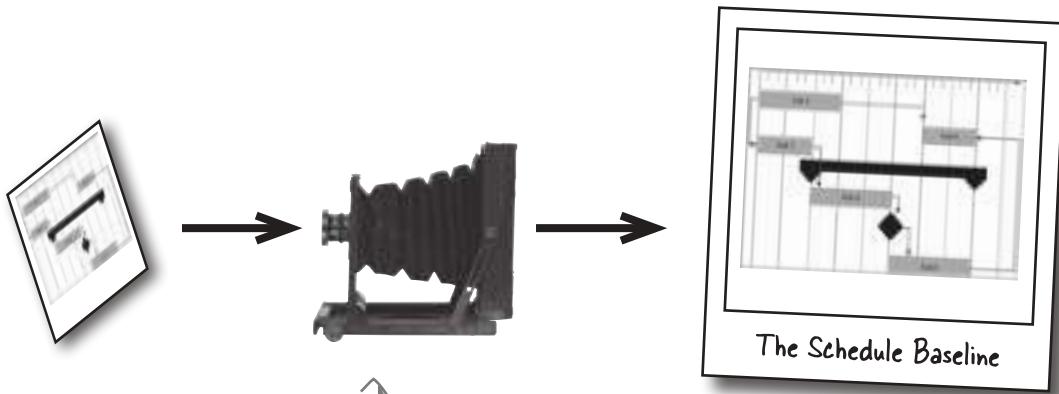
## Schedule data

The schedule data is a collection of information about your schedule. It will include things that you'll need to analyze your schedule later on in the project: alternative schedules, specific requirements for resources, milestone charts, bar charts, project schedule network diagrams, and other data and metrics about your schedule.



Schedule data

**Before you can do change control, you need requested changes.  
Once the change is approved, you can update the baseline!**



This is just like the scope baseline in the last chapter.

### Schedule baseline

When the Develop Schedule process is complete, a baseline is created so that actual progress can be compared to the plan.



### Project calendars

Calendars will help you keep track of the time when team members will be away on vacation or unavailable to work on your project.



### Project Management plan updates

Since the schedule baseline and Schedule Management plan are both part of the Project Management plan, it makes sense that it would have to be updated.



### Project documents updates

While you're creating the schedule, you might find that you need to update calendars, your resource requirements, the attributes of the activities themselves, or even your risk register, to name a few possibilities.



For the exam, you need to know Develop Schedule outputs. Several outputs from the wedding's Develop Schedule process are on the left. Match them to the correct description on the right.

A. Project schedule

1. Kathleen gives a list of dates to the caterer telling him when he will need to have his menu plans, and when the shopping for the ingredients will need to be complete for the reception and rehearsal dinner.

B. Schedule data

2. Kathleen realizes that she needs to make a change to how she keeps track of the waiters' time, so she makes a change to the document that describes it.

C. Schedule baseline

3. While making the schedule, Kathleen realizes that the catering company can't work from 3-4 on the day of the event because they'll be travelling from another event.

D. Project calendar update

4. Kathleen makes a copy of the schedule when it's done so that she can compare how she is doing to the original plan.

E. Project document updates

5. There's a big poster on the wall where Kathleen keeps track of who does what, and when.

Answers: A-5; B-1; C-4; D-3; E-2

## there are no Dumb Questions

**Q:** Don't we need to go through change control before we update the resource requirements or the activity attributes?

**A:** No. You need to go through change control if you are requesting changes to, say, your Cost Management plan. But while you are working on creating your schedule, everything you have created as part of the Time Management knowledge area is fair game.

As you work your way through your network diagram and figure out new dependencies, you will find that you need more resources for some items or that the activity itself has changed. That's why this process gives you the freedom to refine your earlier idea and make all of the Time Management documents sync with your new understanding.

The Develop Schedule process is about taking all of the information you can think of up front and putting it into a schedule that is realistic. When you are done with this process, you should have a really good idea of what you are going to do, who will do it, and how long it will take.

**Q:** We always want to do our projects as quickly as we can. Why don't we always fast-track and crash our schedules?

**A:** Because crashing is expensive and fast-tracking is risky. While it may look good on paper to add a lot of resources to a project that is running late, it often adds so much management overhead and training issues that the project just comes in later.

Even though it might seem like some predecessors are really unnecessary, you usually planned them for a reason. So when you break your dependencies to fast-track your project, you can significantly compromise the quality of the work that gets done. That means you might have to redo it altogether—which would probably take a lot of time.

While fast-tracking and crashing might work sometimes, they always add both risk and cost to your project.

**Q:** Do people really do Monte Carlo analysis to figure out their schedules? I have never heard of that before.

**A:** It's true that most people don't use this technique to figure out what might go wrong on their projects, so don't feel bad if you've never heard of it. Some people think that this is just one of those things that is on the PMP exam, so you have to know what it is. But there really are some project managers who use it and get great results!

**Q:** The critical chain method sounds complicated. Do I need to know how to do it?

**A:** Not really. You need to know that it is a technique for developing schedules that takes resource assignment into account early on.

When project managers use the critical chain method, they identify strategic points to put buffers in their schedule and then manage the size of the buffers so that each milestone in the schedule is met.

Don't worry, you won't be asked to create a schedule using this technique. You just need to know the definition.

**Updates refine the outputs of previous processes so you don't have to go back and redo them.**

## Influence the factors that cause change

**Kathleen doesn't just sit around and wait for schedule changes to happen...**

You might get a question on the PMP exam that asks you about this.



**Joe (on phone):** Good afternoon, Joe's Catering. Joe speaking. How can I help you?

**Kathleen:** Hello, Joe. This is Kathleen calling about Rob and Rebecca's wedding.

**Joe:** Oh, hi! Everything's going fine with that wedding.

**Kathleen:** Are you sure? What about that big convention across town that's going to be happening at the same time? Won't it be tough to find waiters in June?

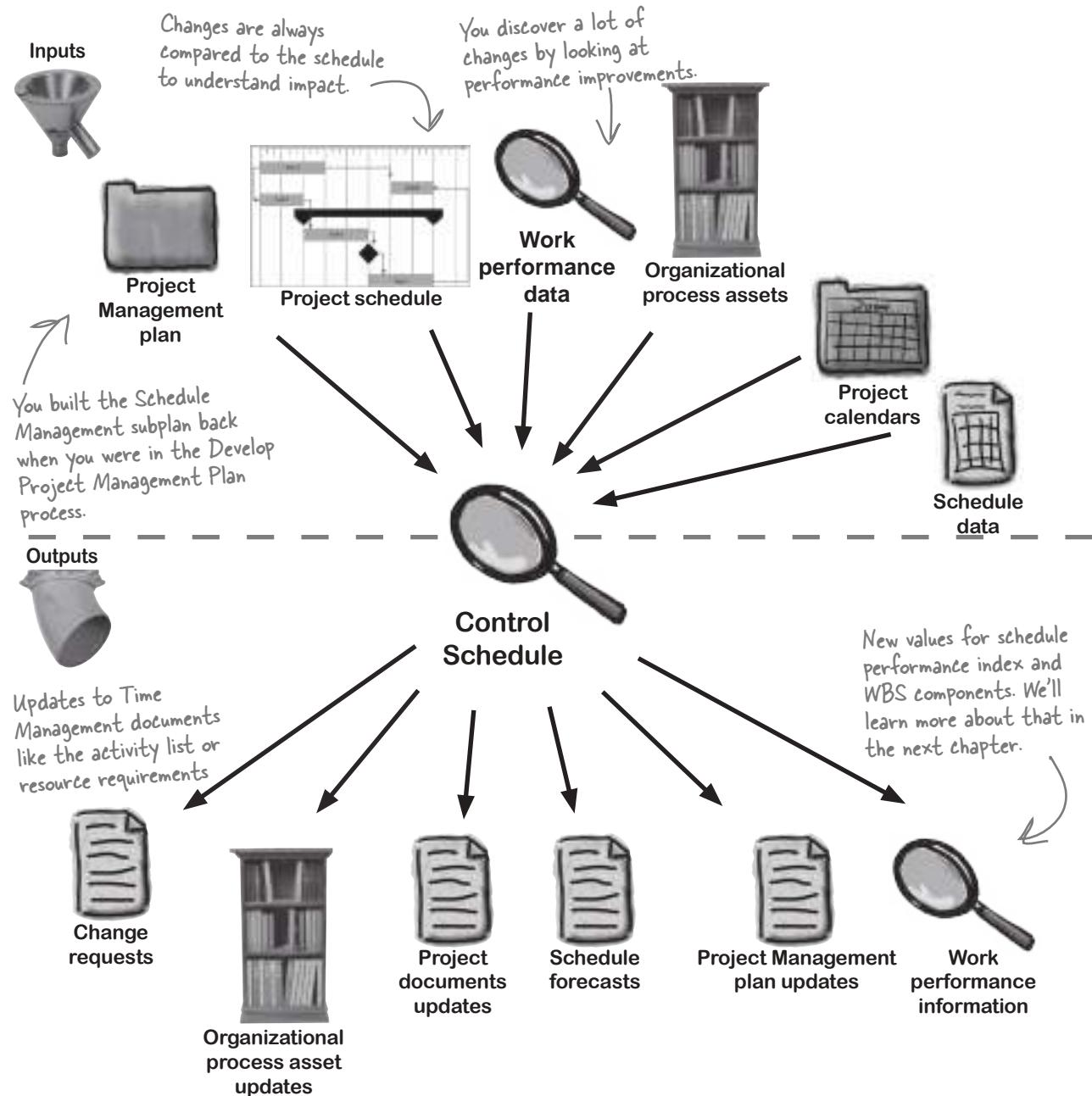
**Joe:** I didn't think of that; we'd better start figuring out how we'll handle it now.

By realizing that the convention across town will need waiters, too, Kathleen prevents a lot of changes before they cause schedule problems!

**The project manager doesn't just wait for change to happen! She finds the things that cause change and influences them.**

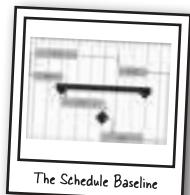
# Control Schedule inputs and outputs

As the project work is happening, you can always discover new information that makes you re-evaluate your plan, and use the **Control Schedule process** to make the changes. The inputs to Control Schedule cover the various ways you can discover that information. The outputs are the changes themselves.

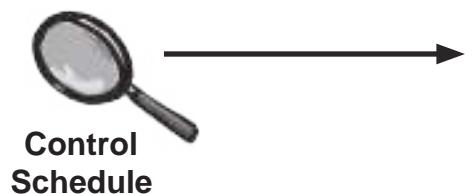


## What Control Schedule updates

All of the stuff you made during the Develop Schedule process gets updated using the Control Schedule process. Here's a closer look at what those updates mean.



Schedule baseline



Updates

Whenever a change is approved to your schedule, the baseline needs to be updated. That way, you will always be comparing your results to the right plan.



Organizational process assets



Activity list



Activity attributes

As you make changes to your project schedule, you should be tracking your lessons learned so that other projects can benefit from your experience. Sometimes you might find changes to templates that will help future projects, too.

If the work you need to do changes, then you need to update your activity list and attributes to match the new information.



Schedule data

Some scenarios for what might go wrong on your project might show up when you are already doing the work. You need to update your schedule accordingly.



Project Management plan

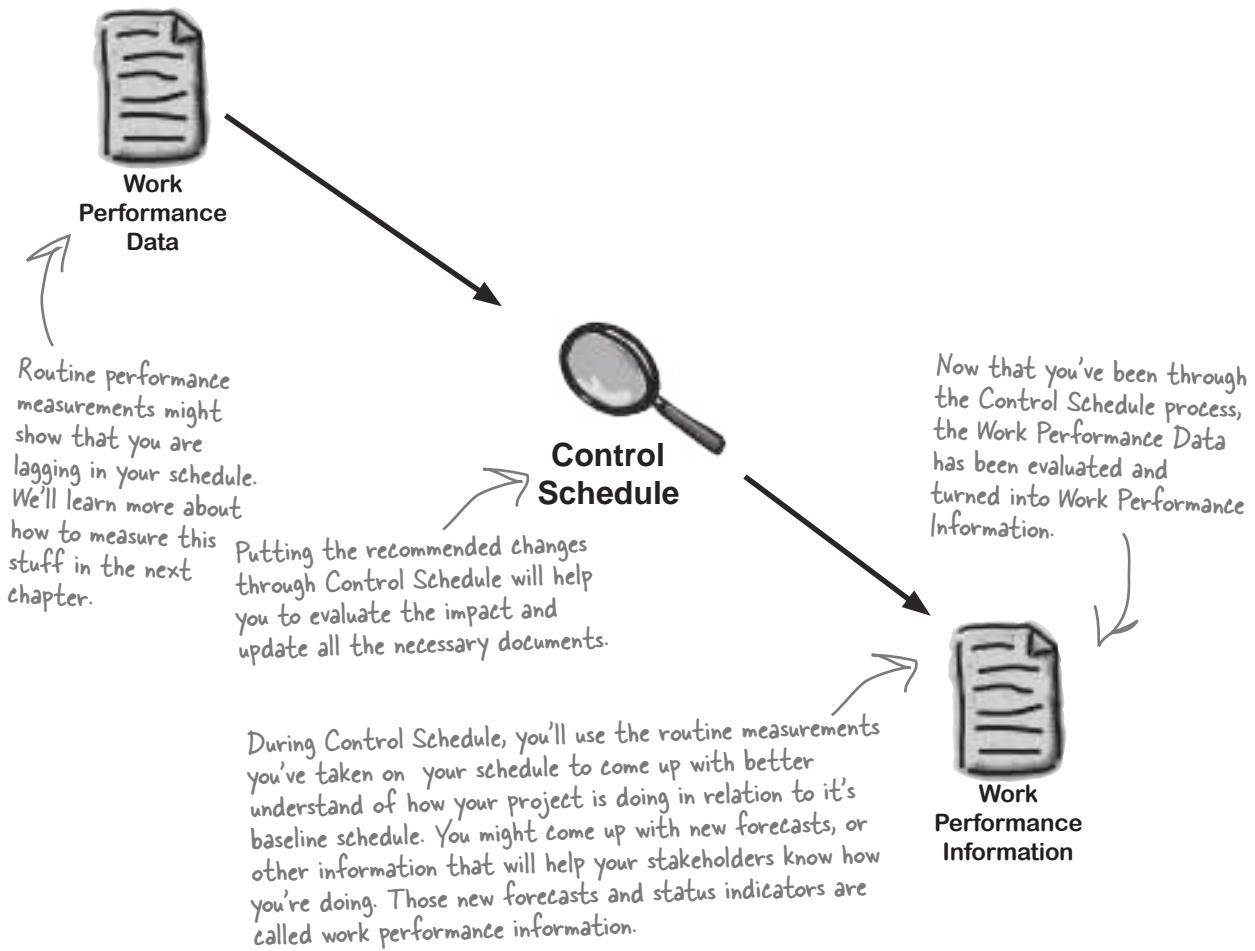
It could happen that the way you manage Control Schedule needs to change, and those changes would need to be updated in the **Project Management plan**.

Managing  
schedule  
change  
means  
keeping  
all of your  
schedule  
documents  
up to date.

# Measuring and reporting performance

Most often, you identify changes by looking at performance data. It's just as important once you make a change to gather performance data as it was when you found the change in the first place. Here's how performance data feeds into the Control Schedule process.

## The Control Schedule process turns Work Performance Data into Work Performance Information.



# Control Schedule tools and techniques

The tools and techniques for Control Schedule are all about figuring out where your project schedule stands. By comparing your actual project to the schedule you laid out in the baseline and looking at how people are performing, you can figure out how to handle every schedule change.



## Performance reviews

There are two important calculations called schedule variance (SV) and schedule performance index (SPI) that give you valuable information about how your project is doing. You'll learn all about them in the next chapter.

## Project management software

This is software like Microsoft Project that helps you organize and analyze all of the information you need to evaluate the schedule of any project.

## Leads and lags, modeling techniques, schedule compression, scheduling tool

Most of the tools from the last process apply to this one too. As you find variances in the schedule, you need to figure out the impact of those issues and change your schedule to account for the new information.

## Resource optimization techniques

As things change in your project, you need to make sure that resources are covering all of the activities in your plan. That means you need to distribute resources so that the work that needs to get done always has a resource available to do it.

A lot of scheduling software contains logic to do this automatically.



HOLD IT! ALMOST ALL THE SCHEDULING IN MY JOB IS DONE WITH GANTT CHARTS, BUT I BARELY SEE THEM HERE. WHAT GIVES?

Remember, Gantt charts—the bar charts you make with MS Project—are just one tool for scheduling. You may use them a lot in your day-to-day work, but they're only one piece of Time Management. And remember, on the exam they're called **bar charts**, not Gantt charts!

*there are no*  
**Dumb Questions**

**Q:** When I create work performance information, who uses them?

**A:** The work performance information that you create are used by a lot of people. The team uses them to keep an eye on the project. If there's a schedule problem coming up, it alerts the team so that they can help you figure out how to avoid it.

Performance information is also used by your project's sponsor and stakeholders, who are very interested in whether or not your project is on track. That information gives them a good picture of how the project is doing...and that's especially important in Control Schedule, because most change control systems require that every change is approved by a change control board that includes sponsor and stakeholders.

**Q:** What's schedule data used for?

**A:** You use the schedule data to build the schedule, and you'll usually generate and analyze it using a schedule tool (like Microsoft Project). It includes detailed information about things like resource requirements, alternate best-case and worst-case schedules, and contingency reserves.

When you put together your schedule, you should look at all of these things in order to create an accurate plan. The more information you have when you're building your schedule, the more likely it is that you'll catch those little problems that add up to big schedule slips.

**Q:** One of the tools is project management software. Do I need to know how to use software in order to pass the exam?

**A:** No. The PMP exam does not require that you know how to use software like Microsoft Project. However, if you spend a lot of time using project management software, then you probably have become very familiar with a lot of the Time Management concepts. It's a good way to learn the basics of time management.

**Q:** How often am I supposed to update the project calendar?

**A:** The project calendar shows you the working days for your team, holidays, nonworking days, planned training, and the dates that could affect your project. Luckily, in most companies these dates don't change very often. You probably won't need to update it—and most project managers just use their company's existing project calendar.

When you're doing Develop Schedule, you may discover that you need to make a change to the project calendar. That's why updates to the project calendar are an output of Develop Schedule.

**Q:** What do I do with work performance data and work performance information once I've collected it?

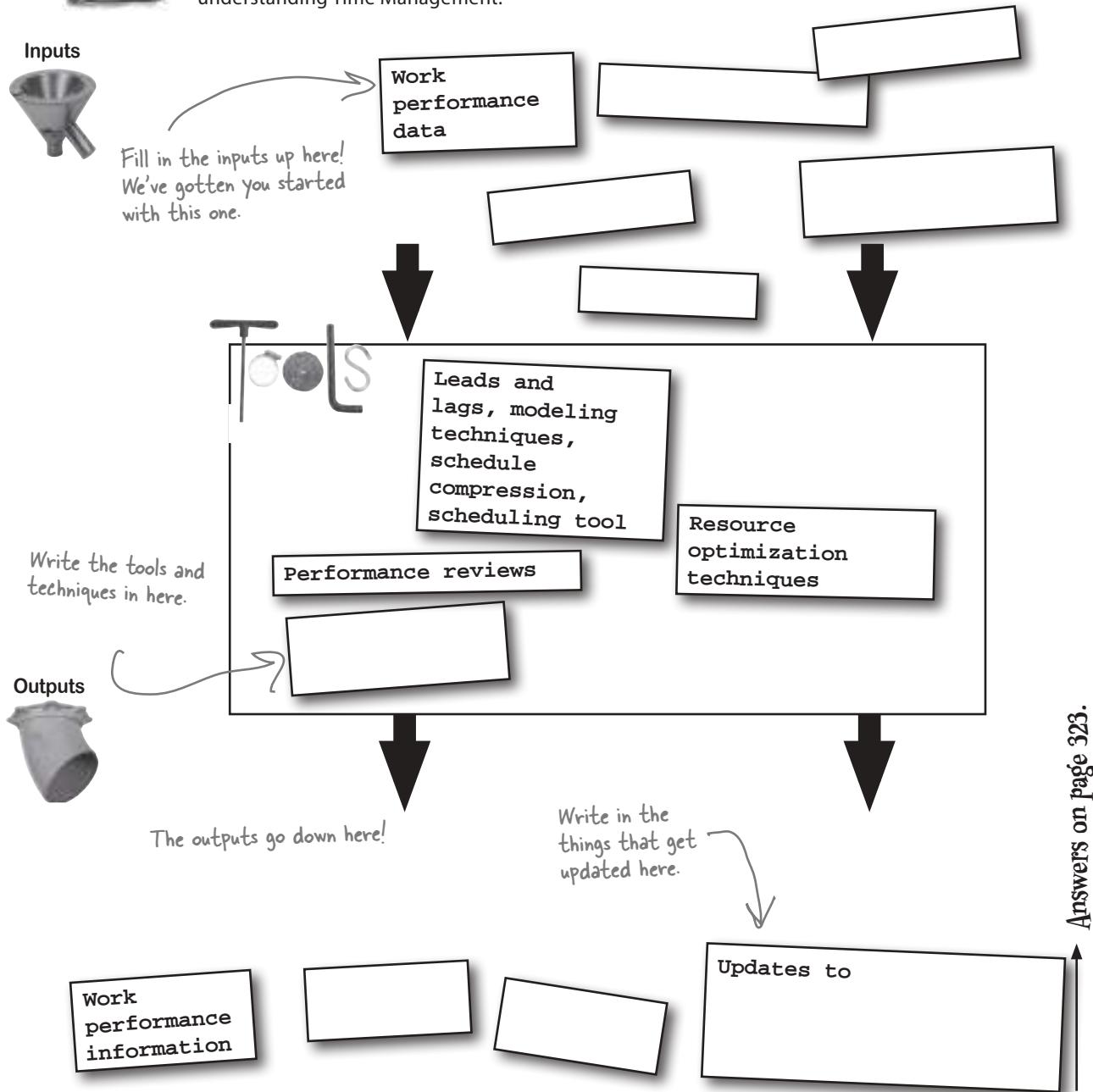
**A:** When you're planning your project, you'll often look to your company's past projects to see what went well and what could have been planned better. And where do you look? That information is in the organizational process assets. So where do you think that information comes from? It comes from project managers like you who added their work performance data and information to the company's Organizational Process Asset library.

**Any time you generate data about your project, you should add it to your organizational process assets so you can use it for future projects.**



## Control Schedule Magnets

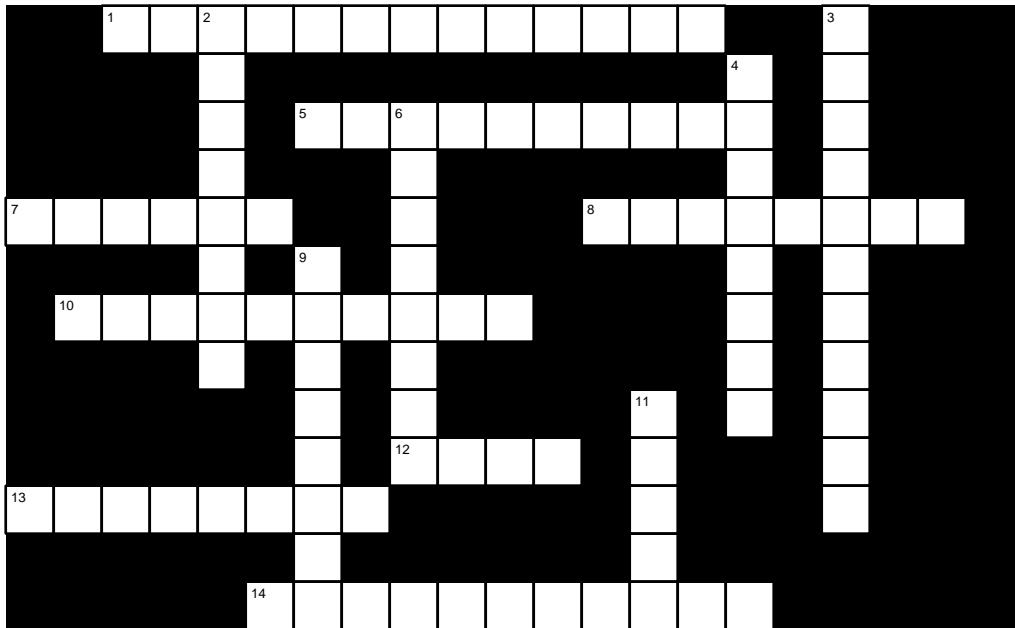
You'll see change control over and over again—every single knowledge area has its own change control process! Luckily, you'll start to see how similar they all are. But Control Schedule has its own quirks, and they're important for understanding Time Management.





# Timecross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



## Across

1. Taking work packages from the WBS and breaking them down into activities.
5. The "P" in PDM.
7. The kind of analysis where you ask a lot of questions about possibilities.
8. A snapshot of the schedule that you can use for later comparison.
10. \_\_\_\_\_ estimation means plugging data about your project into a database of historical information to get an estimate of how long it will take to do the work.
12. Giving a successor task some time to start before a predecessor finishes.
13. Adding more resources to a project so you can get it done faster is called \_\_\_\_\_ the schedule.
14. A PERT three-point estimate is optimistic time + 4 x most likely time + \_\_\_\_\_ time.

## Down

2. Any delay in an activity on the \_\_\_\_\_ path will delay the entire project.
3. You do this sort of planning when you get more information as the project progresses.
4. What you're doing to resources when you evaluate all of them to see if the critical path needs to change to accommodate their restrictions.
6. An activity with a dependency on something outside the project has an \_\_\_\_\_ predecessor.
9. \_\_\_\_\_ Activities is the process where you put the activities in order.
11. How long an activity can slip before the whole project is delayed.

→ Answers on page 318.

## Another satisfied customer!

Rob and Rebecca had a beautiful wedding! Everything was perfect. The guests were served their meals, the band was just right, and everyone had a blast...



**...and Kathleen got  
lots of referrals!**





You'll need to understand the different Estimate Activity Resources tools and techniques for the exam. Look at each of these scenarios and write down which of the five activity resource estimation tools and techniques is being used.

1. Kathleen has to figure out what to do for the music at Rob and Rebecca's wedding. She considers using a DJ, a rock band, or a string quartet. **Alternatives analysis**
2. The latest issue of *Wedding Planner's Journal* has an article on working with caterers. It includes a table that shows how many waiters work with various guest-list sizes. **Published estimating data**
3. There's a national wedding consultant who specializes in Caribbean-themed weddings. Kathleen gets in touch with her to ask about menu options. **Expert judgment**
4. Kathleen downloads and fills out a specialized spreadsheet that a project manager developed to help with wedding planning. **Project management software**
5. There's so much work that has to be done to set up the reception hall that Kathleen has to break it down into five different activities in order to assign jobs. **Bottom-up estimating**
6. Kathleen asks Rob and Rebecca to visit several different caterers and sample various potential items for the menu. **Alternatives analysis**
7. Kathleen calls up her friend who knows specifics of the various venues in their area for advice on which one would work best. **Expert judgment**



### Exercise Solution

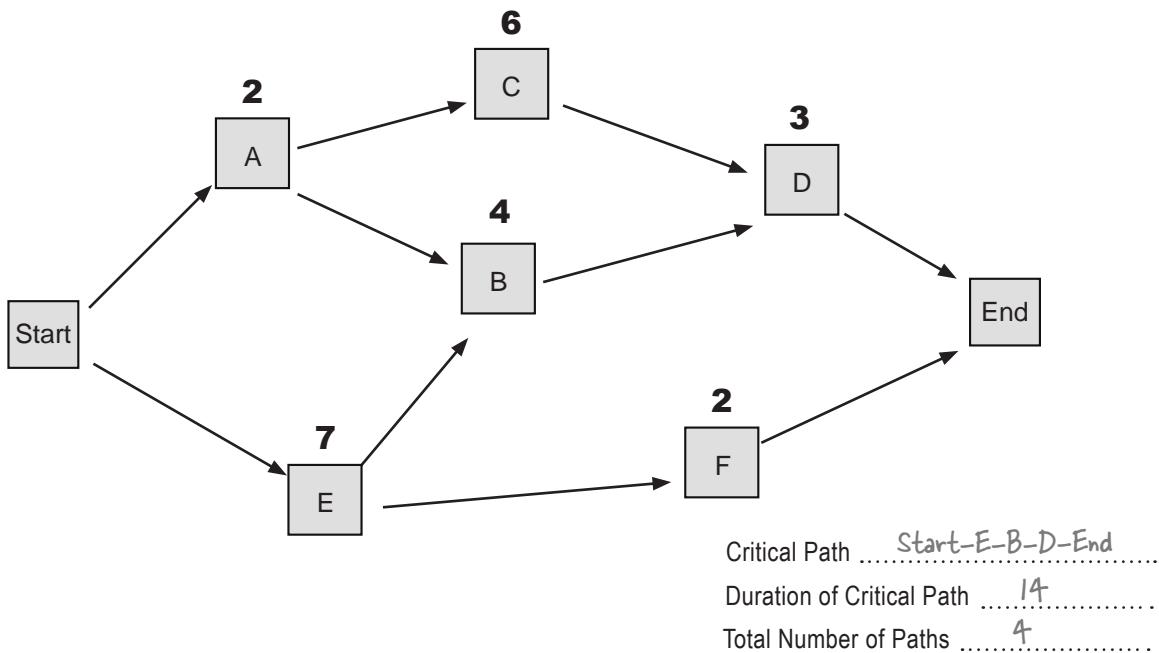
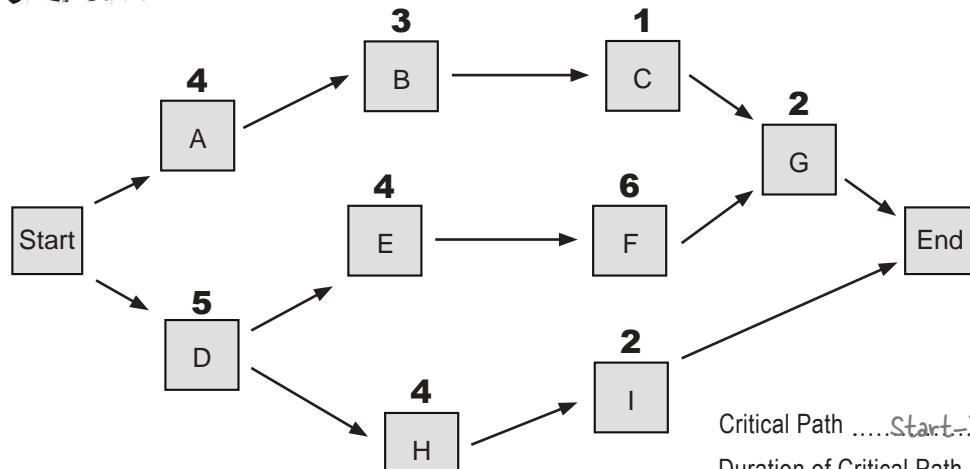
Each of these scenarios describes a different tool or technique from Estimate Activity Durations. Write down which tool or technique is being described.

1. Kathleen comes up with three estimates (one where everything goes wrong, one where some things go wrong, and one where nothing goes wrong) for printing invitations, and averages them together to come up with a final number. **Three-point estimate**
2. There will be two different catering companies at the wedding. Kathleen asks the head chef at each of them to give her an estimate of how long it will take to do the job. **Expert judgment**
3. There's a spreadsheet Kathleen always uses to figure out how long it takes guests to RSVP. She enters the number of guests and their ZIP codes, and it calculates an estimate for her. **Parametric estimating**
4. Kathleen's done four weddings that are very similar to Rob and Rebecca's, and in all four of them it took exactly the same amount of time for the caterers to set up the reception hall. **Analogous estimating**



## Exercise Solution

You may get questions on the exam asking you to identify the critical path in a network diagram. You had to practice that by finding the critical path and duration for this PDM.





You'll need to be able to calculate the float of an activity in a network diagram for the exam. Take another look at this PDM from the last exercise. Can you calculate the float for each activity?

1. What is the float for each activity on the critical path? **0**

2. What is the total duration for path A – B – C – G? **10**

3. What is the total duration for path A – B – F – G? **15**

4. What is the total duration for path D – E – F – G? **17**

5. What is the total duration for path D – H – I? **11**

6. Which path is the critical path? **D – E – F – G**

7. Write down the float for each activity:

A **2** B **2** C **7** D **0** E **0**

F **0** G **0** H **6** I **6**



Each of these scenarios describes a schedule compression technique. Pick which are examples of fast-tracking and which are crashing.

1. Kathleen guesses that 70% of the invitees will RSVP. Instead of waiting for all of them to come in, she goes ahead and reserves the tables and chairs now.



Fast-tracking



Crashing

2. Rebecca is taking a really long time to choose the decorations, so Kathleen brings in a professional decorator to help, even though it will cost more.



Fast-tracking



Crashing

3. Kathleen needs to get the invitations out quickly, so she hires two temps to come in and help her stuff envelopes for a few days.



Fast-tracking



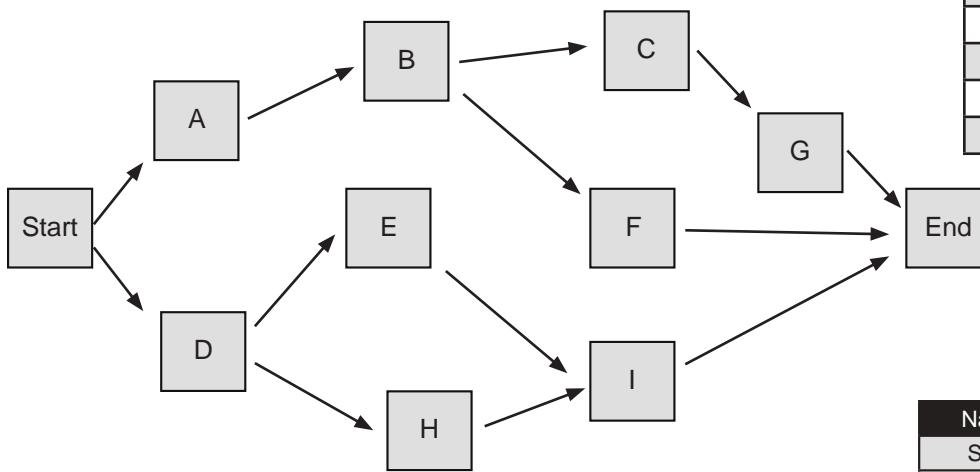
Crashing



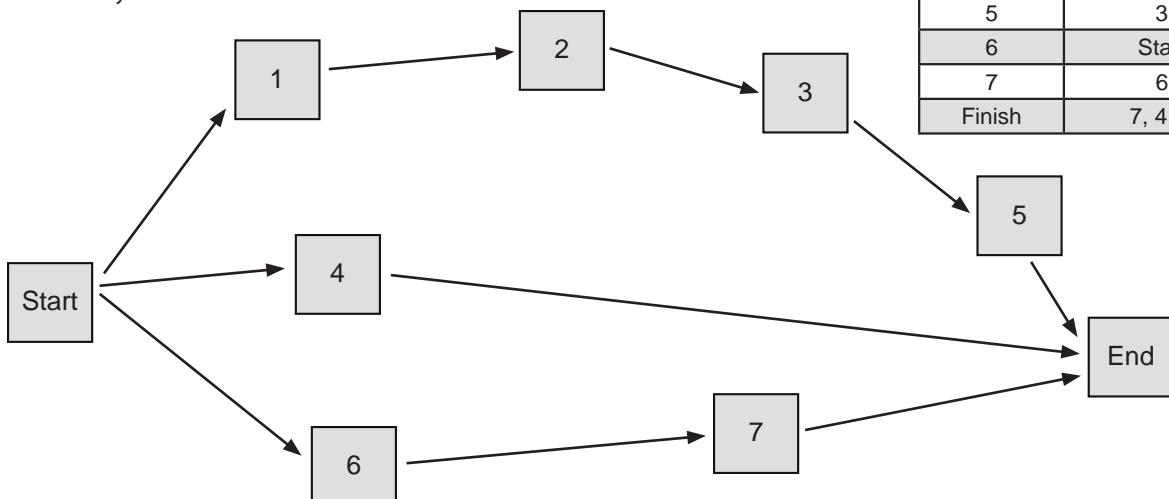
## Sharpen your pencil Solution

You'll need to know how to turn a table of nodes into a network diagram, so here's your chance to get some practice! Here's a list of nodes for a PDM network diagram. Try drawing the diagram based on it:

Name	Predecessor
Start	—
A	Start
B	A
C	B
D	Start
E	D
F	B
G	C
H	D
I	E, H
Finish	F, G, I



Now try another one!



Name	Predecessor
Start	—
1	Start
2	1
3	2
4	Start
5	3
6	Start
7	6
Finish	7, 4, 5



## Control Schedule Magnets Answers

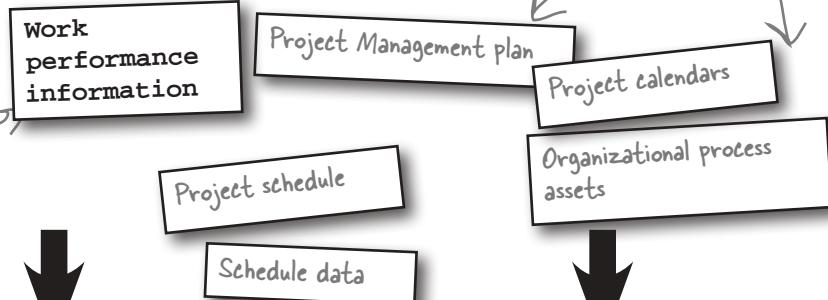
You'll see change control over and over again—every single knowledge area has its own change control process! Luckily, you'll start to see how similar they all are. But Control Schedule has its own quirks, and they're important for understanding Time Management.

This is just like Scope Management! You start with a plan, a baseline, and change requests.

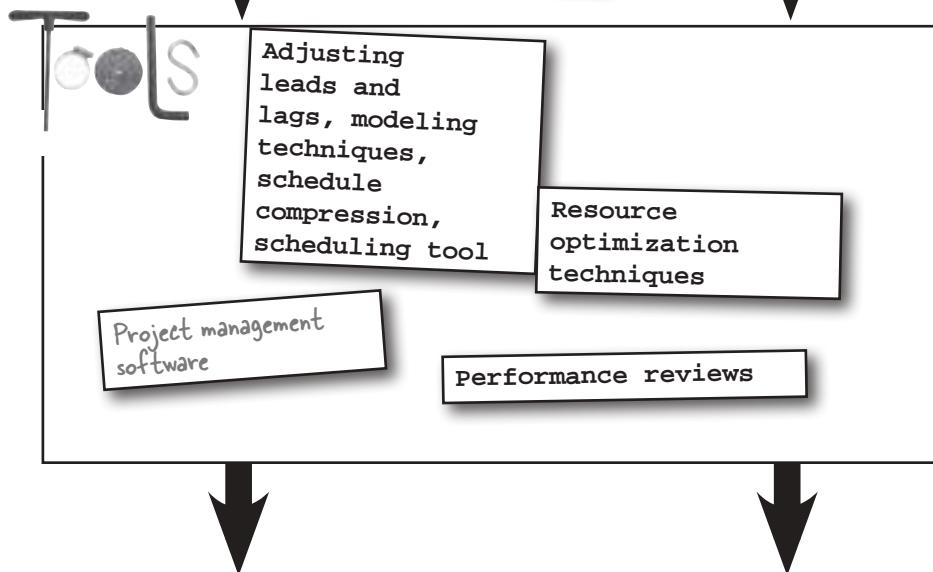
Inputs



You use these to figure out which milestones you hit and which activities are slipping.



These tools are all about figuring out where you stand in relation to the baseline!



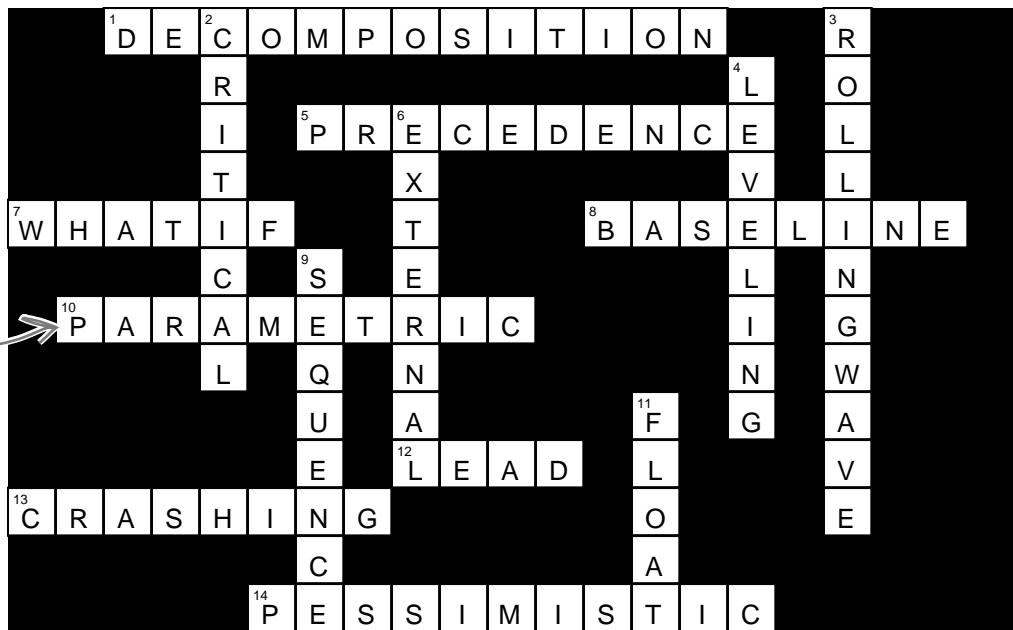
This should also look really familiar. When you go through change control, you end up with a bunch of updates and some corrective actions.





# Timecross solution

Did you get thrown because you thought using a historical database meant that you were doing analogous estimation? If you're plugging values into a database or spreadsheet, you're doing parametric estimation. A lot of people consider this a special type of analogous estimation, but describing it as parametric is more accurate.



## Exercise

Here are some examples of three-point estimates. Use the formula to figure out the expected time for each of these.

1. Expected duration = 50d; Optimistic duration = 30d; Most likely duration = 45d; Pessimistic duration = 90d
2. Expected duration = 20.3d; Optimistic duration = 12d; Most likely duration = 20d; Pessimistic duration = 30d
3. Expected duration = 25d; Optimistic duration = 10d; Most likely duration = 25d; Pessimistic duration = 40d
4. Expected duration = 51.8d; Optimistic duration = 33d; Most likely duration = 49d; Pessimistic duration = 82d

## Exam Questions

1. You're managing a project when your client tells you that an external problem happened, and now you have to meet an earlier deadline. Your supervisor heard that in a situation like this, you can use schedule compression by either crashing or fast-tracking the schedule, but he's not sure which is which. What do you tell him?

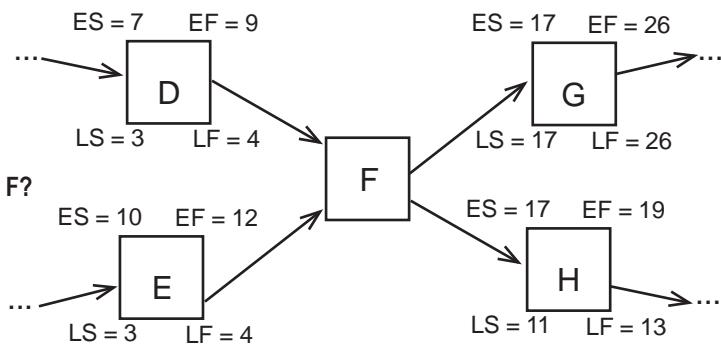
- A. Crashing the project adds risk, while fast-tracking adds cost.
- B. When you crash a project, it always shortens the total duration of the project.
- C. Crashing the project adds cost, while fast-tracking adds risk.
- D. When you fast-track a project, it always shortens the total duration of the project.

2. Given this portion of the network diagram to the right, what's the ES of activity F?

- A. 9
- B. 10
- C. 12
- D. 13

3. Given this portion of the network diagram to the right, what's the LF of activity F?

- A. 10
- B. 11
- C. 16
- D. 17



4. You are managing a software project. Your QA manager tells you that you need to plan to have her team start their test planning activity so that it finishes just before testing begins. But other than that, she says it can start as late in the project as necessary. What's the relationship between the test planning activity and the testing activity?

- A. Start-to-Start (SS)
- B. Start-to-Finish (SF)
- C. Finish-to-Start (FS)
- D. Finish-to-Finish (FF)

5. You're managing an industrial design project. You've come up with the complete activity list, created network diagrams, assigned resources to each activity, and estimated their durations. What's the next thing that you do?

- A. Use rolling wave planning to compensate for the fact that you don't have complete information.
- B. Create the schedule.
- C. Consult the project scope statement and perform Sequence Activities.
- D. Use fast-tracking to reduce the total duration.

## Exam Questions

**6. Which of the following is NOT an input to Develop Schedule?**

- A. Activity list
- B. Project schedule network diagrams
- C. Resource calendars
- D. Schedule baseline

**7. Three members of your project team want to pad their estimates because they believe there are certain risks that might materialize. What is the BEST way to handle this situation?**

- A. Estimate the activities honestly, and then use a contingency reserve to cover any unexpected costs.
- B. Allow more time for the work by adding a buffer to every activity in the schedule.
- C. Tell the team members not to worry about it, and if the schedule is wrong it's OK for the project to be late.
- D. Crash the schedule.

**8. Which of the following tools is used for adding buffers to a schedule?**

- A. Three-point estimates
- B. Critical chain method
- C. Expert judgment
- D. Critical path analysis

**9. What is the critical path in the activity list to the right?**

- A. Start-A-B-C-Finish
- B. Start-A-D-E-F-Finish
- C. Start-G-H-I-J-Finish
- D. Start-A-B-J-Finish

**10. What is the float for activity F in the activity list to the right?**

- A. 0
- B. 7
- C. 8
- D. 10

**11. You're managing an interior decoration project when you find out that you need to get it done earlier than originally planned. You decide to fast-track the project. This means:**

- A. Starting the project sooner and working overtime
- B. Assigning more people to the tasks at a greater total cost, especially for activities on the critical path
- C. Starting activities earlier and overlapping them more, which will cost more and could add risks
- D. Shortening the durations of the activities and asking people to work overtime to accommodate that

Name	Predecessor	Duration
Start	—	—
A	Start	6
B	A	4
C	B	8
D	A	1
E	D	1
F	E	2
G	Start	3
H	G	3
I	H	2
J	B, I	3
Finish	F, J, C	—

## Exam Questions

12. Slack is a synonym for:

- A. Float
- B. Lag
- C. Buffer
- D. Reserve

13. You're managing a construction project. You've decomposed work packages into activities, and your client needs a duration estimate for each activity that you come up with. Which of the following will you use for this?

- A. Milestone list
- B. Activity list
- C. Critical path analysis
- D. Project schedule network diagram

14. What's the correct order of the Time Management planning processes?

- A. Sequence Activities, Define Activities, Estimate Activity Resources, Estimate Activity Durations, Develop Schedule
- B. Plan Schedule Management, Define Activities, Sequence Activities, Develop Schedule, Estimate Activity Resources, Estimate Activity Durations
- C. Plan Schedule Management, Define Activities, Sequence Activities, Estimate Activity Resources, Estimate Activity Durations, Develop Schedule
- D. Plan Schedule Management, Develop Schedule, Define Activities, Sequence Activities, Estimate Activity Resources, Estimate Activity Durations

15. Which of the following is NOT a tool or technique used in Estimate Activity Durations?

- A. SWAG estimation
- B. Parametric estimation
- C. Analogous estimation
- D. Three-point estimation

16. You're managing a project to build a new project management information system. You work with the team to come up with an estimate of 27 weeks. In the best case, this could be shortened by two weeks because you can reuse a previous component. But there's a risk that a vendor delay could cause the project to be delayed by five weeks. Use PERT to calculate a three-point estimate for this project.

- A. 25.83 weeks
- B. 26 weeks
- C. 27.5 weeks
- D. 28.3 weeks

## Exam Questions

17. Given the network diagram below, what's the critical path?

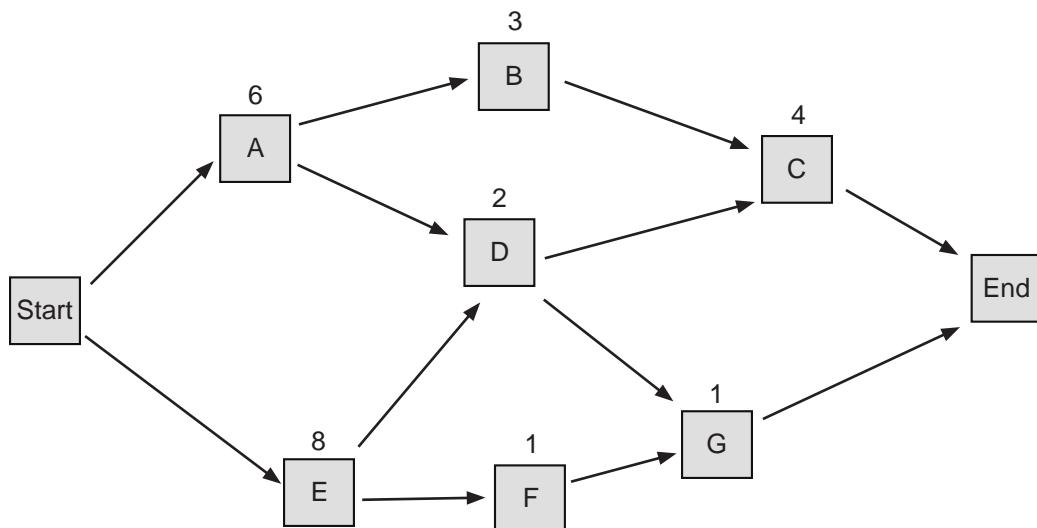
- A. Start-A-B-C-End
- B. Start-A-D-G-End
- C. Start-E-D-C-End
- D. Start-E-F-G-End

18. For that same network diagram below, what's the float for activity A?

- A. 0 weeks
- B. 1 week
- C. 2 weeks
- D. 4 weeks

19. For that same network diagram below, what's the float for activity E?

- A. 0 weeks
- B. 1 week
- C. 2 weeks
- D. 4 weeks



## Exam Questions

- 20. You're managing a software project when your customer informs you that a schedule change is necessary. Which is the BEST thing to do?**
- A. Consult the schedule management plan.
  - B. Notify the team and the sponsor that there's going to be a schedule change.
  - C. Influence the factors that cause change.
  - D. Refuse to make the change because there's already a schedule baseline.
- 21. Your company has previously run other projects similar to the one you're currently managing. What is the BEST way to use that information?**
- A. Check the organizational process assets for lessons learned and other information about the past projects.
  - B. Use parametric estimation to estimate your project based on past projects' performance.
  - C. Start from scratch because you don't want mistakes from past projects to influence you.
  - D. Reuse the Project Management plan from a past project.
- 22. You're planning the schedule for a highway construction project, but the final date you came up with will run into the next budget year. The state comes up with capital from a reserve fund, and now you can increase the budget for your resources. What's the BEST way to compress the schedule?**
- A. Go back to your three-point estimates and use the most optimistic ones.
  - B. Use the extra budget to increase your contingency reserve.
  - C. Hire more experts to use expert judgment so your estimates are more accurate.
  - D. Crash the schedule.
- 23. You're managing a software project. You've created the schedule, and you need to figure out which activities absolutely cannot slip. You've done critical path analysis, identifying the critical path and calculating the early start and early finish for each activity. Which activities cannot slip without making the project late?**
- A. The ones with the biggest difference between ES and LF
  - B. The activities on the critical path
  - C. The activity with the most lag
  - D. The last activity in the project, because it has no float
- 24. You're managing a construction project. You've decomposed work packages into activities, and your client needs a duration estimate for each activity that you came up with. Which of the following BEST describes what you are doing?**
- A. Evaluating each activity to figure out how much effort it will take
  - B. Estimating the number of person-hours that will be required for each activity
  - C. Understanding, in calendar time, how long each activity will take
  - D. Estimating how many people it will take to perform each activity

# Exam Questions

## 1. Answer: C

You're likely to get some questions that ask you about crashing and fast-tracking, and it's important to know the difference between them. When you crash the project, it means that you add resources to it, especially to the critical path. There's no real risk in doing that—in the worst-case scenario, the extra people just sit around!—but it does cost more. Fast-tracking means adjusting the schedule so that activities overlap. The same resources are doing the work, so it's not going to cost more, but it's definitely riskier, because now you've eliminated buffers and possibly broken some dependencies! And remember that crashing or fast-tracking won't always work to make the project go faster!

## 2. Answer: D

Calculating the early start (ES) of an activity isn't hard. All you need to do is look at the early finish (EF) of the previous activity and add one. If there's more than one predecessor, then you take the largest EF and add one. In this case, the predecessors to activity F are D, with an EF of 9, and E, with an EF of 12. So the ES of F is  $12 + 1 = 13$ .

## 3. Answer: A

It's just as easy to calculate the late finish (LF). Look at the following activity, take its LS (late start), and subtract one. If there's more than one following activity, use the one with the lowest LS. So, for activity F in the question, the following activities are G, with an LS of 17, and H, with an LS of 11. So the LF of F is  $11 - 1 = 10$ .

## 4. Answer: C

Don't let the jargon fool you! You don't need to know anything about software testing to answer this question. When you have two activities, and the first activity has to be timed so that it finishes before the second one starts, then you've got a Finish-to-Start relationship, or FS.

## 5. Answer: B

Did answer A trick you? No need for  
rolling wave planning when you've got  
enough info to define all the activities!

This is a which-is-next question that describes a project that's completed the Define Activities, Sequence Activities, Estimate Activity Resources, and Estimate Activity Durations processes. The next process in Time Management is Develop Schedule, which means that the next thing you do is create the schedule!

# Answers

## ~~Exam Questions~~

### 6. Answer: D

The schedule baseline is an output of the Develop Schedule process, not an input. You should definitely know what goes into the schedule baseline: it's a specific version of the schedule that you set aside and use for comparison later on, when you want to know if the project is running late.



I GET IT—WE CAN USE THE SCHEDULE BASELINE THE SAME WAY THAT WE USE THE SCOPE BASELINE! WE TAKE A SNAPSHOT OF IT AND THEN SAVE IT, SO WE CAN COMPARE THE PROJECT'S PERFORMANCE AGAINST IT LATER!

### 7. Answer: A

You always want to be honest with your estimates. Every project has unknowns and risks, and there's no way to estimate any activity exactly! Luckily, we have tools to deal with this. You can use reserve analysis, a tool of Estimate Activity Durations, to come up with a contingency reserve that you can use to plan for these risks.

### 8. Answer: B

The critical chain method is a technique that's part of Develop Schedule that lets you figure out how to handle the problems that come with having limited resources. You use it to shuffle both activities and resources on your critical path. One important aspect of the critical chain method is that you can use it to add buffers to the schedule to reduce the risk of certain activities.

### 9. Answer: A

When you draw out a network diagram for the activities in the table, you end up with four paths. And you definitely should draw out the activity diagram for a question like this! You're allowed to use scratch paper on the exam, and this is one place where you should definitely do it. Of the four paths, only one has the longest duration: Start-A-B-C-Finish, which has a duration of  $6 + 4 + 8 = 18$ . That's the critical path.

## Answers

~~Exam Questions~~

## 10. Answer: C

Activity F is in the path Start-A-D-E-F-Finish. This path has a duration of  $6 + 1 + 1 + 2 = 10$ . The float of an activity is the longest time it can slip before it affects the critical path. In this case, activity F can slip by 8 without causing the path that it's on to go beyond the critical path. But any more than that, and its path becomes the new critical path!



Did you notice answer A? Don't forget that the float of any activity in the critical path is zero!

## 11. Answer: C

This is the definition of fast-tracking, and you're probably getting the hang of this one by now. You may get a question like this, but you'll almost certainly see fast-tracking as an incorrect answer to several questions!

## 12. Answer: A

Remember that when you see *slack*, it's the same thing as float. Either term could appear on the exam!

## 13. Answer: B

This question is asking about the Estimate Activity Durations process. Take a look at the answers—there's only one answer that's used in that process: you need to start with the activity list in order to do the estimates for the activities! The other answers are things that are inputs, tools, or techniques for other processes.



When a question asks what you'd use for a process, it's asking you to pick an input, tool, or technique that's part of the process.

## 14. Answer: C

It's not hard to remember the order in which the Time Management processes are performed. If you use a little common sense, you can reason your way through a question like this. You need to define your activities before you can sequence them, you need to know who's going to be doing an activity before you can estimate how long it's going to take, and you need to do all of that before you can build a schedule!

## 15. Answer: A

You'll have to know the different kinds of estimating techniques for the exam. You don't necessarily have to be good at doing them, but you should recognize which are which. Parametric estimating is when you plug values into a formula, program, or spreadsheet and get an estimate. Analogous estimating uses similar activities from past projects to calculate new estimates. Three-point estimating uses an optimistic, pessimistic, and realistic estimate.



Control Schedule isn't included in the list of processes because if a schedule change happens, you'll have to go back and revisit the other Time Management processes. So it doesn't have a specific order!

# Answers

## ~~Exam Questions~~

### 16. Answer: C

This question is asking you to apply the PERT three-point estimation formula:  $(\text{optimistic time} + 4 \times \text{most likely time} + \text{pessimistic time}) \div 6$ . When a question gives you these values directly, it's easy. But in this case, to answer the question you had to figure out the values for the optimistic time and pessimistic time, which meant that you needed to look at the assumptions that the team was making. The most likely time was given: 27 weeks. The best-case scenario would come in two weeks earlier, at 25 weeks, and the worst case would come in five weeks late, at 32 weeks. So the estimate is  $(25 \text{ weeks} + 4 \times (27 \text{ weeks}) + 32 \text{ weeks}) \div 6 = 27.5 \text{ weeks}$ .

Sometimes you'll get a question about applying a formula, but you'll need to read the text in the question to figure out all of the variables.

### 17. Answer: C

The path Start-E-D-C-End has a duration of  $8 + 2 + 4 = 14$ , which is the longest total duration in the entire network.

### 18. Answer: B

Activity A is on three different paths: Start-A-B-C-End (13), Start-A-D-C-End (12), and Start-A-D-G-End (9). To calculate its float, you take the longest path's length and subtract it from the length of the critical path:  $14 - 13 = 1$ .

Can you think of how a question might quiz you on this information without actually asking you to look at a network diagram?

IT LOOKS LIKE THERE WILL BE A BUNCH OF QUESTIONS ON THE CRITICAL PATH METHOD! IT'S A GOOD THING I'VE GOT SO MUCH PRACTICE WITH IT.



### 19. Answer: A

Since activity E is on the critical path, its float is zero, because the float of any activity on the critical path is zero.

### 20. Answer: A

The Schedule Management plan tells you how changes to the schedule are to be handled. Any time there's a change, the first thing you should do is consult the plan to see how it should be handled.

## ~~Exam Questions~~

### **21. Answer: A**

The organizational process assets contain historical information about past projects. When you write up your lessons learned, or create work performance information, you store it in your company's organizational process asset library! Also, did you notice that answer B was the wrong definition of parametric estimation?

### **22. Answer: D**

Crashing the schedule is the form of schedule compression that increases cost. This is a difficult question because all of the answers sound good, and one or two are a little misleading! Don't fall into the trap of choosing an answer because you recognize a valid tool or technique in it. Reserve analysis and three-point estimates are very useful techniques, but they're not the answer to this question.

### **23. Answer: B**

The critical path is the path in the network diagram where any delay will cause a delay in the schedule. These are the activities that cannot slip without making the project late!

### **24. Answer: C**

This question was really about the definition of *duration*, and the key to answering it is to understand how duration is different from effort. The correct answer talks about "calendar time," which is what a duration is: it's a measurement (or estimate) of how long the activity will take in real life, taking into account the number of people who will be doing the work, the availability of the people and other resources, everyone's vacation time, time taken away from the schedule because people are pulled off of the activity to work on higher-priority activities, and other real-world factors. That's different from effort (which is often measured in person-hours), and it's different from resource estimating (which involves estimating how many people and what other resources will be used for the activity).

## 9 Human resource management

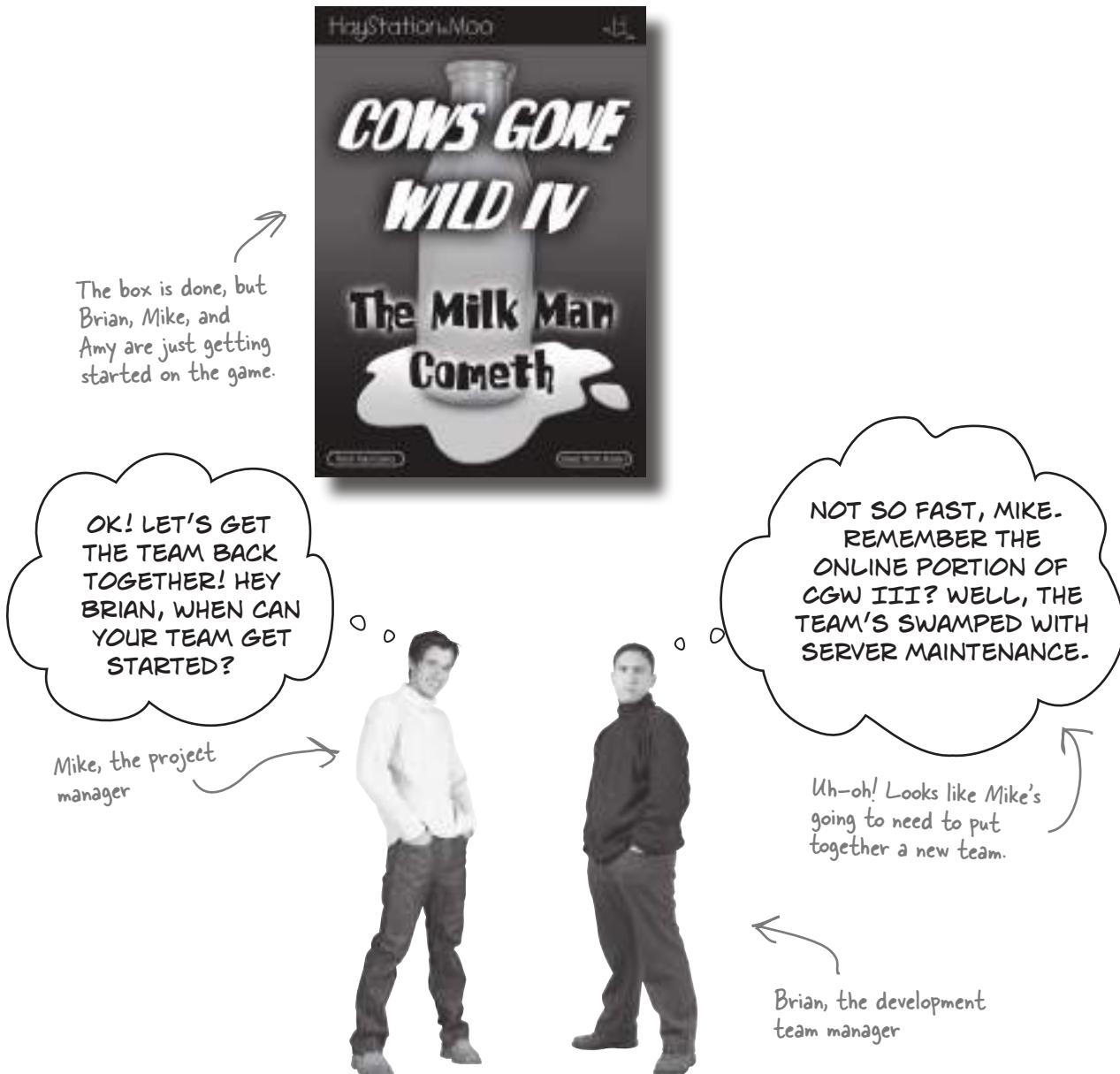
# *Getting the team together*



**Behind every successful project is a great team.** So how do you make sure that you get—and keep—the best possible team for your project? You need to **plan carefully**, set up a good **working environment**, and negotiate for the **best people** you can find. But it's not enough to put a good team together...if you want your project to go well, you've got to keep the team motivated and deal with any conflicts that happen along the way. **Human resource management** gives you the tools you need to get the best team for the job and lead them through a successful project.

## Mike needs a new team

*Cows Gone Wild III* was a huge success! But now the Ranch Hand Games team is gearing up for their next big hit. How are things shaping up?



## Cubicle conversation



HEY, WE'RE ALL ON THE SAME TEAM HERE. LOOK, WHY DON'T WE HAVE PEOPLE FROM OUR TEAMS JUST HELP OUT WHENEVER YOU NEED SOMEONE?

**Brian:** Yeah, there's no reason you need our resources dedicated to your project. We can get **multiple** projects done that way.

**Mike:** Come on, guys. You don't really think that's gonna work, do you?

**Amy:** Sure, why not?

**Mike:** We can't just staff up as we go; that's going to cause huge problems.

**Brian:** You're overreacting, Mike. Look, I'm a team player, and I want to get the project done. You just tell me when you need someone off my team, and I'll make sure you've got the developers and testers you need. What's wrong with that?

**Mike:** OK, so what if I need three developers starting tomorrow for the next two weeks? Can you do that?

**Brian:** Well, no, I've got a deadline on Friday. It'll have to wait until next Monday. But that's just a couple of days.

**Mike:** See, that's what I'm talking about! A few days here, a few days there...if we have to wait a few days every time the team needs someone, we'll totally blow the schedule.



How can Mike solve his problem? What can he do to make sure that he gets the team members he needs when he needs them?

## Get your team together and keep them moving

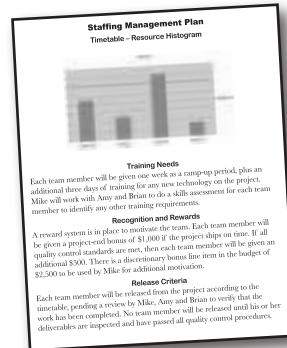
You want to stay in control of your project team, right? But when you work in a matrix organization, your team members don't directly report to you. So how do you make sure you get the best people, and keep them motivated and productive? That's what the four processes in **Human Resource Management** are for: guiding you through all the things you need to do to make sure you get everyone for your project when you need them.

A lot of the stuff in this chapter applies mostly to matrix organizations...but you'll still find it really useful, even if you don't work in a matrix company!

This shouldn't be a surprise—every knowledge area has its planning process, and Plan Human Resource Management is no exception.



In the Plan Human Resource Management process, you plan out exactly which resources you'll need, what their roles and responsibilities are, and how you'll train your team and make sure they stay motivated.



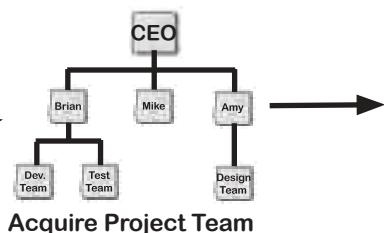
Plan Human Resource Management

This is where you plan out the staffing needs for your project, and how you'll manage and reward the team.

It makes sense that Acquire Project Team and Develop Project Team are in the Executing group—you only put the team together AFTER the project has started.



**Executing process group**



Develop Project Team

You'll need to train your team, and keep them motivated with rewards in order to get the project done.

No project goes perfectly. People have conflicts, and it's up to you to make sure they get resolved.



Manage Project Team

All three of these processes are part of the Executing process group, because they happen while your team's executing the project!



**Executing process group**



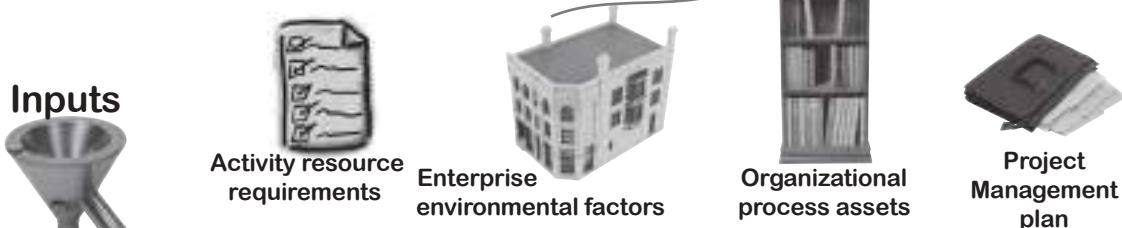
What can you do to make sure that you get the right people for your team exactly when you need them? What can you do before the project starts to make sure they stay motivated?

# Figure out who you need on your team

Project teams don't just assemble themselves spontaneously! It takes a lot of planning and guidance to get a team together, and that's the idea behind the **Plan Human Resource Management** process. Remember, in a matrix organization your team doesn't report directly to the project manager. You need to work with the functional managers to get the team members that you need for your project...which means there's a lot of information that you need to give to everyone so they know exactly who you need for your team.



You've seen these two inputs a whole bunch of times now!



**Organization charts and position descriptions** tell everyone how your team is structured.

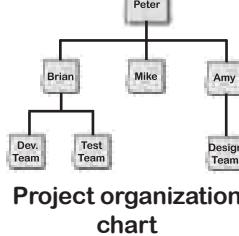
**Networking** means both formally and informally interacting with other people in your company and industry to stay on top of everything.

**Organizational theory** is where you use proven principles to guide your decisions.

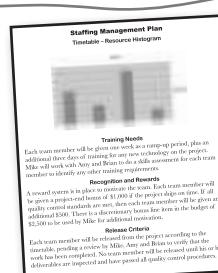
**Expert judgment** is used to figure out resource requirements and position descriptions.

**Meetings** help the team come together and agree on what's needed for the project.

This is a lot like the other planning processes you've seen already! You start with your project plan and what you know about your company, and you come up with a plan.



Project organization chart



Staffing Management plan

Work Package	RACI Matrix	Role			
		Mike	Amy	Brian	Peter
Project Management	R	I	I	I	I
Design	C	R	C	I	
Construction	C	C	R	I	
Testing	C	C	R	I	

R = Responsible A = Accountable C = Consult I = Inform

Roles and responsibilities



The inputs, tools and techniques, and outputs of **Plan Human Resource Management** should seem pretty familiar! Write down what you think you'd use each of them for. Notice that there are a few that you haven't seen before—take an educated guess at those.

## INPUTS

Enterprise environmental factors

Organizational process assets

## TOOLS AND TECHNIQUES

Organization charts and position descriptions

There are a couple  
of other tools &  
techniques—this isn't  
the only one!

## OUTPUTS

Human Resource Management plan:

- Staffing Management plan
- Roles and responsibilities

- Organization charts

Think about how this  
is different than the  
organization charts listed  
under Tools and Techniques.

## Sharpen your pencil Solution

### INPUTS

Enterprise environmental factors

This is information about the company's culture and structure

Organizational process assets

Templates and lessons learned from past projects

Your company's culture is really important—stuff like common languages, technical disciplines, and how people normally relate to one another.

You've already seen lots of ways we use templates and checklists. They're just as important in Plan Human Resource Management.

It's easy to lose track of who reports to whom, and what different people do in your company. You need to know that stuff if you want to staff your project!

### TOOLS AND TECHNIQUES

Organization charts and position descriptions

Shows the relationships between managers, team members, and other people inside and outside the company who will work on the project

### OUTPUTS

Human Resource Management plan:

- Staffing Management plan

Your Staffing Management plan describes who will be on your project, when they'll do the work and for how long, and the reward system you'll use to keep the team motivated.

Describes how you'll manage and control your resources

Every role on the project needs to be defined—it has a title, has authority to do certain things, and is responsible for specific deliverables.

- Roles and responsibilities

Lists each role on the project that needs to be filled

- Organization charts

Shows the reporting structure of the resources assigned to the project team

This is a lot like the org chart for your whole company, except that it lists only the specific people on the project.



HOLD ON—HOW CAN ORGANIZATION CHARTS BE BOTH TOOLS AND TECHNIQUES AND OUTPUTS?

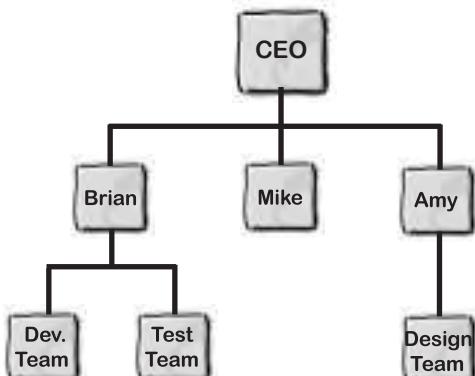
**You need two charts because you have two “organizations.”**

One organization is the whole company—along with any subcontractors or consultants you’ve got access to for your project team. The other organization is just the people who are on the team. The team might have people from different groups in your company, and they need to know how they interact. That’s why you create a chart just for the team.

Some people will bring in a consultant or expert to manage or lead part of the team. Make sure the project’s org chart shows that relationship, even if it’s not part of the company!

**The project organization chart shows how your team members relate with one another.**

This might include people or relationships that may not necessarily show up on a company organization chart. If you’ve got a team built from multiple consultants and subcontractors, this chart will be the only place where everyone is listed at once.



**Roles and responsibilities show who's responsible for what.**

It's really common to see the roles and responsibilities for a project written out as a **RACI matrix**, which is just a table that lists the role or people on the top; the specific activities, work, or responsibilities down the side; and the level of responsibility that each person or role has for each of the activities or responsibilities. (RACI stands for “Responsible, Accountable, Consulted, and Informed.”)

This could also list roles, like Project Manager, Creative Director, or Development Manager.

RACI Matrix		People			
Work Package	Project Management	Mike	Amy	Brian	CEO
		R	I	I	I
	Design	C	R	C	I
	Construction	C	C	R	I
	Testing	C	C	R	I

R = Responsible A = Accountable C = Consulted I = Informed

# The Staffing Management plan

An important component of the Human Resource Management plan is the **Staffing Management plan**. It tells you everything that you need in order to build your team, keep them motivated, and manage them to resolve conflicts and get the work done.

A common way of showing the timetable—or when people will work on what—is to use a resource histogram.

This is really important for telling the functional managers exactly who you'll need on your team, so they can provide the staff that you need to get the job done.

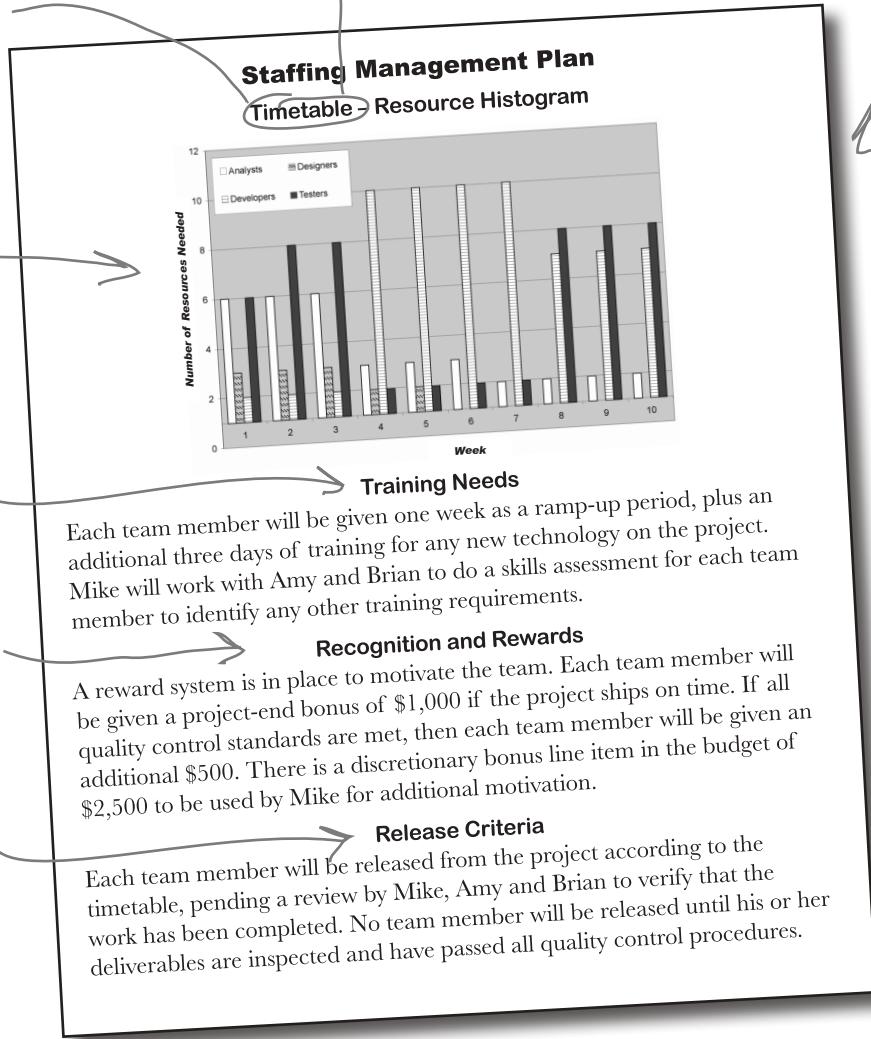
The resource histogram tells you the type and number of resources you need at any time. It's usually a vertical bar chart.

You need to make sure everyone on the team has the skills he or she needs to do the job.

A really important part of Human Resource Management is keeping your team motivated, and rewards tied to goals are a great way to do that.

You'll need to plan out exactly how your team members will roll off of your project so functional managers and other project managers will know if they're available for other projects.

Everything you do with your team—acquiring them, developing them, and managing them—depends on a good Staffing Management plan.





Answers on page 496.

Read the **Staffing Management plan** on the facing page and answer these questions about the project.

1. How many designers, developers, and testers are needed in week #7 of the project?

..... designers ..... developers ..... testers

2. Who is responsible for verifying that each team member has the skills appropriate to the project?

.....  
3. Rewards should always be tied to performance goals in order to motivate the team. What performance goal has been set for the team, and what reward will each team member receive if it's achieved?

.....

## *there are no* **Dumb Questions**

**Q:** I still don't get the resource histogram. Am I supposed to make this myself, or does it come from somewhere?

**A:** You need to come up with the histogram yourself when you put together the Staffing Management plan. Since you're managing the project, you're the only one who knows when each person is needed on the project. Remember all of the activities that you came up with, back when you were building the schedule in the Chapter 6? Well, each of those activities had resource requirements, right? That means you know exactly what resources you'll need at any time in your project! That's why the activity resource requirements are an input to Plan Human Resource Management—you need the schedule and the activities in order to figure out the timetable. The histogram is the easiest way to show that information.

**Q:** Is that RACI chart really necessary?

**A:** Yes, definitely! Sometimes people split up responsibilities in ways that aren't immediately obvious just from people's titles or the names of their roles on the project—that's one of the big advantages of a matrix organization. RACI charts help everyone figure out their assignments. Mike might have Brian's senior developers sit in on Amy's design meetings, even though they don't usually do that. He'd put that in the RACI matrix to show everyone that's now part of their jobs for the project.

**Q:** Once I know what roles need to be filled on my project, how do I actually get the team on board?

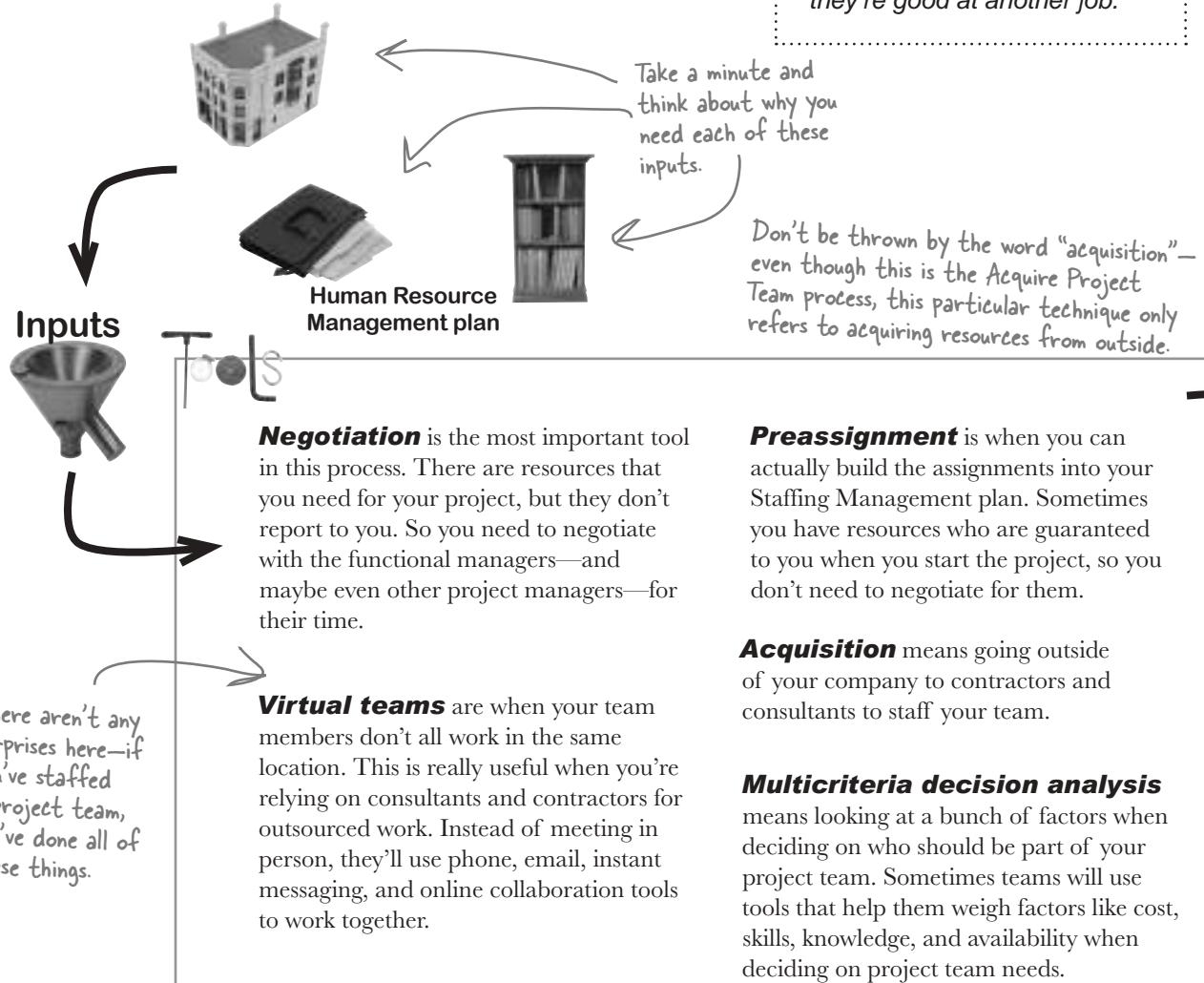
**A:** That's what the next process is all about! It's called **Acquire Project Team**, and it's where you actually staff your project. Of course, you don't staff it during the planning phase. You have to wait until the project work begins, which is why it's in the *Executing* process group.

The hardest part about staffing your project is negotiating with the functional managers. The best resources are the ones that are in demand, which means your negotiating skills will be very important when it comes time to staff your project team.

## Get the team together

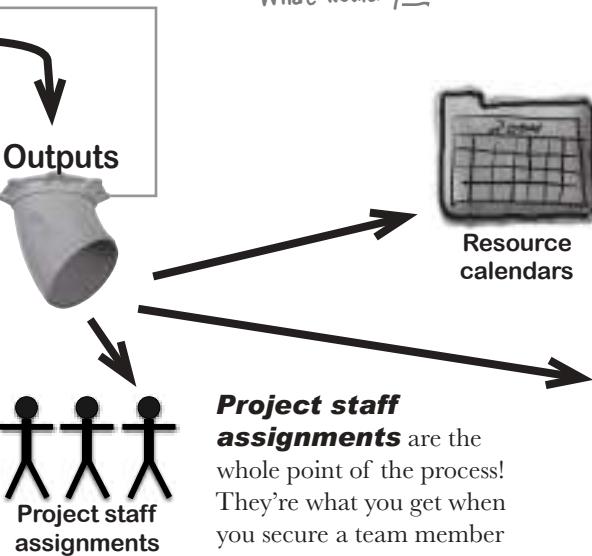
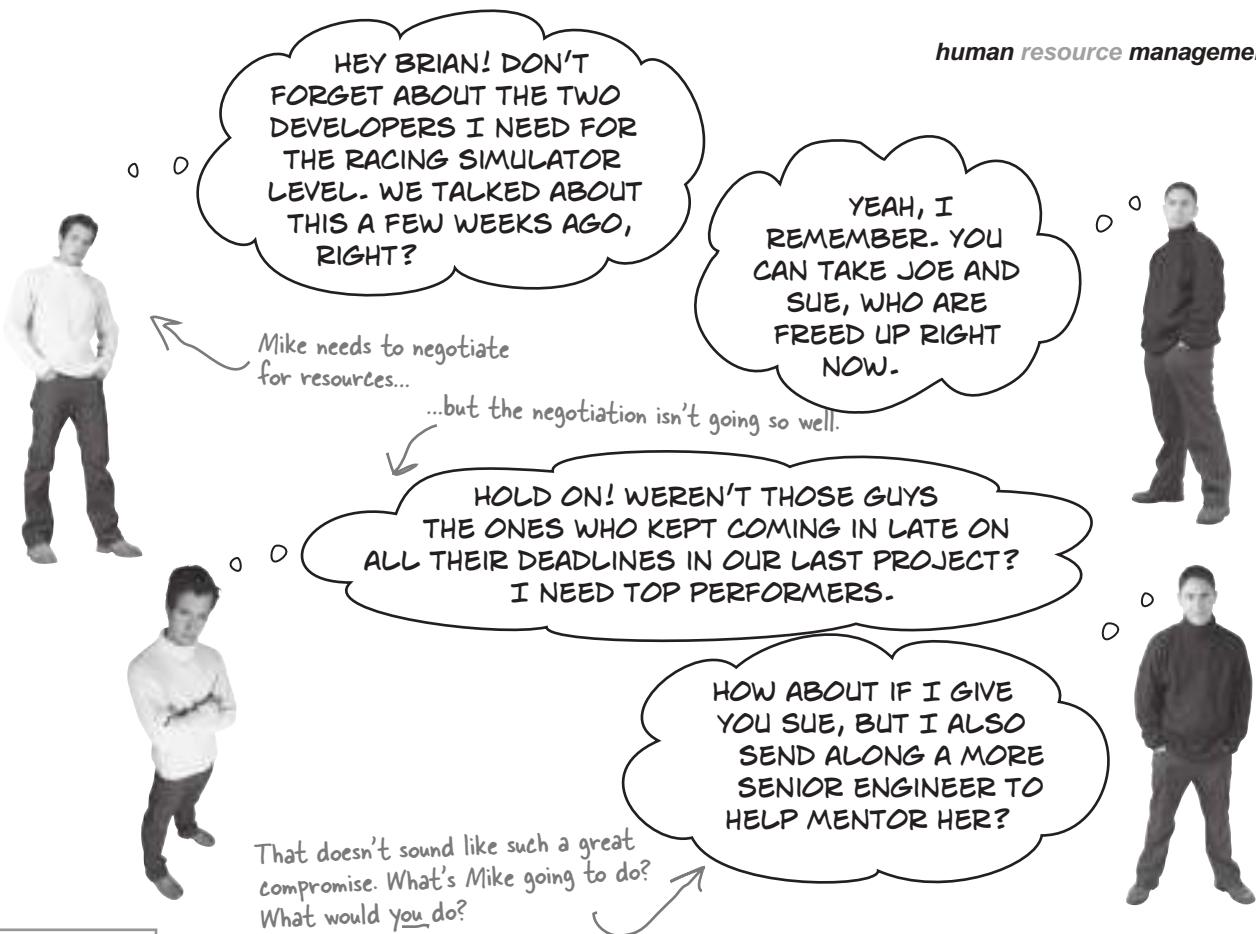
Your Human Resource Management plan is in place, your project is ready to roll, and now it's time to begin the actual project work! You need your team, and the way you bring them on board is the **Acquire Project Team** process.

This is where you negotiate with functional managers for your project team members. You need the right people for the project, and you've done all the prep work to figure out who you need and when you need them. So now it's time to go get your team!

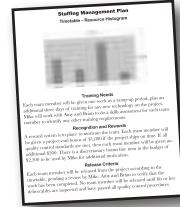


### Beware of the halo effect!

*That's when you put someone in a position they can't handle, just because they're good at another job.*



**Project staff assignments** are the whole point of the process! They're what you get when you secure a team member and assign him or her to a specific role on the project.



### Project Management plan updates

**Project Management plan updates** During Plan Human Resource Management, you might not have all the information. You might discover a better team structure, or find out that certain resources simply aren't available. Keep the plan up to date with this new information.

If you need a team member for a few weeks at the beginning, and then again for another week later, make sure the resource availability reflects this!

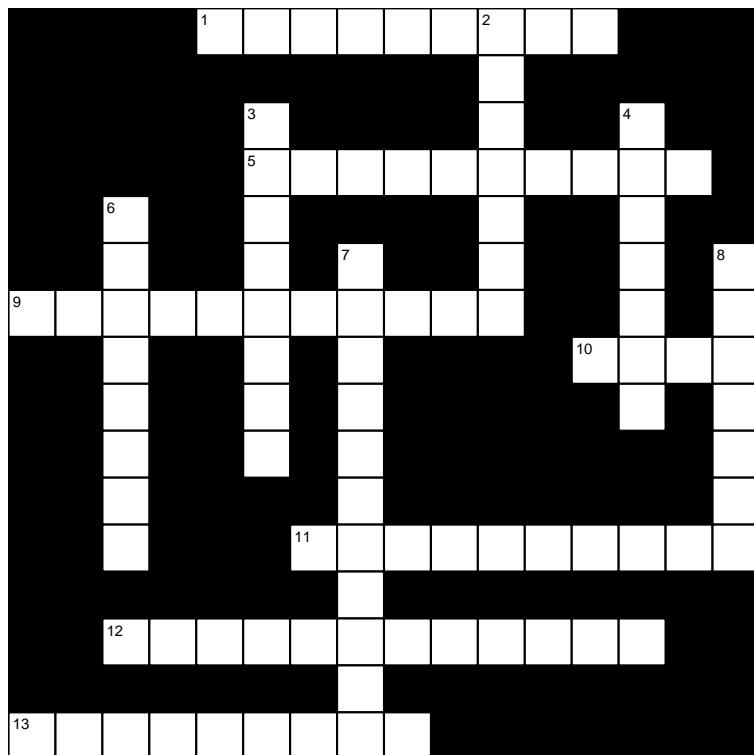


**Resource calendars** tell the company exactly when the team members will be available once they're done.



## Human Resourcecross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



Answers on page 497.



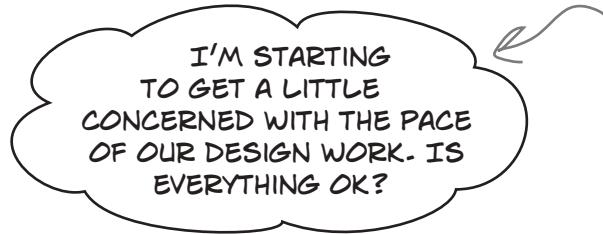
### Across

1. The resource \_\_\_\_\_ is a vertical bar chart in the Staffing Management plan that tells you the type and number of resources you need.
5. This is a great tool for communicating roles and responsibilities.
9. The main output of the Acquire Project Team process is project staff \_\_\_\_\_.
10. The \_\_\_\_\_ effect causes people with technical expertise to be put in positions for which they're unqualified.
11. The first process you perform in this knowledge area is Plan Human Resource \_\_\_\_\_.
12. This kind of chart tells you how team members relate to one another in your company.
13. The Manage Project Team process is part of the \_\_\_\_\_ process group.

### Down

2. A great way to motivate your team.
3. What you provide for a human resource in order to ensure he or she has the skills necessary to do the project.
4. You use \_\_\_\_\_ teams when your team members don't all work in the same location.
6. \_\_\_\_\_ availability is an output that describes when each team member will be available to your project.
7. The most important tool in Acquire Project Team.
8. The \_\_\_\_\_ organization chart shows only the people assigned to your team, including consultants and subcontractors.

## Cubicle conversation



Looks like Mike's negotiation went well in the end! So now he's got his team...but can he get them motivated?

**Amy:** I haven't noticed anything. What's up?

**Mike:** Well, maybe it's nothing, but a couple of the design team members have been missing some deadlines. Nothing major, but it's starting to concern me.

**Amy:** Well, OK. I can keep an eye on them.

**Mike:** That's not all. One of them hasn't been replying to emails at all, and another scheduled a vacation right in the middle of a huge deadline week. I think we may have a real motivation problem.

**Amy:** You're right, that sounds pretty bad. What can I do about it?

**Mike:** Well, I built a discretionary bonus budget into the plan.

**Amy:** Right, that \$2,500. But should we really be talking about giving bonuses? I thought these were underperformers. Shouldn't we reward only good behavior?

**Mike:** Well, right, but if we tie the bonus to meeting an aggressive deadline or high quality standards, it might help get them energized again.

**Amy:** We can give it a shot, but I'm skeptical.



Do you think Mike's idea will work? Why is it a good idea to make the bonus contingent on meeting specific goals? Can this plan backfire?

## Develop your project team

The **Develop Project Team** process is the most important one in Human Resource Management. It's the one where you make sure your team is motivated and well managed—and those are some of the most important things that project managers do! You do it throughout the *entire* Executing phase of the project, because you need to keep your team moving toward the goal.



Get the team involved in planning—the more they feel like they're in control, the better they feel about the project!

### Motivation

- One of your most important jobs as project manager is keeping the team motivated and constantly monitoring them to make sure they stay motivated.
- A really effective way to motivate your team is to set up a reward system. But make sure that they understand exactly what they're being rewarded for—and it *must* be fair, or it could backfire!
- Training is another great way to keep a team motivated. When people feel that they're growing professionally, they stay more involved and get more excited by their work.

This makes it more challenging to stay on top of the team and make sure the work is getting done.

### Management

- When the project is being planned, you're directing everything—but by the time it's *executing*, the project manager is more of a coach and a facilitator.
- That's why it's really important for a project manager to have “soft skills”—you need to really understand what makes your team members tick, and help with their problems.
- A really good way to make sure that your project team sticks together is to establish **ground rules** for your project, which set a standard for how everyone works together.

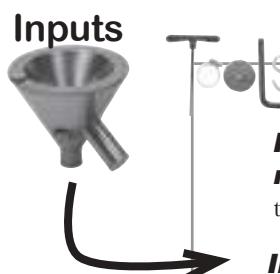
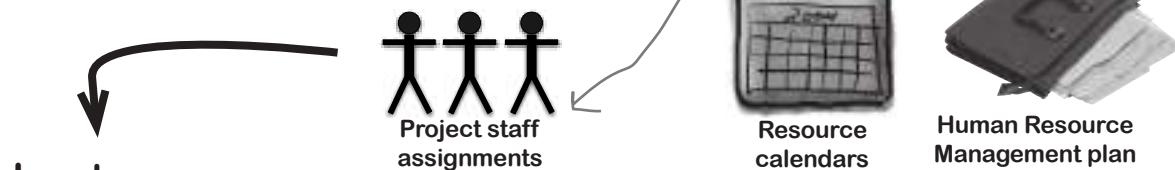
This is one of the tools and techniques for Develop Project Team.

You develop your project team by keeping them motivated, and you do this all the way through your entire project.

# Develop the team with your management skills

How do you keep your team motivated and up and running? With the tools and techniques for **Develop Project Team**, that's how. When you're working with your team, you need to be a leader. That means setting the rules for how people interact with one another, making sure they have the skills they need, setting up a good working environment, and keeping them motivated.

The inputs to Develop Project Team are the outputs you just created.



Discussing ground rules with the team can be really valuable, because it helps everyone see what's important to their teammates!

**Recognition and rewards** are the best way to keep your team motivated!

**Interpersonal skills** are all about using soft skills to help the people on your team solve problems.

**Ground rules** help you prevent problems between team members, and let you establish working conditions that everyone on the team can live with.

**Team-building activities** are important throughout your entire project. You're responsible for keeping the team together!

**Personnel assessment tools** are used to figure out how your team approaches the work and how they like to work together. These tools include things like focus groups and surveys used to determine your team's style of working and interacting.

**Training** is a really important part of developing your team. If you've got a team member who doesn't have the skills to do the job, you need to get him trained...and it's up to you to plan enough of the project's time and budget to make sure it happens!

For example, you might have a rule where everyone always emails the team when they take a day off.

**Colocation** is the opposite of virtual teams. When you have all of your team located in the same room, you can increase communication and help them build a sense of community. Sometimes that room is called a **war room**.

# Your interpersonal skills can make a big difference for your team

Knowing all of the tools and techniques in the *PMBOK Guide* will help you learn a lot about your project, but the way you help your team to get the job done is just as important as the steps you take to get it done.

The team was happy to work on CGW III from the beginning. But when Mike told them that the company saw the game's success as responsible for 70% of their revenue, it really showed them how important the work was.



**Leadership** is all about giving the team a goal to shoot for and helping them to see the value in the work they are doing. It's not enough to have a team know the end product that they're building; they need to **understand the value that that product is going to bring to the company**.

A project manager needs to constantly remind the team of the vision they're working toward, and make decisions to help keep the team on track toward it.



**Team building** involves helping your team learn to depend on and trust one another. As a project manager, you're responsible for helping the team come to an understanding about how they'll communicate and stay motivated when things go wrong. If you're open about your decision-making processes and communicate often about what you're doing, you can **help your team to bond**. Some people think of team building as going out for pizzas after work, but it's more about how you lead, and how you help to create an environment where your team members can trust one another.

**Motivation** demonstrates to your team the value that the project has for them. It includes making sure that people are compensated and rewarded financially for their work. But that's not the only facet of team motivation that you need to be concerned with. Your team also needs to know how the tasks they're doing contribute to project success, and what's in it for them. Motivating your team is about **helping them to be satisfied with the job they're doing**, recognizing them when they do a good job, and keeping them challenged with new and different problems.



**Communication** is a constant concern when you're leading a team. It's not enough to make the best decisions to get your project done; you've got to make sure that everybody in the team knows why you're making them, and feels like you're being **open and honest** about what's motivating every decision you make. If the people on your team feel like they're always getting the information they need from you and that they're never in the dark, they'll be able to trust you and one another more.

When Mike agreed to consolidate the code reviews for two features into one review, he forgot to tell the team about it. When the first code review was cancelled, the team was confused. They thought Mike didn't care about the quality of the product they were making, and the misunderstanding was really hard on them.

**Influencing** is all about using your relationships with the people on your team to get them to cooperate in making good decisions for the project. When you lead by example, you show your team how you want them to behave by doing it. It may seem subtle, but the way you work as a project manager can **set the standard for your teammates**. Collaborating with your team on the best way of working through your project is a really effective way of making sure that the team members gel, and know that they can rely on one another.

**Political and cultural awareness** means knowing the people on your team and understanding their backgrounds. Since projects sometimes span more than one culture, it's important to take the time to **understand the similarities and differences in the working environments** across the project team. It's equally important to communicate with your team members and understand what motivates them.

**Decision making** is how you handle the issues that come up when you're working through your project. There are a few basic techniques for decision making that you'll use:

**Command:** Sometimes you'll just make a decision and inform your team about it. You'll decide, and then team will do what you say.

**Consultation:** Sometimes you'll talk your decision over with your team and ask for their opinions before you decide.

**Consensus:** Another way of making decisions is to talk about a few options with your team and get everybody to agree on one of them before you decide.

**Coin flip:** Another way to make a decision is to just randomly choose one of the options.



**Negotiation** helps the people on your team come to an agreement about how to work together. It's important when you're negotiating to **listen to both parties** and to make sure that you **make it clear when concessions are made**. That should get everyone to see both sides of the issue and know that you're negotiating a fair resolution to it.

**Trust building, coaching, and conflict management** are also important in managing the interpersonal dynamics on your team. You'll remember trust building and coaching from Chapter 1. We'll talk about conflict management in just a minute.



Mike made sure he came to work early as often as he could. After a while he noticed that everybody on the team was doing the same thing.



## Lead the team with your management skills

You've seen tools and techniques that help you set up a great environment for your team to succeed, but you need more than that to get them through a tough project. You need **leadership skills**, those "soft skills" you use to influence your team and keep them directed toward the project's goals.

You use leadership skills throughout the entire project! But they're most important in Develop Project Team because that's where you lead your team through their work.

WAIT A SECOND! HOW CAN A MULTIPLE-CHOICE TEST QUIZ ME ON MY LEADERSHIP SKILLS?

**You're right, it can't.** What the PMP exam *can* quiz you on is your **knowledge** of leadership skills. There's been a lot of research on how people wield power in companies. The PMP exam concentrates on research done by two social psychology researchers named French and Raven who came up with five different kinds of power that people use to influence others.



### The five kinds of power

There are five kinds of power that a project manager typically uses on a project. The first is called **legitimate power**, which is what you use when you assign work to someone who reports to you.

When you're someone's boss, you have legitimate power to tell them what to do. But when you work in a matrix organization, you don't have direct reports! So you'll need to use the other kinds of power to influence your team.

**Reward power** is what you have when you can award a bonus or another kind of reward in order to motivate team members. Always make sure that rewards are **fair**—you don't want to single out one person who is eligible for a reward without giving others a chance at it! And rewards work best when they're tied to specific goals or project priorities.

Making everyone compete for one single reward isn't fair—it's actually demotivating to force people to compete for an arbitrary prize.

**Expert power** means that the team respects you for your expertise in a specific area, and gives you credibility because of that. Think about it: a team of programmers is more likely to respect you and do what you ask them to do if they know that you're an accomplished software engineer!



EVERYONE ON THE TEAM WILL GET AN EXTRA \$500 BONUS IF WE MEET ALL OF THE QUALITY STANDARDS IN THE SPEC!

Reward and expert power are the most effective kinds of power that a project manager can use.

I SPENT A FEW YEARS LEADING A GAME DESIGN TEAM, AND I GOT THE BEST RESULTS WHEN WE HELD JOINT DESIGN MEETINGS WITH THE PROGRAMMERS.



**Referent power** means that people admire you, are loyal to you, and want to do what you do because you're part of the cool crowd. Often, a project manager might wield referent power because he's trusted by people in authority, and others perceive him as associated with success.

If you buy something because a celebrity does, that's referent power.



I WAS JUST HAVING COFFEE WITH THE CEO AND WE GOT TO TALKING ABOUT OUR PROJECT. HE'S REALLY COUNTING ON US.

**Punishment power** is exactly what it sounds like—you correct a team member for poor behavior. **Always remember to do this one-on-one and in private!** Punishing someone in front of peers or superiors is extremely embarrassing, and will be really counterproductive.

LOOK, JOE, I KNOW YOU'RE TRYING YOUR BEST, BUT IF YOU CAN'T MEET THE DELIVERY DEADLINE, I'M GOING TO HAVE TO TAKE YOU OFF THE TEAM.



Could you imagine if someone said that to you in front of your boss?

## WHAT'S MY PURPOSE

Match each form of power to the scenario where it's being used.

Legitimate power

"We're not meeting our quality standards, and until we do we're going to have to work weekends."

Reward power

A project manager sets up an "Accolade Wall" and posts awards for team members who come in ahead of schedule.

Expert power

Everyone always does what Shelly says because everyone knows that senior management loves her.

Referent power

A functional manager assigns a tester to work on the project manager's team.

Punishment power

The programmers always listen to the team lead because he's a really good software architect.

Answers on page 496.

# Motivate your team

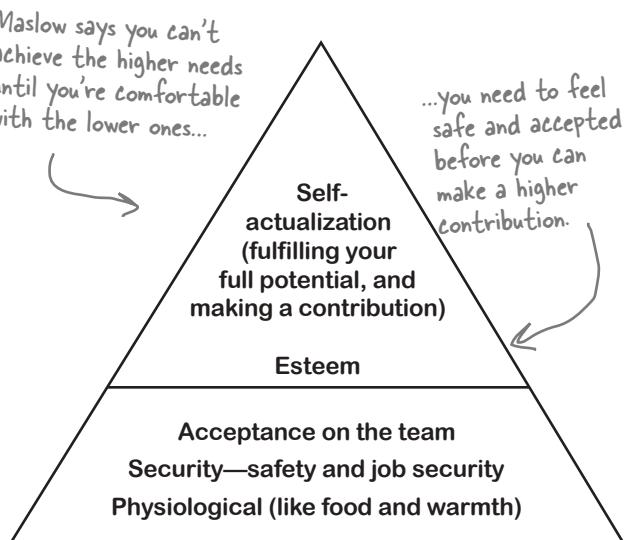
No matter how good your soft skills are, if your team has a lousy work environment, they're going to have a hard time getting the project done. Luckily, there's been research done over the years to figure out exactly what makes a good working environment. For the PMP exam, you'll be expected to be familiar with the most popular theories of motivation and organization.

This stuff is all part of recognition and rewards—one of the tools and techniques for Develop Project Team.



You might see this in a question about "Maslow's theory," or it might show up on the exam as "Hierarchy of Needs" or "Maslow's Hierarchy."

**Maslow's Hierarchy of Needs** says that people have needs, and until the lower ones are satisfied they won't even begin to think about the higher ones.



## McGregor's Theory X and Theory Y

McGregor tells us that there are two kinds of managers: ones who assume that everyone on the team is selfish and unmotivated, and ones who trust their team to do a good job. He calls the kind of manager who distrusts the team a "Theory X" manager, and the kind who trusts them a "Theory Y" manager. **You could get exam questions where the answer could be "Theory X" or "Theory Y"—or both!**

A Theory X manager will micromanage the team, looking over everyone's shoulder all the time and making them feel like they aren't trusted.

It's much better—and easier—to be a Theory Y manager. If you trust the team to do their jobs, they won't let you down!

A "hygiene factor" is something like a paycheck or status—stuff that people need in order to do the job. If people don't have this stuff, it's really hard to motivate them!

## Herzberg's Motivation-Hygiene Theory

Sure, you love being a project manager. But would you do the job if you weren't getting a paycheck? Of course not!

What Herzberg figured out was that you need things like good working conditions, a satisfying personal life, and good relations with your boss and coworkers—stuff he called "hygiene factors." They don't motivate you, but you need them before you can be motivated. Until you have them, you don't really care about "motivation factors" like achievement, recognition, personal growth, or career advancement.



Herzberg says that people need the stuff they normally expect out of a job—like hot coffee—before you can get them motivated about achievement and personal growth.

Two more theories that might appear on the PMP exam—although they're not nearly as common as the others.

**Expectancy Theory** says that you need to give people an expectation of a reward in order to motivate them—but this works only if that award is achievable. If everyone knows the award is either worthless or impossible to achieve, it will actually demotivate them!

**McClelland's Achievement Theory** says that people need to be motivated. Achievement is when someone performs well and is recognized for it. Power means he or she has a lot of control or influence in the company. And someone feels a strong sense of affiliation from being a part of a working team and having good relationships with coworkers.



Each of the following scenarios demonstrates one of the motivational theories at work.  
Write down which theory each scenario describes.

1. Bob is a programmer on the team, but he doesn't really feel like he's "one of the guys." He doesn't really have a lot of control over the work he's assigned. Recently, Bob put in a long weekend to get his work done, but nobody really seemed to take notice.
  
2. There was a break-in at the office, and now people are really jittery. Plus, the heating system has been broken for weeks, and it's freezing! No wonder nobody's getting any work done.
  
3. Eric's a functional manager, but his team seems to move really slowly. It turns out that everyone who reports to him has to hand him their work first, before they can give it to anyone else. He goes through it line by line, which sometimes takes hours! He doesn't trust his team to release anything he hasn't seen.
  
4. Joe's a functional manager, and his team is very efficient. He spot-checks their work, but for the most part he sets realistic performance goals and trusts them to meet it—he only pulls people aside if he finds that there's a specific problem that has to be corrected.
  
5. A project manager is having a lot of trouble motivating the team. He tries setting up rewards and a good working environment. But the team remains difficult to motivate—mostly because their paychecks all bounced last week, and everyone is angry at the CEO because they didn't get bonuses.

→ Answers on page 498.

## Stages of team development

There's a process for a team to get from a group of strangers to a group that creates something good together, and that's what the stages of team development are all about.



Every team goes through these stages during a project.

**Forming:** People are still trying to figure out their roles in the group; they tend to work independently, but are trying to get along.

**Storming:** As the team learns more about the project, members form opinions about how the work should be done. This can lead to temper flare-ups in the beginning, when people disagree about how to approach the project.

**Norming:** As the team learns more about the other members, they begin to adjust their own work habits to help out one another and the team as a whole. Here's where the individuals on the team start learning to trust one another.

**Performing:** Once everyone understands the problem and what the others are capable of doing, they start acting as a cohesive unit and being efficient. Now the team is working like a well-oiled machine.

**Adjourning:** When the work is close to completion, the team starts dealing with the fact that the project is going to be closing soon.

Researcher Bruce Tuckman came up with these five stages as a model for team decision making.

Although this is the normal progression, it's possible that the team can get stuck in any one of the stages. One big contribution you can make, as the project manager, is to help the team get through the initial Storming phase, and into Norming and Performing. It's important to keep in mind that people have a tough time creating team bonds initially, and to try to use your soft skills to help the team to progress through the stages quickly.



How does knowing the five stages of team development change the decisions that you'll make in handling conflicts on your team?



Each of the following scenarios demonstrates one of the stages of team development. Write down which stage each scenario describes.

1. Joe and Tom are both programmers on the Global Contracting project. They disagree on the overall architecture for the software they're building, and frequently get into shouting matches over it. Joe thinks Tom's design is too short-sighted and can't be reused. Tom thinks Joe's design is too complicated and probably won't work. They're at a point right now where they're barely talking to each other.
  
2. Joan and Bob are great at handling the constant scope changes on the Business Intelligence project. Whenever the stakeholders request changes, they shepherd them through the change control process and make sure the team doesn't get bothered with them unless it's absolutely necessary. That leaves Darrel and Roger to focus on building the main product. Everybody is focusing on their area and doing a great job. It seems like it's all just clicking for the group.
  
3. Derek just got to the team, and he's really reserved. Folks on the team aren't quite sure what to make of him. Everybody's polite, but it seems like some people are a little threatened by him.
  
4. Now that the product has shipped, the team is meeting to document all of their lessons learned and write up project evaluations.
  
5. Danny just realized that Janet is really good at developing web services. He's starting to think of ways to make sure that she gets all of the web service development work and Doug gets all of the client software work. Doug seems really happy about this too—he seems to really enjoy building Windows applications.

→ Answers on page 500.

## How's the team doing?

There are two outputs of Develop Project Team.

One is the **team performance assessment**.

Developing the project team means working with them to keep everyone motivated, and training them to improve their skills. The other is **updates to your company's enterprise environmental factors**, to update your company's personnel records.

The project manager should look at how the team's skill set has improved, and make sure it's documented here.

Has the team performance improved?

Are the motivational techniques working? If so, that goes here!

You can measure how motivated and happy the team is by keeping an eye on the turnover rate.

### Outputs



You'll need to keep track of how well the team is performing, so when the team has problems you'll have a good baseline to compare against.

### Cows Gone Wild IV Team Performance Assessment

#### Competencies / Skills improvements

Developers: attended three-day training course on new vector graphics coding techniques. Designers: brought in industrial design professor from Ivy College to hold seminar on design techniques.

#### Team Performance

There's been a marked improvement in team cohesion, and it's resulted in a lower defect rate. We've awarded 50% of our \$2,500 bonus budget.

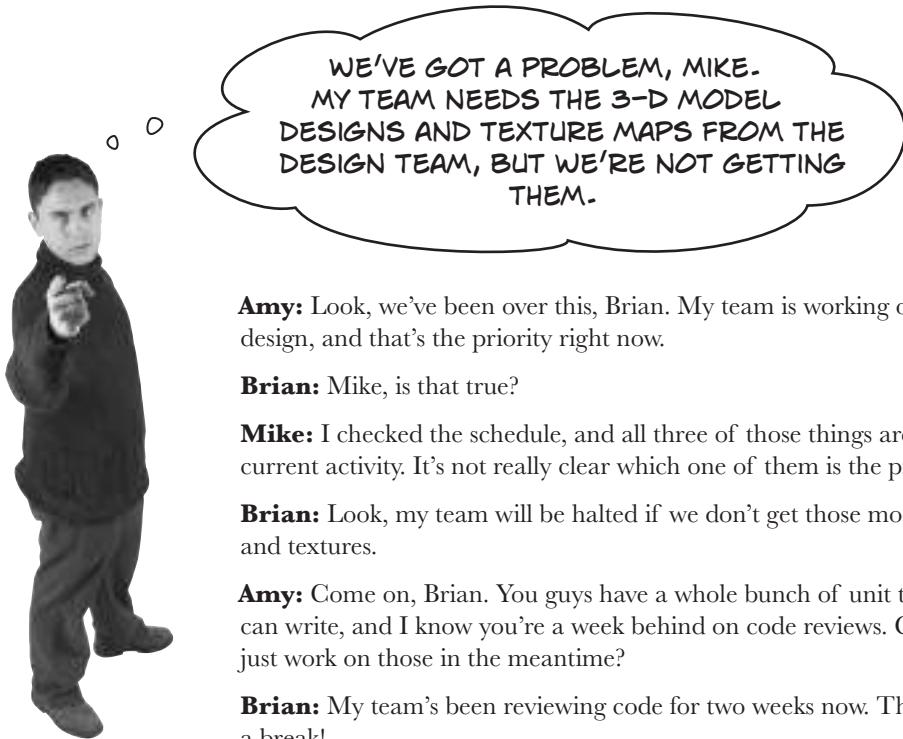
#### Turnover Rate

Two designers and one developer have left the team, which is an improvement from CGW III.

## BULLET POINTS: AIMING FOR THE EXAM

- Project managers use their **general management skills** ("soft skills") to motivate and lead the team.
- In a matrix organization, the project manager doesn't have **legitimate power**, because the team doesn't directly report to the project manager.
- The most effective forms of power are **reward power**, where the project manager sets up rewards and recognition for the team, and **expert power**, which means the team respects the project manager's technical expertise.
- **Referent power** is power that's based on identifying with or admiring the power holder.
- **Punishment power** is the least effective form of power. The project manager should never punish a team member in front of peers or managers!
- Project managers should be familiar with modern **theories of motivation and management**.
- **McGregor's Theories X and Y** state that there are poor Theory X managers who don't trust their teams, and good Theory Y managers who do.
- **Maslow's Hierarchy of Needs** is the theory that says that people can't achieve "self-actualization" (full potential) or esteem (feeling good and important) until lower needs like safety and security are met.
- **Herzberg's Theory** says that it's difficult to motivate people unless hygiene factors like a paycheck and job security are already in place.
- **Expectancy Theory** holds that people only respond to rewards that are tied to goals they feel they have a realistic chance of achieving.
- Bruce Tuckman's five stages of team development are **forming** (the team still finding their roles), **storming** (the team forming opinions), **norming** (adjusting work habits to help the team), **performing** (working like a well-oiled machine), and **adjourning** (closing down the project).

## Cubicle conversation



**Amy:** Look, we've been over this, Brian. My team is working on level design, and that's the priority right now.

**Brian:** Mike, is that true?

**Mike:** I checked the schedule, and all three of those things are part of the current activity. It's not really clear which one of them is the priority.

**Brian:** Look, my team will be halted if we don't get those models and textures.

**Amy:** Come on, Brian. You guys have a whole bunch of unit tests that you can write, and I know you're a week behind on code reviews. Can't you just work on those in the meantime?

**Brian:** My team's been reviewing code for two weeks now. They need a break!

**Amy:** Aha! So it's not *really* that you're going to fall behind if you don't get the textures immediately.

**Brian:** Well, no, but I'll be dealing with a team that has motivation problems. And I'm the one who has to clean up that mess!

**Mike:** OK, hold on, guys. Let's see if we can work this out.

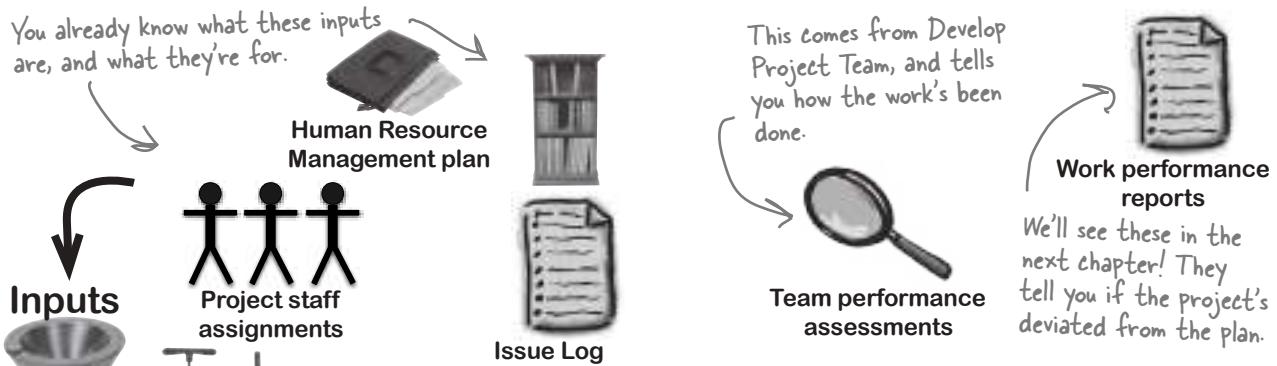
**Amy:** I don't see what there is to work out. He's being unreasonable.



It looks like Brian and Amy are having a serious conflict, and it could have a big impact on the project if Mike doesn't get it under control! What usually causes conflicts in projects, and what can the project manager do about it when those conflicts happen?

# Managing your team means solving problems

Wouldn't it be great if your team members never had any conflicts? Well, we all know that conflicts are a fact of life in any project. A good project manager knows how to handle conflicts so they don't delay or damage the project. And that's what the **Manage Project Team** process is about.



**Conflict management** is one of the most important tools in Manage Project Team, because it's where you resolve conflicts between people.

**Interpersonal skills** are all about helping the people on your team to solve problems.

**Project performance appraisals** means looking at each person's work and assessing his or her performance.

**Observation and conversation** are how you communicate to manage your team.



You've seen all of the outputs of Manage Project Team before. Take an educated guess and write them down. You'll need to handle potential changes that the team discovers, and make updates if they turn out to be required.



Answers on Page 497.



# Conflict management up close

It's probably no surprise that over half of conflicts come from priorities, schedules, and people. That's why so many of the processes you're learning about are focused on preventing conflicts. Ground rules, good planning practices, and pretty much anything that has to do with communication are all there to prevent the most common reasons that conflicts happen.

## Some of the common reasons that conflicts happen

**Resources** are scarce—that's why you have to negotiate for them. Have you ever been in a situation where there's a “good” conference room, or top-performing team member, or even that photocopy machine that always seems to be in use? Well, that's a scarce resource. No wonder resources cause so many conflicts.

**Priorities** mean one project or person is more important than another, and gets more budget, resources, time, prestige, or other perks. If the company's priorities aren't crystal clear, then conflicts are definitely going to happen.

**Schedules** decide who gets what, when. Have you ever had a client, sponsor, or stakeholder get upset because your project won't come in as early as he or she wanted it to? Then you've had a conflict over schedules.

**Personalities** are always clashing. Sometimes two people just don't get along, and you're going to have to find a way to make them work together in order to get your project done.

**Cost** disagreements seem to come up a lot, especially where contracts are involved. Even when the price is agreed upon up front, buyer's remorse will set in, and it will lead to issues.

These three things are the source of over 50% of all conflicts!

**Over half of all conflicts are caused by resources, priorities, and schedules.**

**Technical opinions** are definitely a reason that conflicts happen, because it's really hard to get an expert to change his mind...so when two of them disagree, watch out!



What's the best way to deal with a conflict between two people on your project team?

## How to resolve a conflict

When you're managing a project, you depend on people to get the work done. But when they have any sort of conflict, your project can grind to a halt...and you're the one who has to face the music when it causes delays and costs money! Since you're on the hook when a conflict threatens your project, **you're the one who has to resolve it.** Luckily, there are some techniques for getting your conflicts resolved.

**The best way to resolve a conflict is to confront the problem: do your research, figure out what's behind it, and fix the root cause.**

### **Confronting—or problem solving—is the most effective way to resolve a conflict.**

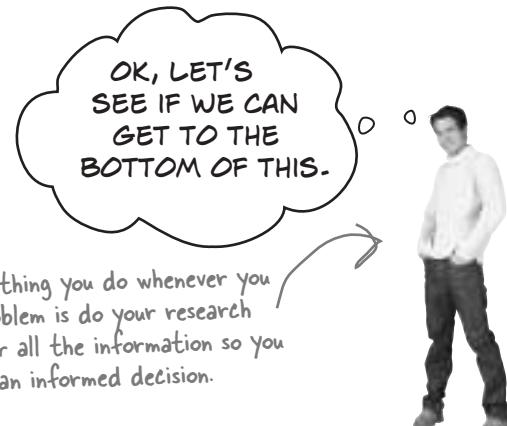
When you confront the source of the conflict head-on and work with everyone to find a solution that actually fixes the reason that conflicts happen, then the problem is most likely to go away and never come back!

### **Compromise** sounds good, doesn't it?

But hold on a second—when two people compromise, it means that each person gives up something. That's why a lot of people call a compromise a “lose-lose” solution.

You should always try to confront the problem first—you should forge a compromise only after you've tried every possible way to solve the real problem.

**Collaborating** means working with other people to make sure that their viewpoints and perspectives are taken into account. It's a great way to get a real commitment from everyone.



The first thing you do whenever you face a problem is do your research and gather all the information so you can make an informed decision.



LOOK, EACH OF YOU IS GOING TO HAVE TO GIVE UP SOMETHING IF WE WANT TO GET BACK ON TRACK.



AMY CAME UP WITH A GOOD IDEA, AND BRIAN EXPANDED ON IT. IT SOUNDS LIKE WE'VE GOT A REAL PLAN HERE!

**Smoothing** is what you're doing when you try to play down the problem and make it seem like it's not so bad. It's a temporary solution, but sometimes you need to do it to keep tempers from flaring and give people some space to step back and really figure out what's going on.



COME ON, GUYS. I KNOW THIS SEEMS LIKE THE END OF THE WORLD, BUT IT'S REALLY NOT SUCH A BIG DEAL.

**Forcing** means putting your foot down and making a decision. One person wins, one person loses, and that's the end of that.



I'M IN CHARGE HERE, AND I'VE MADE MY DECISION... AND YOU'RE JUST GONNA HAVE TO LIVE WITH IT.

You should really try to avoid forcing and withdrawal if you can.

**Withdrawal** doesn't do much good for anyone. It's when people get so frustrated, angry, or disgusted that they just walk away from the argument. It's almost always counterproductive. If someone withdraws from a problem before it's resolved, it won't go away—and your project will suffer.



YOU GUYS ARE BEING TOTALLY UNREASONABLE, AND WE'RE JUST NOT GOING TO TALK ABOUT IT ANYMORE.

Who's really being unreasonable here?





BUT CONFRONTING  
SOUNDS LIKE A BAD  
THING! SHOULDN'T I AVOID  
CONFRONTATION?

**No!** **Confrontation is just another name for problem solving,** because you solve a problem by confronting it head-on, doing your research, and fixing whatever is causing it. If you always remember to:

### Confront the problem

...it will really help you through a bunch of questions on the exam!

Make it Stick



"Confronting" is another way of saying "problem solving." Any time two people have a conflict, you need to step back and figure out what's actually causing the problem. That's how you "confront" it—by finding and fixing the underlying issue!



Take a look at each of these attempts to resolve a conflict and figure out which conflict resolution technique is being used.

1. "I don't really have time for this—let's just do it your way and forget I ever brought up the problem."

.....

2. "Look Sue, Joe's already filled me in on your issue. I've considered his position, and I've decided that he's right, so I don't need to hear anymore about it."

.....

3. "Hold on a second, let's all sit down and figure out what the real problem is."

.....

4. "Joe, you've got a solid case, but Sue really brings up some good points. If you just make two little concessions, and Sue gives up one of her points, we'll all be good."

.....

5. "You guys are almost entirely in agreement—you just differ on one little point! I'll bet we'll be laughing about this next week."

.....

6. "I don't really have time to deal with this right now. Just figure it out and get back to me."

.....

7. "I know this problem seems really big, but I'll bet if we take a long, hard look at it, we can figure out how to fix it permanently."

.....

→ Answers on page 499.

## there are no Dumb Questions

**Q:** How do I know what form of power to use?

**A:** You should always try to use expert power or reward power if you can. Expert power is effective because people naturally follow leadership from someone they respect. And reward power is also good because rewards help people motivate themselves.

When you use referent power, you're appealing to a really important psychological tool: the fact that when you like someone or she likes you, you're much more likely to influence her. And when you use punishment, you have to be very careful because it can be highly demotivating to the team. When you use it, always be careful not to punish someone in front of the team or other managers in your company. That can be embarrassing for the person, and just makes you look vindictive. Remember, your goal is to get your project back on track, not to put someone in his place!

**Q:** It sounds like compromise is a bad thing. But I've been told that when people are fighting, I should always look for a middle ground!

**A:** Yes, as little kids a lot of us were told that we should always look for a compromise. And that probably is the right thing to do on the playground. But when you're managing a project, you're judged by the success of your final product, not by how happy your team is. When you forge a compromise instead of really figuring out what's causing the problem, you're usually taking the easy way out.

**Q:** I'm still not quite clear about all of that storming and norming stuff. Do I need to know that to run a project?

**A:** Yes, you do! When Bruce Tuckman published his pioneering research about group development in 1965, he was looking for a model to describe how teams face their challenges, tackle their problems, find solutions to those problems, and deliver results. Since then, it's become the foundation for a lot of modern thinking about how teams form and work. More importantly, if you learn to recognize how teams evolve over the course of a project, it will actually help you in real life when you run your projects. If you understand how group dynamics work, you'll have a much better idea of what's causing conflicts and problems on your team, and you can help everyone work through those problems. Sometimes knowing that groups go through these patterns helps you keep perspective...and realize that it's normal—even healthy!—to have conflicts every now and then.

**Try to avoid using punishment.  
When you do have to punish  
someone, make sure to do it in  
private, and not in front of  
peers or other managers.**



### BULLET POINTS: AIMING FOR THE EXAM

- **Resources, schedules, and priorities** cause 50% of project problems and conflicts. Personality conflicts are actually the least likely cause.
- The best way to solve a problem is to **confront** it, which means doing your research, figuring out what's causing the problem, and fixing it.
- **Withdrawal** happens when someone gives up and walks away from the problem, usually because he's frustrated or disgusted. If you see a team member doing this, it's a warning sign that something's wrong.
- Don't be fooled by questions that make it sound like "confronting" is a bad thing. **Confronting is just another word for problem solving.**
- **Smoothing** is minimizing the problem, and it can help cool people off while you figure out how to solve it.
- You should **compromise only if you can't confront** the problem.
- **Forcing** means making a decision by simply picking one side. It's a really ineffective way to solve problems.

# The Cows Gone Wild IV team ROCKS!

The odds were against Mike—he had to fight for a whole new team, keep them motivated, and solve some pretty serious problems. But he followed his plan, got a great team together, kept them on track, and got the product out the door!



## Question Clinic: The "have-a-meeting" question



THERE ARE A WHOLE LOT OF QUESTIONS ON THE EXAM THAT GIVE YOU A SITUATION WHERE THERE'S A CONFLICT, AN ISSUE, OR EVEN A CRISIS, AND ASK YOU WHAT TO DO FIRST. THE TRICK IS THAT IN ALL OF THESE CASES, ONE OF THE OPTIONS IS TO HAVE A MEETING. SOUNDS ODD, RIGHT? BUT THIS IS ACTUALLY REALLY IMPORTANT FOR A PROJECT MANAGER TO KNOW! THAT'S BECAUSE YOU NEED TO GATHER INFORMATION FROM OTHER PEOPLE BEFORE YOU MAKE A DECISION.

Don't be fooled—even though this asks about conflict, that doesn't mean it's asking you for a conflict resolution technique.

It's not always team members who have conflicts. You could have an unhappy client who has a complaint about you or your team members... and that client could be right.

Sounds like these guys are right, and the other person is wrong... right? Well, maybe not.

198. Three people on your project team are having conflicts about priorities. A junior team member wants to do the activities out of order, while two senior members want to follow the schedule that you had originally put together. What's the first step in resolving this conflict?

- A. Tell everyone to work out the problem among themselves.
- B. Tell the junior member that you should always follow the schedule.
- C. Tell them to keep to the original schedule.
- D. Meet with all three people and get all the information.

Never push off your management responsibilities on the team.

That's not true! What if the schedule has a problem and needs change control? The junior team member could be right.

You shouldn't make a unilateral decision without understanding the conflict.

This is the right answer. Get all the facts before you make any move.

REMEMBER HOW YOU ALWAYS LOOK AT THE IMPACT OF A CHANGE BEFORE YOU DECIDE WHETHER OR NOT TO MAKE IT? WELL, THIS IS THE SAME IDEA! YOU ALWAYS WANT TO LOOK AT ALL THE FACTS BEFORE YOU MAKE A MOVE.





# HEAD LIBS

Fill in the blanks to come up with your own “have-a-meeting” question!

You're managing \_\_\_\_\_ when \_\_\_\_\_  
(description of a project) (two people with a conflict)  
come to you with a disagreement about \_\_\_\_\_. One team member  
(source of disagreement) says \_\_\_\_\_, while the other says \_\_\_\_\_.  
(one idea about how to resolve it) (a different idea about how to solve it)

What's the first thing that you do?

- A. \_\_\_\_\_  
(make a unilateral decision)
- B. \_\_\_\_\_  
(side with one person)
- C. \_\_\_\_\_  
(side with the other person)
- D. \_\_\_\_\_  
(have a meeting)

Here's an additional “have-a-meeting” exercise to help get you used to this kind of question.

How many different ways can you say “Have a meeting”?

Fill in a few more.

Gather information from everyone involved.

\_\_\_\_\_



Talk to the people involved directly.

\_\_\_\_\_

Make sure you know everything you need  
about the situation.

\_\_\_\_\_

Don't make a move until you've got all the  
information.

\_\_\_\_\_



Join the Head First PMP community at <http://www.headfirstlabs.com/PMP>  
You can add your Head Libs answer, and see what Head Libs other project managers came up with!



Read the **Staffing Management plan** on the facing page and answer these questions about the project.

1. How many designers, developers, and testers are needed in week #7 of the project?

..... 0 .....

designers

..... 10 .....

developers

..... 2 .....

testers

2. Who is responsible for verifying that each team member has the skills appropriate to the project?

**Mike, Amy, and Brian**

3. Rewards should always be tied to performance goals in order to motivate the team. What performance goal has been set for the team, and what reward will each team member receive if it's achieved?

**Each team member will receive \$1,000 if the schedule is met, and \$500 more if all quality control standards are met.**

## \* WHAT'S MY PURPOSE \*

Match each form of power to the scenario where it's being used.

Legitimate power

"We're not meeting our quality standards, and until we do we're going to have to work weekends."

Reward power

A project manager sets up an "Accolade Wall" and posts awards for team members who come in ahead of schedule.

Expert power

Everyone always does what Shelly says because a senior director assigned her personally.

Referent power

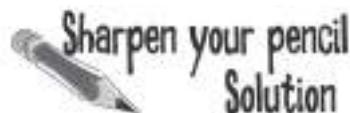
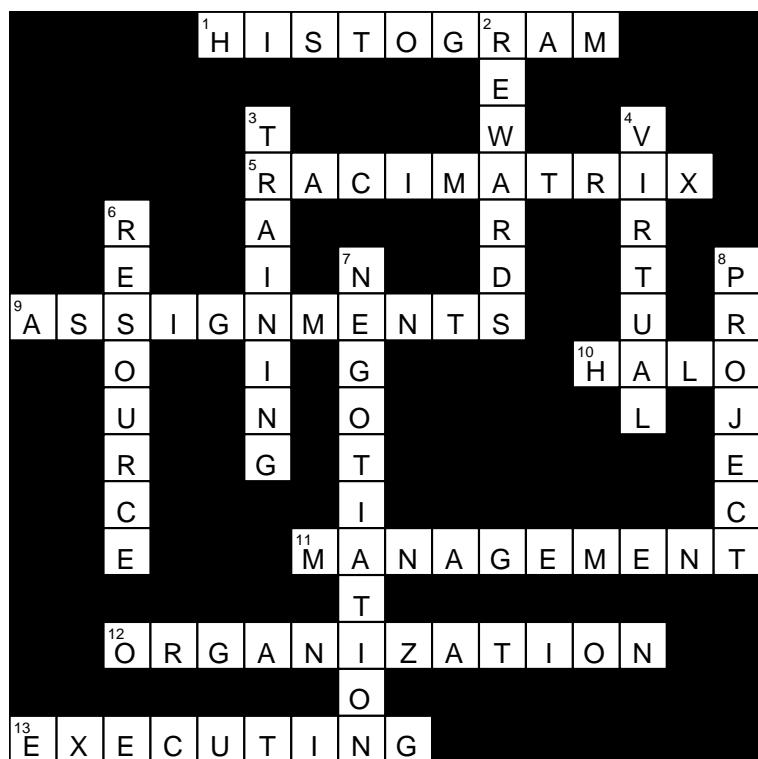
A functional manager assigns a tester to work on the project manager's team.

Punishment power

The programmers always listen to the team lead because he's a really good software architect.



# Human Resourcecross Solution



You've seen all of the outputs of Manage Project Team before. Take an educated guess and write them down. You'll need to handle potential changes that the team discovers, and make updates if they turn out to be required.

Change requests

Updates to enterprise environmental factors

Project documents updates

Updates to the organizational

process assets

Updates to the Project Management plan

Outputs





Each of the following scenarios demonstrates one of the motivational theories at work. Write down which theory each scenario describes.

1. Bob is a programmer on the team, but he doesn't really feel like he's "one of the guys." He doesn't really have a lot of control over the work he's assigned. Recently, Bob put in a long weekend to get his work done, but nobody really seemed to take notice.

#### **McClelland's Achievement Theory**

2. There was a break-in at the office, and now people are really jittery. Plus, the heating system has been broken for weeks, and it's freezing! No wonder nobody's getting any work done.

#### **Maslow's Hierarchy of Needs**

3. Eric's a functional manager, but his team seems to move really slowly. It turns out that everyone who reports to him has to hand him their work first, before they can give it to anyone else. He goes through it line by line, which sometimes takes hours! He doesn't trust his team to release anything he hasn't seen.

#### **McGregor's Theory X**

4. Joe's a functional manager, and his team is very efficient. He spot-checks their work, but for the most part he sets realistic performance goals and trusts them to meet them—he only pulls people aside if he finds that there's a specific problem that has to be corrected.

#### **McGregor's Theory Y**

5. A project manager is having a lot of trouble motivating the team. He tries setting up rewards and a good working environment. But the team remains difficult to motivate—mostly because their paychecks all bounced last week, and everyone is angry at the CEO because they didn't get bonuses.

#### **Herzberg's Motivation-Hygiene Theory**



Take a look at each of these attempts to resolve a conflict and figure out which conflict resolution technique is being used.

1. "I don't really have time for this—let's just do it your way and forget I ever brought up the problem."

### **Withdrawal**

2. "Look Sue, Joe's already filled me in on your issue. I've considered his position, and I've decided that he's right, so I don't need to hear any more about it."

### **Forcing**

3. "Hold on a second, let's all sit down and figure out what the real problem is."

### **Confronting (or problem solving)**

4. "Joe, you've got a solid case, but Sue really brings up some good points. If you just make two little concessions, and Sue gives up one of her points, we'll all be good."

### **Compromise**

5. "You guys are almost entirely in agreement—you just differ on one little point! I'll bet we'll be laughing about this next week."

### **Smoothing**

6. "I don't really have time to deal with this right now. Just figure it out and get back to me."

### **Withdrawal**

7. "I know this problem seems really big, but I'll bet if we take a long, hard look at it, we can figure out how to fix it permanently."

### **Confronting (or problem solving)**



### **Exercise Solution**

Each of the following scenarios demonstrates one of the stages of team development. Write down which stage each scenario describes.

1. Joe and Tom are both programmers on the Global Contracting project. They disagree on the overall architecture for the software they're building, and frequently get into shouting matches over it. Joe thinks Tom's design is too short-sighted and can't be reused. Tom thinks Joe's design is too complicated and probably won't work. They're at a point right now where they're barely talking to each other.

### **Storming**

2. Joan and Bob are great at handling the constant scope changes on the Business Intelligence project. Whenever the stakeholders request changes, they shepherd them through the change control process and make sure the team doesn't get bothered with them unless it's absolutely necessary. That leaves Darrel and Roger to focus on building the main product. Everybody is focusing on their area and doing a great job. It seems like it's all just clicking for the group.

### **Performing**

3. Derek just got to the team, and he's really reserved. Folks on the team aren't quite sure what to make of him. Everybody's polite, but it seems like some people are a little threatened by him.

### **Forming**

4. Now that the product has shipped, the team is meeting to document all of their lessons learned and write up project evaluations.

### **Adjourning**

5. Danny just realized that Janet is really good at developing web services. He's starting to think of ways to make sure that she gets all of the web service development work and Doug gets all of the client software work. Doug seems really happy about this too—he seems to really enjoy building Windows applications.

### **Norming**

## Exam Questions

1. A RACI matrix is one way to show roles and responsibilities on your project. What does RACI stand for?

- A. Responsible, Approve, Consult, Identify
- B. Responsible, Accountable, Consulted, Informed
- C. Retain, Approve, Confirm, Inform
- D. Responsible, Accountable, Confirm, Inform

2. Everybody does what Tom says because he and the president of the company are golfing buddies. What kind of power does he hold over the team?

- A. Legitimate
- B. Reward
- C. Punishment
- D. Referent

3. What's the most effective approach to conflict resolution?

- A. Smoothing
- B. Confronting
- C. Compromise
- D. Withdrawal

4. Two of your team members are having a disagreement over which technical solution to use. What's the first thing that you should do in this situation?

- A. Consult the technical documents.
- B. Tell the team members to work out the problem themselves.
- C. Ask the team members to write up a change request.
- D. Meet with the team members and figure out what's causing the disagreement.

5. Joe is a project manager on a large software project. Very late in his project, the customer asked for a huge change and wouldn't give him any more time to complete the project. At a weekly status meeting, the client demanded that the project be finished on time. Joe told the client that he wasn't going to do any more status meetings until the client was ready to be reasonable about the situation. Which conflict resolution technique was he using?

- A. Forcing
- B. Compromise
- C. Withdrawal
- D. Confronting

## Exam Questions

6. You've just completed your resource histogram. What process are you in?

- A. Acquire Project Team
- B. Develop Project Team
- C. Plan Human Resource Management
- D. Manage Project Team

7. Which of the following describes Maslow's Hierarchy of Needs?

- A. You can't be good at your job if you don't have a nice office.
- B. You need to feel safe and accepted to want to be good at your job.
- C. Your boss's needs are more important than yours.
- D. The company's needs are most important, then the boss's, then the employee's.

8. Jim and Sue are arguing about which approach to take with the project. Sue makes some good points, but Jim gets frustrated and storms out of the room. What conflict resolution technique did Jim demonstrate?

- A. Withdrawal
- B. Confronting
- C. Forcing
- D. Smoothing

9. Tina is a project manager who micromanages her team. She reviews every document they produce and watches when they come and go from the office. Which kind of manager is she?

- A. Theory X
- B. Theory Y
- C. Theory Z
- D. McGregor manager

10. Which of the following is NOT one of the top sources of conflict on projects?

- A. Resources
- B. Technical opinions
- C. Salaries
- D. Priorities

11. Which of the following is an example of the "halo effect"?

- A. When a project manager is good, the team is good, too
- B. The tendency to promote people who are good at technical jobs into managerial positions
- C. When a project manager picks a star on the team and always rewards that person
- D. When a technical person does such a good job that no one can find fault with her

## Exam Questions

12. You are working on a construction project that is running slightly behind schedule. You ask the team to put in a few extra hours on their shifts over the next few weeks to make up the time. To make sure everyone feels motivated to do the extra work, you set up a \$1,500 bonus for everyone on the team who works the extra hours if the deadline is met. What kind of power are you using?

- A. Legitimate
- B. Reward
- C. Expert
- D. Referent

13. Two team members are having an argument over priorities in your project. One thinks that you should write everything down before you start doing any work, while the other thinks you can do the work while you finish the documentation. You sit both of them down and listen to their argument. Then you decide that you will write most of it down first but will start doing the work when you are 80% done with the documentation. What conflict resolution technique are you using?

- A. Forcing
- B. Confronting
- C. Smoothing
- D. Compromise

14. What is a war room?

- A. A place where managers make decisions
- B. A room set aside for conflict management
- C. A room where a team can sit together and get closer communication
- D. A conflict resolution technique

15. You are writing a performance assessment for your team. Which process are you in?

- A. Develop Project Team
- B. Acquire Project Team
- C. Manage Project Team
- D. Plan Human Resource Management

16. You are working in a matrix organization. You don't have legitimate power over your team. Why?

- A. They don't report to you.
- B. They don't trust you.
- C. They don't know whether or not they will succeed.
- D. You haven't set up a good bonus system.

## Exam Questions

17. Tom is using an organization chart to figure out how he'll staff his project. What process is he performing?

- A. Plan Human Resource Management
- B. Acquire Project Team
- C. Develop Project Team
- D. Manage Project Team

18. You're a project manager on an industrial design project. You've set up a reward system, but you're surprised to find out that the team is actually less motivated than before. You realize that it's because your rewards are impossible to achieve, so the team doesn't expect to ever get them. What motivational theory does this demonstrate?

- A. Herzberg's Hygiene Theory
- B. Maslow's Hierarchy of Needs
- C. MacGregor's Theory of X and Y
- D. Expectancy Theory

19. You're managing a software project when two of your programmers come to you with a disagreement over which feature to work on next. You listen to the first programmer, but rather than thinking through the situation and gathering all the information, you decide to go with his idea. Which conflict resolution technique did you use?

- A. Compromise
- B. Forcing
- C. Confronting
- D. Smoothing

20. Your client comes to you with a serious problem in one of the deliverables that will cause the final product to be unacceptable. Your team members look at his complaint and feel that it's not justifiable, and that the product really does meet its requirements. What's the first thing that you do?

- A. Confront the situation by making the change that needs to be made in order to satisfy the client.
- B. Explain to the client that the solution really is acceptable.
- C. Work with the client and team members to fully understand the problem before making a decision.
- D. Write up a change request and send it to the change control board.

# Answers

## ~~Exam Questions~~

### 1. Answer: B

When you think about how you organize the work on your project, the RACI chart makes sense. Being **responsible** for a specific task or area of work means you're the one who's on the hook if it doesn't get done. Being **accountable** means you might not be doing it directly, but you have influence over it. Some people need to be **consulted** but don't get involved in the work, while others should just be kept **informed** of status.

### 2. Answer: D

Did you choose punishment? People might be afraid of punishment from the president of the company if they don't agree with Tom. But since Tom isn't the one who would punish them, it's referent power.

The power is here is referent. People are reacting to Tom's relationship to the president of the company, not his own authority.

### 3. Answer: B

Confronting does sound like it would be negative, but it just means solving the problem. If you actually solve the problem, there's no more reason for people to fight at all. That's always the best way to deal with a conflict. Any of the other options could lead to more problems later.

### 4. Answer: D

This is a classic "have-a-meeting" question! You should always gather the information you need before you make any kind of decision.

### 5. Answer: C

Joe decided that the best tactic was to refuse to talk to the client anymore—that's withdrawing. It's also probably not going to solve the problem.

### 6. Answer: C

You create the histogram as part of the Staffing Management plan. It's the main output of the Plan Human Resource Management process.

### 7. Answer: B

Maslow's Hierarchy of Needs says that your safety and acceptance are a prerequisite for your being able to do your best.

## ~~Exam Questions~~

### 8. Answer: A

Jim took his ball and went home.  
That's withdrawal.

IT SEEMS  
LIKE JIM AND SUE HAD  
A CONFRONTATION, RIGHT?  
BUT THAT'S NOT WHAT  
"CONFRONTING" MEANS HERE!  
IT REALLY MEANS PROBLEM  
SOLVING.

### 9. Answer: A

A micromanager is a Theory X manager.  
Tina believes that all employees need to be  
watched very closely, or they will make mistakes.



### 10. Answer: C

You definitely need to know what causes conflicts on projects. Resources, technical opinions, priorities, and personalities all cause people to have conflicts, and there's a good chance you'll get a question on that!

### 11. Answer: B

Just because someone is good at a technical job, it doesn't mean he will be good at management.  
The jobs require very different skills.

### 12. Answer: B

You are motivating the work by offering a reward for it. People might be motivated by the bonus to put in the extra time even if they would not have been motivated by the deadline alone.

### 13. Answer: D

Both of them had to give something up, so that's a compromise.

### 14. Answer: C

War rooms are part of colocation. It's a way to keep your entire team in one room so they don't have any communication gaps.

*Answers*~~Exam Questions~~**15. Answer: A**

Developing the team is where you evaluate performance and set up motivational factors. Manage Project Team is where you solve conflicts.

**16. Answer: A**

In matrix organizations, team members usually report to their functional managers. A project manager never has legitimate power over the team in those situations.

Don't forget that there are two org charts—one for the company, and one for the project.

**17. Answer: A**

Tom's project is at the very beginning—he's using the organization chart as a tool to figure out who's going to be assigned to his team.

**18. Answer: D**

Expectancy Theory says that people get motivated only by rewards that they can achieve, and that are fair. If you set up a reward system that selects people who don't deserve rewards, or that has rewards that are unattainable, then it will backfire and cause people to resent their jobs.

**19. Answer: B**

Whenever you choose one side over another without thinking or actually finding the root cause of the problem, you're forcing a solution on it. This is *not* a good way to solve problems!

**20. Answer: C**

Any time there's any sort of conflict, the first thing you need to do is gather all the information. And that's especially true when there's a disagreement between the client and the team! You'd better have your facts straight in such a charged situation.

HE SHOULD  
HAVE SAT DOWN WITH  
BOTH PROGRAMMERS AND  
FIGURED OUT WHAT THE  
REAL PROBLEM WAS. EVEN  
IF THE SOLUTION ISN'T  
PERFECT, AT LEAST IT'S  
MORE FAIR.





## 10 Communications management

# Getting the word out



**Communications management is about keeping everybody in the loop.** Have you ever tried talking to someone in a really loud, crowded room? That's what running a project is like if you don't get a handle on communications. Luckily, there's **Communications Management**, which is the knowledge area that gets everyone talking about the work that's being done, so that they all **stay on the same page**. That way, everyone has the information they need to **resolve any issues** and keep the project **moving forward**.

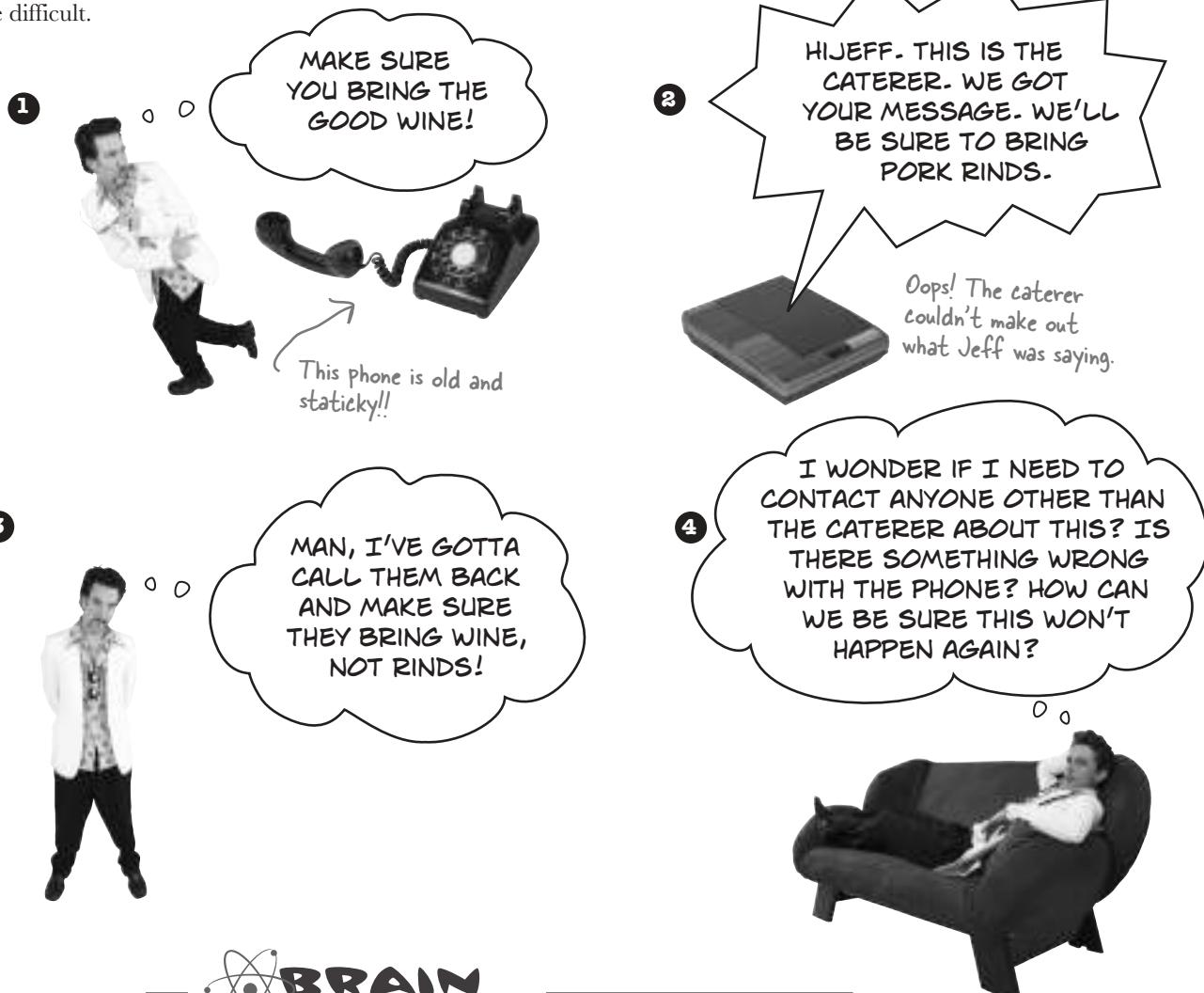
## Party at the Head First Lounge!

Jeff and Charles want to launch their new Head First Lounge, so they're going to have a party for the grand opening. They're thinking of all of the things they need to arrange: the DJ, the hors d'oeuvres, the drinks, hula dancing. They need to start contacting caterers, DJs, and suppliers to make sure it all goes off without a hitch.



## But something's not right

When Jeff called the caterer and the DJ to request everything he wanted for the party, his old staticky phone made it hard for everybody to understand what he was asking. Sometimes their taste for retro furniture can make things a little difficult.

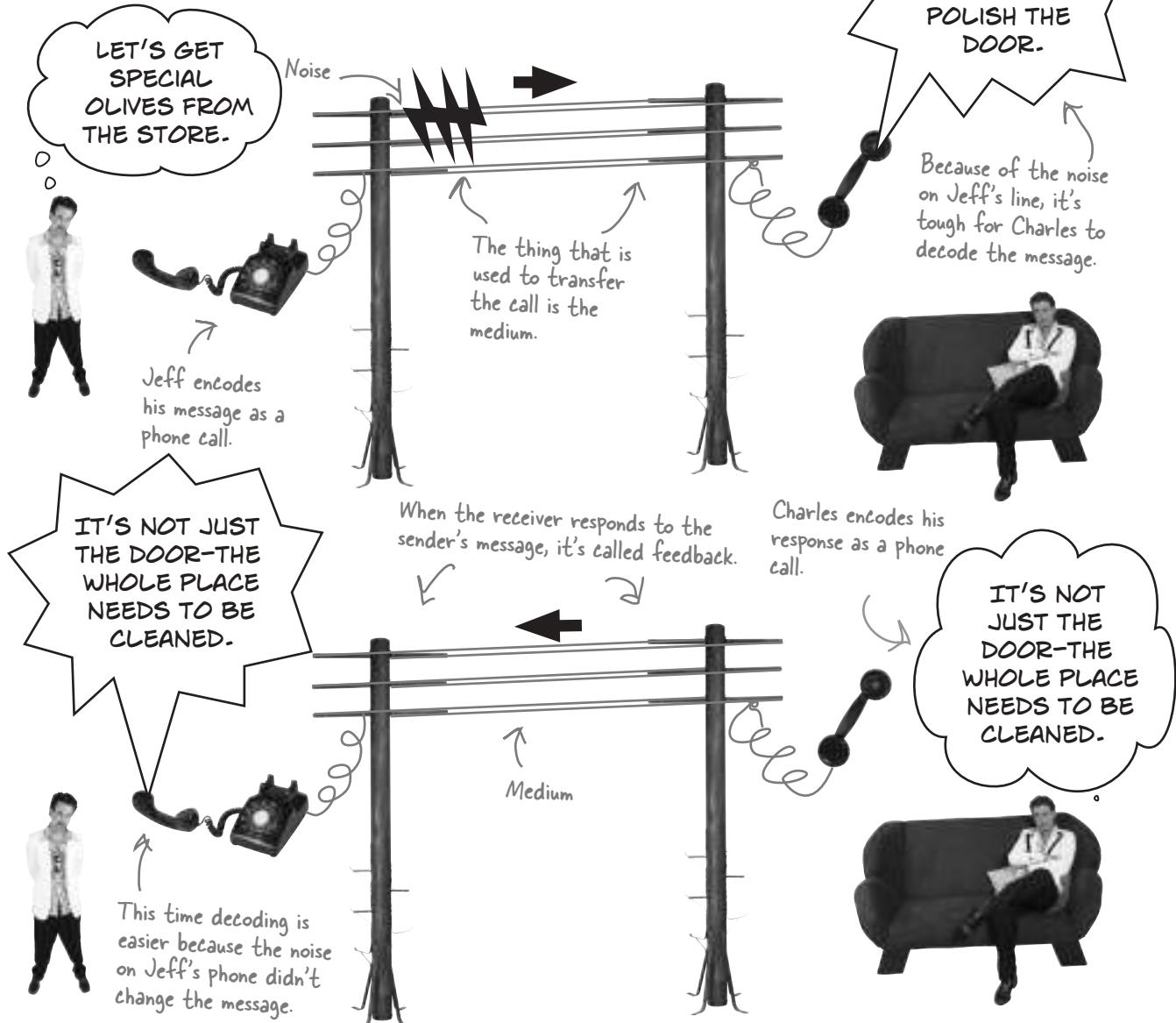


What can Jeff and Charles do to get a handle on their communication problems?

## Anatomy of communication

When you communicate with your team, you need to **encode** your message into a phone call, a document, an IM chat, or sometimes even a different language for them to understand. Your team then **decodes** that message so they can get its content. If something happens to your message along the way (static on the phone line, your printer inserts garbage characters, your Internet connection is spotty, or your translation isn't very good), then your team might not get the intended message. The kind of interference that can alter your message is called **noise**.

When you're talking about messages, encoding, decoding, and noise, you're talking about a communications model.



## WHAT'S MY PURPOSE

Match each communication element to what it does.

Acknowledge

Getting the information from one person to the other

Transmit message

Letting the sender know that the message was received

Feedback/response

Modifying a message that has been sent so that it can be understood

Encoding

An answer to a message

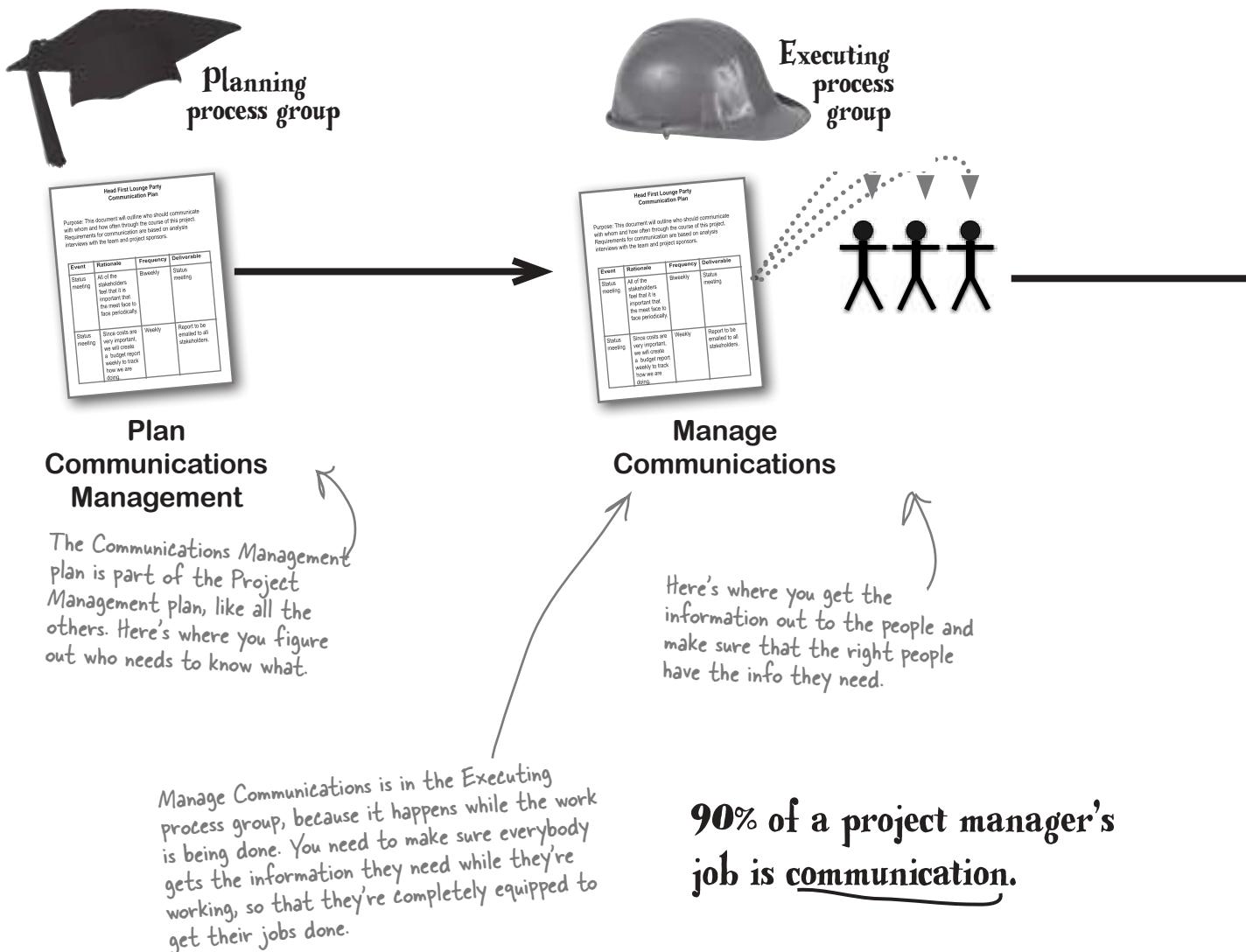
Decoding

Modifying a message so that it can be sent

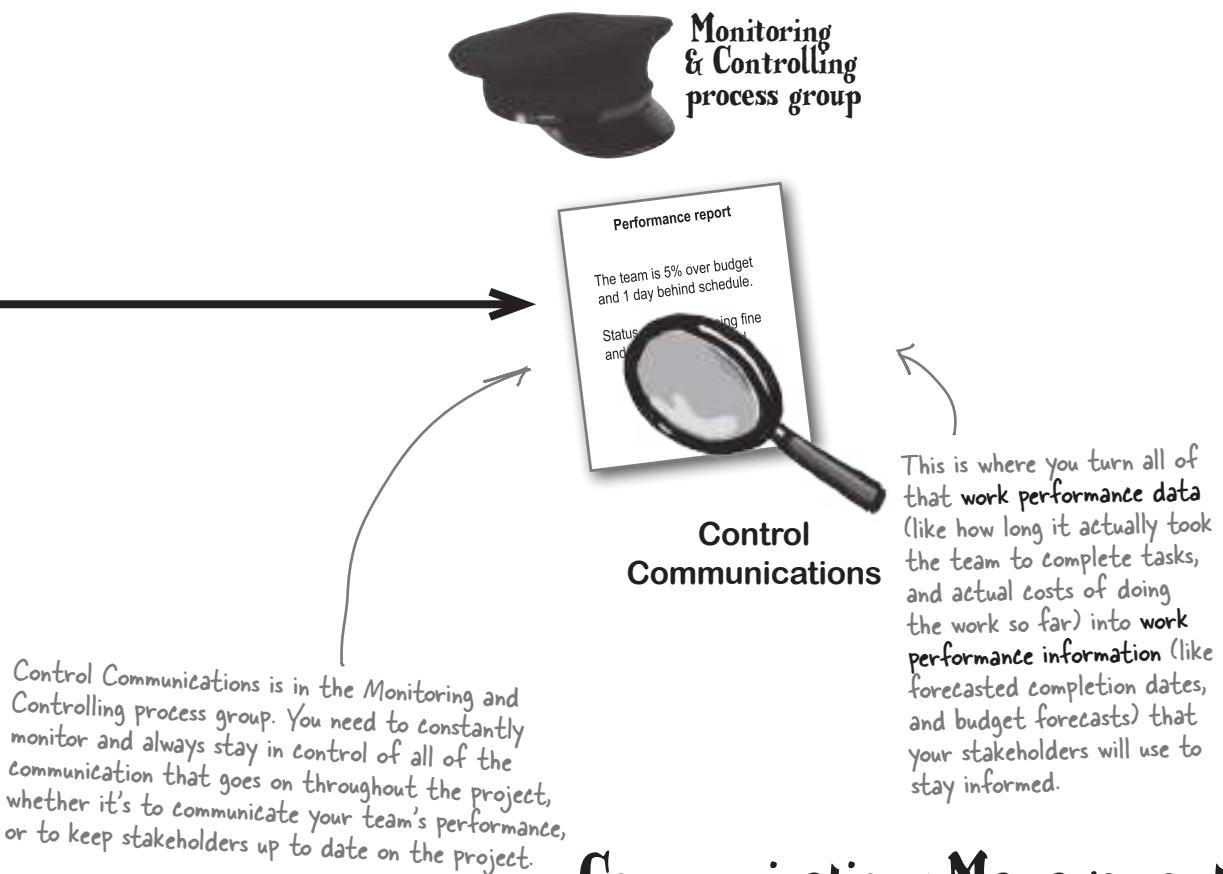
—————> Answers on page 540.

# Get a handle on communication

Any kind of communication can have interference. The wrong person can get the message; noise can garble the transmission; you can make mistakes decoding or encoding the message. It turns out that 90% of a project manager's job is communication, which is why there's a whole knowledge area devoted to it. The **Communications Management** processes are here to help you avoid these common kinds of errors, through planning and careful tracking of stakeholder communications on your project. Just like every other knowledge group we've covered so far, it all starts with a plan.



It's not enough to plan and manage the communications on your project. You need to make sure that everybody who has a stake in your project is getting accurate reports of how it's going so they can make good decisions—that's what the **Control Communications** process is all about. You use it to monitor the data your project is producing, and control how it is presented to your stakeholders.

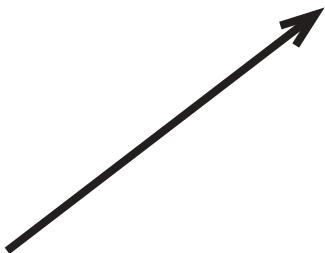


**Communications Management**  
makes sure everybody gets the  
right message at the right time.



This is the Plan Communications Management process. You've seen a lot of planning processes now. Can you fill in the inputs and outputs for this one?

## Inputs



## Stakeholder register

Here's where you plug in all of the planning you've done on your project so far.



## Communication requirements analysis

means figuring out what kind of communication your stakeholders need from the project so that they can make good decisions. Your project will produce a lot of information; you don't want to overwhelm every member of your project team with all of it. Your job here is to figure out what all of them feel they need to stay informed and to be able to do their jobs properly.

Here's an example: Jeff and Charles will definitely care about the cost of the overall catering contract, but they don't need to talk to the caterer's butcher, liquor supplier, grocer, or other companies they work with.

**Communication models** demonstrate how the various people associated with your project send and receive their information. You've already learned about this—it's the **messages** you send, how you **encode** and **decode** the messages, the **medium** you use to transmit the messages, the **noise** that blocks the messages, and the **feedback** you get.

This one is your company's culture and policies toward Project communication.

Here's where your company keeps all of its templates and lessons learned.

You need to know who you're going to communicate with. You'll learn more about this in Chapter 13!



## Communication technology

has a major impact on how you can keep people in the loop. It's a lot easier for people to get information on their projects if it's all accessible through a website than it is if all of your information is passed around by paper memos. The technologies available to you will definitely figure into your plan of how you will keep everyone notified of project status and issues.

**Communication methods** are how you actually share the information with your stakeholders. Communications can be **interactive**, where everyone exchanges information with one another. You can **push** information out to your stakeholders by sending out emails, memos, faxes, or other one-way communications. Or, if you need to get a lot of information out to people, they can **pull** it down themselves from intranet websites, e-learning courses, or libraries.

Before you turn the page, take a minute and think of three examples of how you used each of these methods on your last project. That'll help you remember them for the exam!

There are only two outputs. Can you guess what this one is?

**Meetings** are always great for helping your team to think about communication.

## Outputs



Are you surprised at how much of this process you can fill in? Looks like you're getting the hang of this stuff!



There are several project documents that get updated when you're planning communications. Can you think of one of them?

Head First Lounge Party Communications Management Plan			
Event	Rationale	Frequency	Deliverables
Status meeting	Identify the stakeholders involved and determine how important that the message is to each stakeholder.	Biweekly	Status meeting
Status meeting	Since costs are increasing, we will create a budget report each week to track how we are doing.	Weekly	Report to be distributed to all stakeholders



## Exercise Solution

This is the Plan Communications Management process. You've seen a lot of planning processes now. Can you fill in the inputs and outputs for this one?

### Inputs



Enterprise environmental factors

Organizational process assets

Stakeholder register

Project Management plan

This is where you've planned all  
of the communications taking  
place in the project.



### Communication requirements analysis

means figuring out what kind of communication your stakeholders need from the project so that they can make good decisions. Your project will produce a lot of information; you don't want to overwhelm every member of your project team with all of it. Your job here is to figure out what all of them feel they need to stay informed and to be able to do their jobs properly.

Here's an example: Jeff and Charles will definitely care about the cost of the overall catering contract, but they don't need to talk to the caterer's butcher, liquor supplier, grocer, or other companies they work with.

**Communication models** demonstrate how the various people associated with your project send and receive their information. You've already learned about this—it's the **messages** you send, how you **encode** and **decode** the messages, the **medium** you use to transmit the messages, the **noise** that blocks the messages, and the **feedback** you get.

**Communication technology** has a major impact on how you can keep people in the loop. It's a lot easier for people to get information on their projects if it's all accessible through a website than it is if all of your information is passed around by paper memos. The technologies available to you will definitely figure into your plan of how you will keep everyone notified of project status and issues.

**Communication methods** are how you actually share the information with your stakeholders. Communications can be **interactive**, where everyone exchanges information with one another. You can **push** information out to your stakeholders by sending out emails, memos, faxes, or other one-way communications. Or, if you need to get a lot of information out to people, they can **pull** it down themselves from intranet websites, e-learning courses, or libraries.

**Meetings** are always great for helping your team to think about communication.

It's important that everyone involved understands why you are doing the meetings and reports you create.

The plan tells how you will distribute the information, to whom, and how often.

The PM's not always responsible for every communication. The plan makes it clear who communicates what on the project.



### Document updates

You'll usually need to update the project schedule, the stakeholder register, or the Stakeholder Management strategy when you plan communications for your project.



Planning process group

This is the only output of the Plan Communications Management process.

### Head First Lounge Party Communications Management Plan

Purpose: This document will outline who should communicate with whom and how often through the course of this project. Requirements for communication are based on analysis of interviews with the team and project sponsors.

Event	Rationale	Frequency	Deliverable
Status meeting	All of the stakeholders feel that it is important that they meet face to face periodically.	Biweekly	Meeting minutes to be emailed to all stakeholders. Archived in the document repository.
Budget report	Since costs are very important, we will create a budget report weekly to track how we are doing.	Weekly	Report to be emailed to all stakeholders.

# Tell everyone what's going on

Once you have the Communications Management plan completed, it's time to make sure that everybody is getting the information that they need to help your project succeed. The **Manage Communications** process is all about making sure that the right information makes it to the right people.



## Communication methods

There are a lot of different ways to get a message across. For the test you will need to know four different kinds of communication, and when to use them.

### 1 Formal written

Any time you're signing a legal document or preparing formal documentation for your project, that's formal written communication.



Any time you see anything that has to do with a contract, you should always use formal written communication.

### 2 Informal written

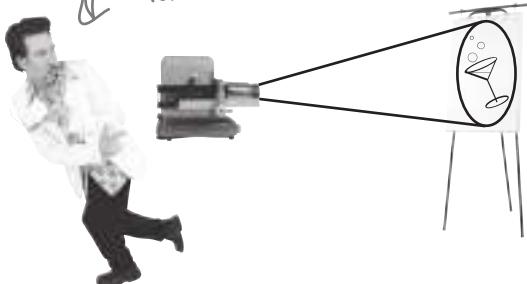
Blueprints, specifications, and all other project documents are examples of formal written communication.



If you drop someone a quick email or leave her a memo or a sticky note, that's informal written communication.

### 3 Formal verbal

If you ever have to give a presentation to update people on your project, that's formal verbal communication.



### 4 Informal verbal

Speeches and prepared talks are formal. Meetings, hallway chats, and planning sessions are informal.



Just calling somebody up to chat about your project is informal verbal communication.



Choose which kind of communication is being used in each situation.

### Exercise

- |   |   |   |
|---|---|---|
| 1. You and your business analysts write a requirements specification for your project.  | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |
| 2. You call up a supplier for materials for your project to let him know that you are a week late, so he's got a little flexibility in his delivery schedule. | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |
| 3. You present your project's status to your company's executive committee.   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |
| 4. You send an email to some of your team members to get more information about an issue that has been identified on your project.                            | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |
| 5. You leave a voicemail message for your test team lead following up on an issue she found.  | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |
| 6. You IM with your team members.   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |
| 7. You prepare an RFP (request for proposals) for vendors to determine which of them will get a chance to contract a new project with your company.           | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   | <input type="checkbox"/> Formal verbal <input type="checkbox"/> Informal verbal   |
|   | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written | <input type="checkbox"/> Formal written <input type="checkbox"/> Informal written |

Hint: We haven't talked about RFPs yet, but you don't need to know what they are to answer this question.

→ Answers on page 541.



**Watch it!**

#### Be careful about when you use different kinds of communication.

Any time you need to get a message to a client or sponsor, you use **formal** communication. Meetings are always **informal verbal**, even if the meeting is to say something really important. And any project document—like a Project Management plan, a requirements specification, or especially a contract—is always **formal written**.

## Get the message?

Communication is about more than just what you write and say. Your facial expressions, gestures, tone of voice, and the context you are in have a lot to do with whether or not people will understand you. **Effective communication** takes the way you act and sound into account. Most of the communication on your project takes place during the Manage Communication process, so you need to know how to communicate effectively. Here are the important aspects to effective communication:

**Nonverbal communication** means your gestures, facial expressions, and physical appearance while you are communicating your message. Imagine what Jeff and Charles would think of the caterer if he negotiated the contract for their party while wearing a chicken suit. They probably wouldn't take him very seriously. You don't always think about it, but the way you behave can say more than your words when you are trying to get your message across.

When you're communicating with other people, you actually do more nonverbal communication than verbal!

**Paralingual communication** is the tone and pitch of your voice when you're talking to people. If you sound anxious or upset, that will have an impact on the way people take the news you are giving. You use paralingual communication all the time—it's a really important part of how you communicate. When your tone of voice makes it clear you're really excited about something, or if you're speaking sarcastically, that's paralingual communication in action.

If someone has dread in his voice when he tells you about a promotion, you get a much different impression than if he'd emailed you about it.

**Feedback** is when you respond to communication. The best way to be sure people know you are listening to them is to give lots of feedback. Some ways of giving feedback are summarizing their main points back to them, letting them know that you agree with them, or asking questions for clarification. When you give a lot of feedback to someone who is speaking, that's called **active listening**.

Like effective communication, effective listening is about taking everything the speaker says and does into consideration and asking questions when you don't understand.



That's why active listening is an important part of communication.

You do most of the project communication when you're performing the Manage Communications process.



Jeff and Charles are interviewing new bartenders to help with the expanded space. Choose which kind of communication is being used in each situation.

1. One applicant came in 30 minutes late and was dressed unprofessionally. The guys knew that he would not be a good fit for the position.

Paralingual       Nonverbal  
 Feedback

3. Charles asked the next applicant if he knew how to make a sidecar. He said "A sidecar? Sure. It's one part brandy or cognac, one part Cointreau, and one part lemon juice."

Paralingual       Nonverbal  
 Feedback

2. Charles asked an applicant about her background. Her tone of voice was really sarcastic, and he got the impression she didn't take the job seriously. Charles and Jeff decided to pass on her, too.

Paralingual       Nonverbal  
 Feedback

4. Then the applicant told them about his background as a bartender for other retro clubs. As he spoke, he made eye contact with them and made sure to confirm agreement with them.

Paralingual       Nonverbal  
 Feedback

→ Answers on page 540.



## More Manage Communications tools

The tools in this process area are all about getting information from your team and making sure that the information makes it to the people who need it. You'll start your project with a kickoff meeting to get everyone on the same page, and follow your Communications Management plan as your project progresses. As you learn more about your project, you write down decisions you make and everything you learn on the project as lessons learned.

**Communication methods** are the specific methods you use to distribute information to your team...and you've already learned about them!

**Communication models** are important in the Manage Communications process, just like they are in planning. You already know about those too!

**Information management systems** are how you get the information your team needs to do the job. You might have an inbox where everyone puts their status information. If it's printed out on paper, you're doing **hard copy document distribution**. You could also use **electronic communication**. For example, you might use email, or you could have a software application that gathers information about your project and saves it to a database so that you can make your reports. Or your company might have **electronic tools for project management**, like a timesheet system for tracking hours spent on a project or a budgeting system for tracking expenditures. All of those are information gathering and retrieval systems, because the data they produce will be used to make decisions about your project.

**Performance reporting** is all about gathering information on how your team is progressing through the project. You might create **status reports** that show how close you are to your baseline schedule and highlight issues that your team has run into along the way. You'll always want to keep everybody informed on how your project is tracking risks, any changes that might come up that weren't planned for, and forecasts of what's coming up next for the team.

**Communication technology** is a tool that you use to get the message out. If you need to get a message to someone urgently, it might be hard to wait for a face-to-face meeting. You might choose to use email, phone, or a ticketing system to communicate. There are a lot of factors that influence your decision to use a particular technology when communicating other than urgency, including availability, how easy the technology is to use, whether or not the team can meet to face-to-face because of where they work, and how confidential the information you're communicating is.



**Outputs****Project communications**

Throughout your project, you're creating status reports, presentations, and many other communications to keep your project stakeholders informed. It makes sense that all of these would be outputs of the Manage Communications process.

**Project Management plan updates**

As your project progresses, you'll make changes to the Project Management plan as new information is available. All of those project plan updates help to communicate what's going on in your project.

**Project document updates**

We've seen in other processes that keeping the project documentation updated is a big part of keeping everyone on the same page. Those project document updates are likewise a big part of how your project is communicated to all of the project stakeholders.

**Organizational process asset updates**

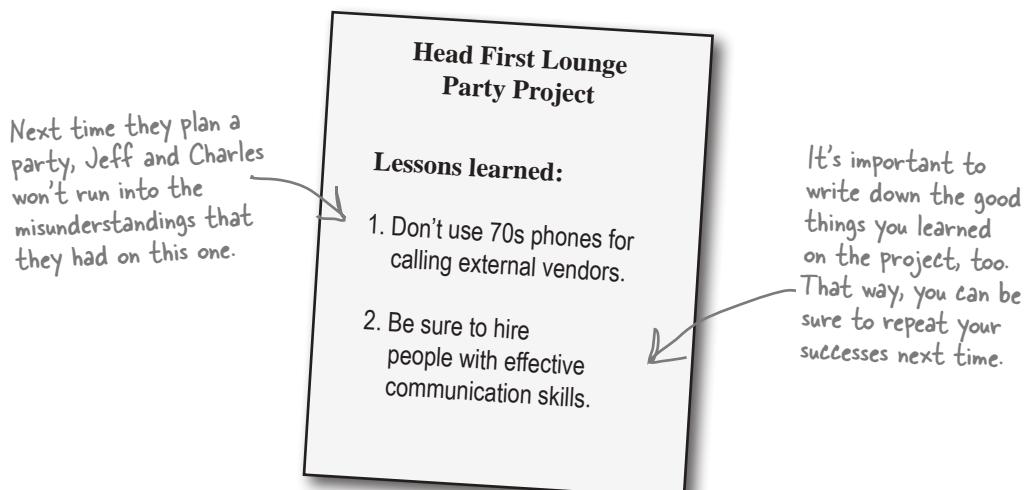
You've used lessons learned from all of the other projects your company has done as you've planned out your work. Here's where you get a chance to give your project's experience back to the company and to help future project managers learn from what's happened on your project.



Organizational  
process assets

**One of your most important outputs**

**Lessons learned** are all of the corrective and preventive actions that you have had to take on your project, and anything you have learned along the way. And one of the most valuable things you'll do for future project managers is **write them down and add them to your company's organizational process asset library**. That way, other people can learn from your experience.



## *there are no Dumb Questions*

**Q:** What do I do with lessons learned after I write them?

**A:** The great thing about lessons learned is that you get to help other project managers with them. You add them to your company's organizational process asset library, and other project managers then use them for planning their projects.

Since Jeff and Charles learned that they shouldn't use their retro phones for planning parties, no one should ever have to deal with that problem when planning a party for Jeff and Charles again. They wrote down the lesson they learned and filed it away for future planning efforts.

**Q:** I still don't get the different types of communication.

**A:** When you think about it, they are pretty easy to remember. You have formal and informal communication, and verbal and written communication types. The four different ways you can mix those up are all of the communication types. Think of informal verbal as phone calls between different team members. Formal verbal is giving a presentation. Informal written is sending out notes, emails, or memos. Formal written is when you have to write specifications or other formal project documentation.

For the test, you need to be able to identify which is which. If you just think of these examples, it should be a snap for you.

**Q:** Now, who's decoding, who's encoding, and where does feedback come from?

**A:** Think of encoding as making your message ready for other people to hear or read. If you write a book, you are encoding your message into words on pages. The person who buys the book needs to read it to decode it. The same is true for a presentation. When you present, you encode your thoughts into presentation images and text. The people who are listening to your presentation need to read the text, hear your voice, and see the visuals to decode it.

Feedback is all about the person who decodes the message letting the person who encoded it know that she received it. In the case of a book, this could be a reader sending a question or a note to the author or writing a review of it on a website. In a presentation, it could be as simple as nodding your head that you understand what's being said.

**Q:** Do I have to know everything that will be communicated to build a plan?

**A:** No. As you learn more about the project, you can always update the plan to include new information as you learn it. Pretty much all of the planning processes allow for progressive elaboration. You plan as much as you can up front, and then put all changes through change control from then on. So, if you find something new, put in a change request and update the plan when it's approved.

**There are only four communication types; formal written, informal written, formal verbal, and informal verbal. For the test, you need to be able to tell which is which.**

# Let everyone know how the project's going

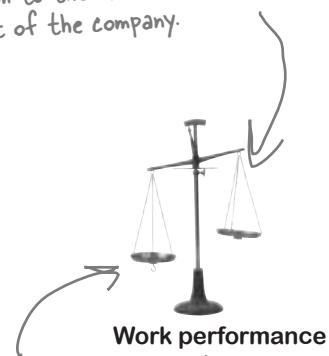


You spend a lot of time collecting valuable information about how your projects are doing. So what do you do with it? You *communicate* it. And that's what the **Control Communications** process is for: taking the information you gathered about how work is being done and distributing it to the stakeholders who need to make decisions about the project.



Remember, the team members are all stakeholders, too—and this information is especially important to them!

You created this when you were executing the project—it was where you reported how the project work was going. Now you're using it to report the performance of the team to the stakeholders and the rest of the company.



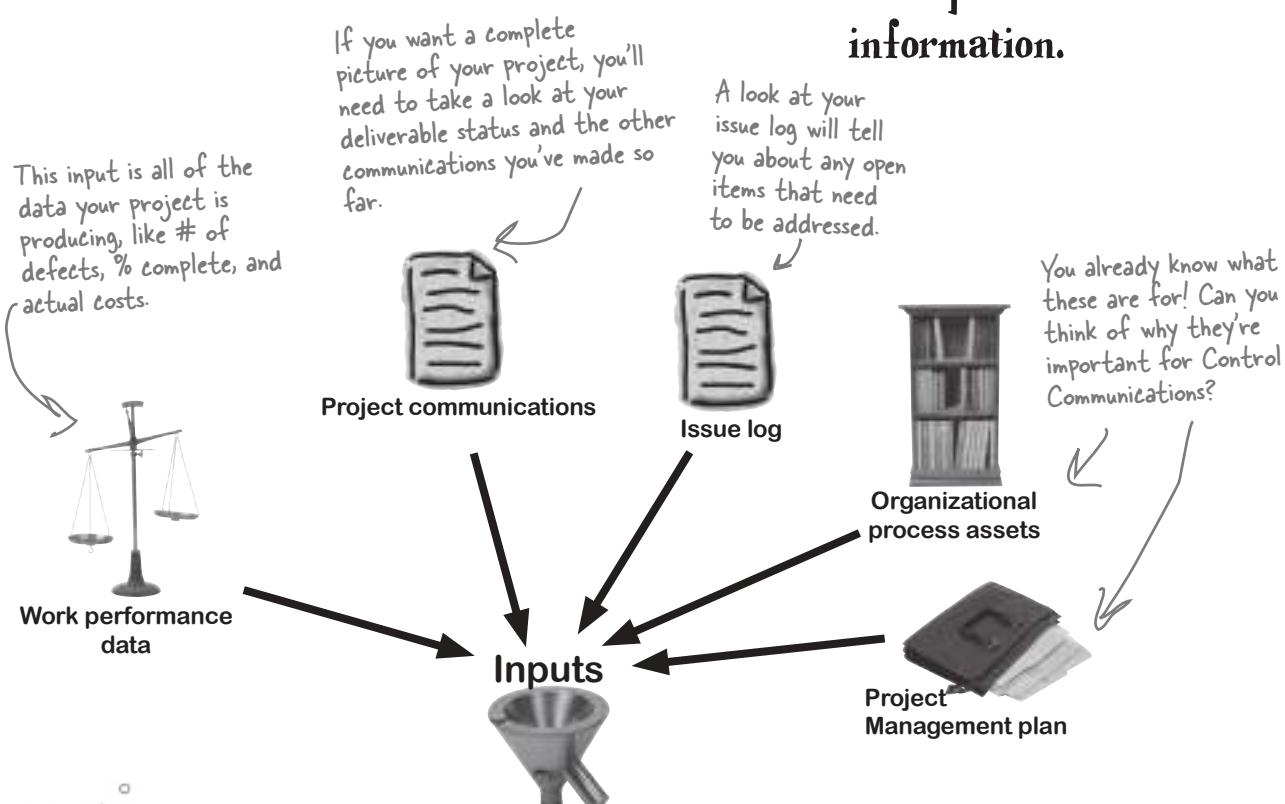
Work performance data

Whenever you hear back from a team member about how the job is going, that's work performance data.



## Take a close look at the work being done

Work performance information isn't the only information you need to figure out how the project is going. There are a whole lot of outputs from the Executing processes that you need to look at if you really want to get a clear picture of your project.



**The work performance data input is a lot easier than it looks—because you already know all about it!**

Take a minute and flip back to Control Costs in Chapter 7. You learned how to use actual costs and actual percent complete numbers to help you calculate EV, CPI, and SPI to measure your

project's performance, and you used EAC and ETC to forecast when the project would be complete. Those data points that were actually measured on your project are called work performance data. And those forecasts that you calculated are called work performance information.

**Control Communications takes the outputs from the Executing process in Manage Communications and turns them into work performance information.**



# Tools

**Information management systems**

Control Communications is one of those *PMBOK Guide* processes that's really familiar to a lot of project managers. Can you figure out what each of its **tools and techniques** is for just from the name?

**Expert judgment**

**Meetings**



Control Communications is one of those *PMBOK Guide* processes that's really familiar to a lot of project managers. Can you figure out what each of its **tools and techniques** is for just from the name?

#### **Information management systems**

Here's where all of the project communication can be found. You'll find all of the current progress reports, risk and issue logs, and other project documents here.

#### **Expert judgment**

You might want to rely on expertise from your stakeholders, consultants, your PMO, or others to determine the right information to communicate about your project.

#### **Meetings**

You can hold meetings with your team members to get everyone on the same page about the progress reports on your project.

# Now you can get the word out

Now that you've gathered up all the information about how the project's being done, it's time to get it out to the people who need it. The **outputs from Control Communications** shouldn't be particularly surprising... you're just packaging up the information you collected and turning it all into stuff that's easy to distribute to all the stakeholders. You've got three outputs from the process:

**Work performance information** is the most important output of the process—which shouldn't be a surprise, since the process is called Control Communications. Your performance reports tell everyone exactly how the project is doing, and how far off it is from its time, cost, and scope baselines. These include **forecasts**, which are what you turn your EAC and ETC numbers into. That way, everyone has a good idea of when the project is going to finish.

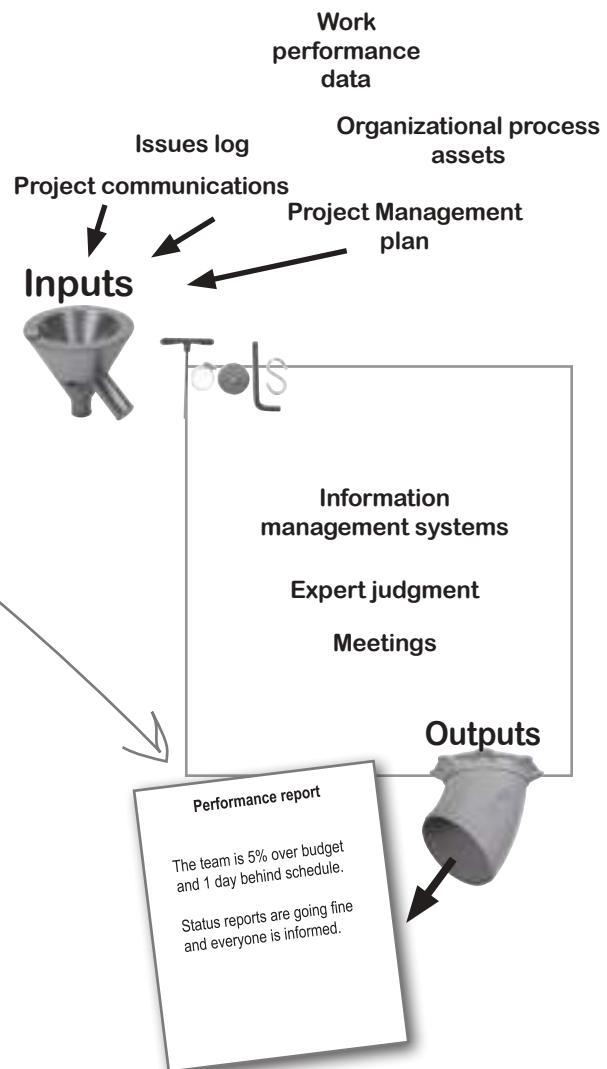
**Organizational process asset updates** need to be added—especially your **lessons learned**. There are always a lot of lessons to be learned when you're gathering this kind of project information.

**Change requests** happen when you do Control Communications. What do you do if you find out that your forecasts have your project coming in too late or over budget? You put the **change request** in as soon as possible. And if you need the project to change course, you'll need to **recommend corrective actions** to the team.

**Project Management plan updates** need to be done to make sure your plan reflects your project's current status.



Control Communications is about more than just telling people how the project is doing. It's also about finding problems. What kind of problems are you likely to uncover when you sit down with stakeholders and put together your work performance information and forecasts?

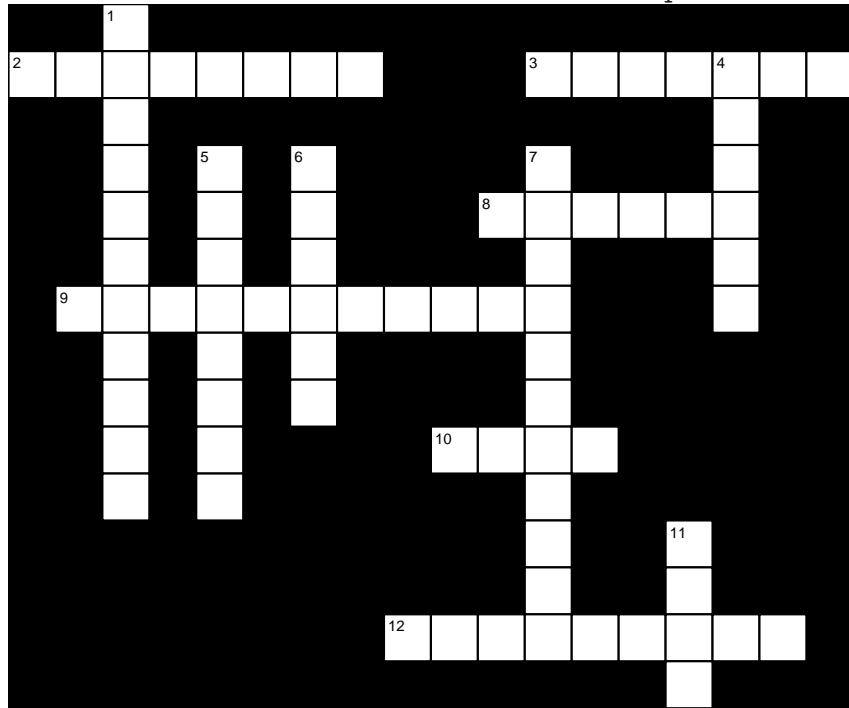


**Project documents updates** could mean updates to performance reports, issue logs, or forecasts.



## Communicationcross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



### Across

2. When you move a message from one person to another, you \_\_\_\_\_ the message.
3. One thing you need to consider when choosing a communication technology is the \_\_\_\_\_ of the communication.
8. \_\_\_\_\_ listening is when a listener uses both verbal and nonverbal clues like nodding or repeating the listener's words to communicate that the message has been received.
9. The Control Communications process turns work performance data into work performance\_\_\_\_\_.
10. When your stakeholders get information from an intranet website, you're using this communication model.
12. You can use the ETC and EAC calculations from Cost Management to create \_\_\_\_\_.

### Down

1. This kind of communication includes vocal but nonverbal signals, such as changing the pitch and tone of voice.
4. According to the *PMBOK Guide*, \_\_\_\_\_ percent of project management is communication.
5. A conversation in a hallway is an example of \_\_\_\_\_ verbal communication.
6. A contract is always \_\_\_\_\_ communication.
7. When you receive a message and tell the sender that you got it, you \_\_\_\_\_ the communication.
11. The communication model you use when you send email announcements.

→ Answers on page 542.

# People aren't talking!

There's so much information floating around on any project, and if you're not careful it won't get to the people who need it. That's why so much of your job is communication—if you don't stay on top of all of it, your project can run into some serious trouble!

THE FORECAST LOOKED GOOD, AND EVERYONE WAS ON TOP OF THEIR JOBS. WE THOUGHT WE WERE ON TRACK FOR FRIDAY NIGHT. THEN ALL THESE PROBLEMS CAME UP...



## Problems

- ★ The caterer's serving food that doesn't go with the drinks or theme.
- ★ The DJ and the band want to set up in the same place.
- ★ All the guests are telling us they like different food.
- ★ Has anyone even talked to the neighbors about the noise?
- ★ Three people are bringing friends, but nobody told the caterer.

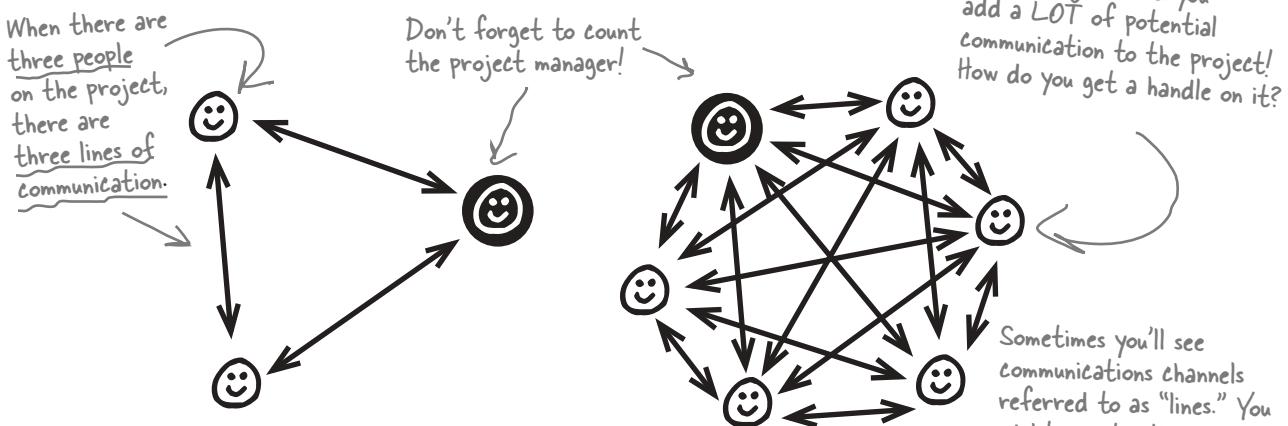
HOW ARE WE GONNA GET  
A HANDLE ON THIS?



What's causing all of these problems?  
Will better communication help?

## Count the channels of communication

How many people need to talk to one another? Well, Jeff and Charles need to talk. But what about the DJ and the band? They wanted to set up their equipment in the same place—it looks like they need to talk, too. And the bartender needs to coordinate with the caterer. Wow, this is starting to get complicated. A good project manager needs to get a handle on all this communication, because it's really easy to lose track of it. That's why you need to know how to **count the channels of communication** on any project.



### Counting communication lines the easy way

It would be really easy to get overwhelmed if you tried to count all the lines of communication by hand. Luckily, there's a really easy way to do it by using a simple formula. Take the total number of people on the project—including the project manager—and call that number **n**. Then all you need to do is plug that number into this simple formula:

$$\# \text{ lines for } n \text{ people} = \frac{n \times (n - 1)}{2}$$

You'll need to know this formula on the PMP exam. Just keep using it, though, and you'll get it down in no time.

So, how many more lines of communication were added when three more people joined the three-person project above? You know there were **three lines** to start with. So now just figure out **how many lines** there are **for 6 people**:

$$\# \text{ lines for 6 people} = \frac{6 \times (6 - 1)}{2} = (6 \times 5) \div 2 = 15$$

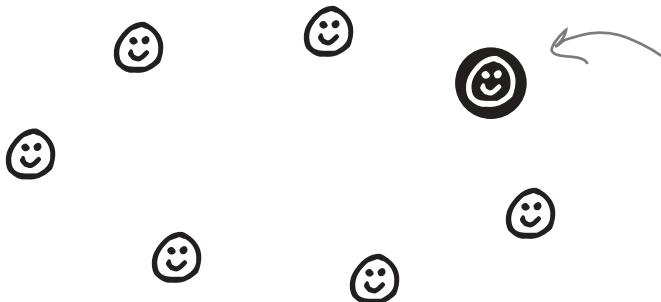
When you added three more people to the three-person project—that had three lines of communication—the new team has 15 lines. So you **added 12 channels of communication**.

# Sharpen your pencil



You'll need to know how to calculate the number of lines of communication for the exam...but don't worry, it's really easy once you get a little practice.

1. You're managing a project with five people on the team, plus one additional stakeholder—the sponsor. Draw in all the channels of communication on this picture.



*Don't forget the project manager. There are six people on the team, but the total number of people who need to communicate is seven people, because the PM needs to communicate with the team members and sponsor.*

2. Wow, that was a lot of work. Luckily, you won't need to do that again. Now do it the easy way: use the formula to figure out how many lines of communication there are for seven people.

$$\# \text{ lines for } \dots \text{ people} = \frac{\dots \times (\dots - 1)}{2} = (\dots \times \dots) \div 2 = \dots$$

3. OK, now let's say that you've added two team members and two more stakeholders, so there are now 11 people on the project who need to communicate with one another. How many lines did you add?

First figure out how many lines there are for 11 people:

$$\# \text{ lines for } \dots \text{ people} = \frac{\dots \times (\dots - 1)}{2} = (\dots \times \dots) \div 2 = \dots$$

So how many lines were added when four people joined the seven-person project?

$$\# \text{ lines added} = \# \text{ lines for 11 people} - \# \text{ lines for 7 people}$$

$$= \dots - \dots = \dots$$

→ Answers on page 543.

*there are no*  
**Dumb Questions**

**Q:** Some of those communication skills seem like the same thing. What's the difference between active and effective listening?

**A:** Some of the communications ideas do have names that are a little confusing. But don't worry, they're really easy concepts for you to understand.

Active listening just means when you're listening to something, you keep alert and take specific actions that help make sure you understand. It includes both effective listening and feedback. Effective listening is a way that you do active listening—it means paying attention to both verbal and nonverbal communication. Feedback means doing things like repeating back the words that you were told in order to make sure you understood them, and giving your own nonverbal cues to show the speaker that you got the message.

**Q:** OK, so what about nonverbal and paralingual communication? Aren't those the same thing?

**A:** They are very similar, but they're not exactly the same. Nonverbal communication is any kind of communication that doesn't use words. That includes things like changing your body language, making eye contact, and using gestures. Paralingual communication is a kind of nonverbal communication—it's changing your tone of voice or intonation, finding ways to communicate things above and beyond just the words that you're saying. For example, the same words mean very different things if you say them sarcastically than if you say them in a normal tone of voice.

**Q:** Why is all that stuff about different kinds of communication important?

**A:** It's important because 90% of project management is communication, so if you want to be the best project manager that you can be, you need to constantly work to improve your communication skills!

**Q:** Should I always have a kickoff meeting?

**A:** Yes, absolutely! You should always have a kickoff meeting for every project. Not only that, but if you're running the kind of project with several phases, and you go through all of the process groups for each phase, then you should have a separate kickoff meeting for each new phase. Kickoff meetings also help you define who's responsible for various communications. Kickoff meetings are really important, because they give the team a chance to meet face-to-face, and give you the opportunity to make sure that everyone really understands all of the ways they can communicate with one another. That's a great way to head off a lot of potential project problems!

**Q:** Why do I need to be able to calculate the number of lines of communication?

**A:** It may seem like the lines of communication formula is something arbitrary that you just need to memorize for the exam, but it's actually pretty useful.

Let's say that you have a project with a whole lot of people on it. You set up a good communication system in your Communication Management plan, but you want to make sure that you really included every line in it, because if you missed one then you could run into communications problems down the line. So what do you do? Well, one thing you can do to check your work is to calculate the total number

of lines of communication in your project, and then make sure that every one of those lines is represented somewhere in your communications plan. It's a little more work up front, but it could really save you a lot of effort down the line!

**Q:** I spent all that time working on performance reports. What do I do with them once I'm done with them?

**A:** The same thing you do with any information that you generate on your project. You add them to your organizational process assets!

Think back to how you came up with your estimates in Time Management and Cost Management. You spent a lot of time doing analogous estimation, right? That's where you use performance from past projects to come up with a rough, top-down estimate for your new project. Well, where do you think the performance information from those past projects came from? You got them from your organizational process assets. And how did they end up there? Project managers from those past projects took their performance reports and added them. So you should add your performance reports, too. That way, project managers on future projects can use your project when they need to look up historical data.

**You should add all of your performance reports to the organizational process assets so that project managers on future projects can use them as historical information.**

# It's party time!

The Head First Lounge party is a big hit! Everything came together beautifully, and Jeff and Charles are the new downtown sensation!



## Question Clinic: The calculation question



YOU'LL RUN ACROSS A BUNCH OF QUESTIONS ON THE EXAM ASKING YOU TO USE SOME OF THE FORMULAS THAT YOU LEARNED. LUCKILY, THESE ARE SOME OF THE EASIEST QUESTIONS THAT YOU CAN ANSWER.

This is the wrong answer you'd get if you calculate the number of lines of communication if you include the team and two sponsors, but forget to include the project manager.

This wrong answer is the number of lines of communication BEFORE the team size was increased. You have 13 people (10 team members, 2 client sponsors, and you), so the number of lines is  $13 \times 12 \div 2 = 78$ .

This wrong answer is the number of lines of communication AFTER the team size was increased by 30%. You have 16 people (13 team members, 2 client sponsors, and you), so the number of lines is  $16 \times 15 \div 2 = 120$ .

12. You're managing a project with 2 client sponsors, and you have a 10-person team reporting to you. You've been given a budget increase, which allowed you to increase your team size by 30%. How many lines of communication were added?

- A. 66
- B. 78
- C. 42
- D. 120

Aha! Here's the right answer. Take the number of lines for 16 people and subtract the number of lines for 13 people:  $120 - 78 = 42$ .

WHEN YOU SIT DOWN TO TAKE AN EXAM AT A COMPUTER TESTING CENTER, YOU'LL BE GIVEN SCRATCH PAPER. YOU'LL ALSO HAVE 15 MINUTES TO GO THROUGH A TUTORIAL THAT SHOWS YOU HOW TO USE THE EXAM SYSTEM. BEFORE YOU FINISH THE TUTORIAL, TAKE A MINUTE AND WRITE DOWN ALL OF THE FORMULAS. WRITE DOWN THE EARNED VALUE FORMULAS AND THE FORMULA TO CALCULATE THE LINES OF COMMUNICATION ON THE SCRATCH PAPER. THAT WILL MAKE ANY CALCULATION QUESTION EASY.



# HEAD LIBS

Try coming up with your own calculation question! But this time, try using one of the earned value formulas from Chapter 7.

You are managing a \_\_\_\_\_ project.  
(kind of project)

You have \_\_\_\_\_, \_\_\_\_\_,  
(a value needed for the calculation) (another value needed for the calculation)  
and \_\_\_\_\_.  
(an irrelevant value that is NOT needed for the calculation)

Calculate \_\_\_\_\_ for your project.  
(name of a formula)

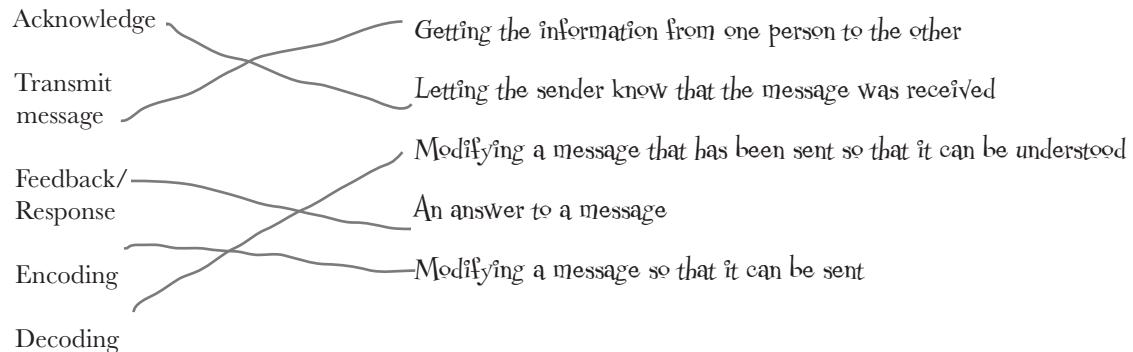
- A. \_\_\_\_\_  
(the answer you'd get if you plug the wrong value into the formula)
- B. \_\_\_\_\_  
(the answer you'd get if you used the wrong formula)
- C. \_\_\_\_\_  
(the correct answer)
- D. \_\_\_\_\_  
(a totally bizarre answer that comes out of nowhere)



Join the Head First PMP community at <http://www.headfirstlabs.com/PMP>  
You can add your Head Libs answer, and see what Head Libs other project managers  
came up with!

# + WHAT'S MY PURPOSE ? +

Match each communication element to what it does



## Exercise Solution

Jeff and Charles are interviewing new bartenders to help with the expanded space.  
Choose which kind of communication is being used in each situation.

The candidate repeated the question. That's a great example of feedback.

1. One applicant came in 30 minutes late, and was dressed unprofessionally. The guys knew that he would not be a good fit for the position.

Paralingual  
 Nonverbal  
 Feedback

3. Charles asked the next applicant if he knew how to make a sidecar. He said “A sidecar?” Sure. It’s one part brandy or cognac, one part Cointreau, and one part lemon juice.”

Paralingual  
 Nonverbal  
 Feedback

2. Charles asked an applicant about her background. Her tone of voice was really sarcastic, and he got the impression she didn’t take the job seriously. Charles and Jeff decided to pass on her too.

Paralingual  
 Nonverbal  
 Feedback

4. Then the applicant told them about his background as a bartender for other retro clubs. As he spoke, he made eye contact with them and made sure to confirm agreement with them.

Paralingual  
 Nonverbal  
 Feedback



## Exercise Solution

Choose which kind of communication is being used in each situation.

1. You and your business analysts write a requirements specification for your project.

<input type="checkbox"/> Formal verbal	<input type="checkbox"/> Informal verbal
<input checked="" type="checkbox"/> Formal written	<input type="checkbox"/> Informal written

2. You call up a supplier for materials for your project to let him know that you are a week late, so he's got a little flexibility in his delivery schedule.

<input type="checkbox"/> Formal verbal	<input checked="" type="checkbox"/> Informal verbal
<input type="checkbox"/> Formal written	<input type="checkbox"/> Informal written

3. You present your project's status to your company's executive committee.

<input checked="" type="checkbox"/> Formal verbal	<input type="checkbox"/> Informal verbal
<input type="checkbox"/> Formal written	<input type="checkbox"/> Informal written

4. You send an email to some of your team members to get more information about an issue that has been identified on your project.

<input type="checkbox"/> Formal verbal	<input type="checkbox"/> Informal verbal
<input type="checkbox"/> Formal written	<input checked="" type="checkbox"/> Informal written

5. You leave a voicemail message for your test team lead following up on an issue he found.

<input type="checkbox"/> Formal verbal	<input checked="" type="checkbox"/> Informal verbal
<input type="checkbox"/> Formal written	<input type="checkbox"/> Informal written

6. You IM with your team members.

<input type="checkbox"/> Formal verbal	<input type="checkbox"/> Informal verbal
<input type="checkbox"/> Formal written	<input checked="" type="checkbox"/> Informal written

7. You prepare an RFP (request for proposals) for vendors to determine which of them will get a chance to contract a new project with your company.

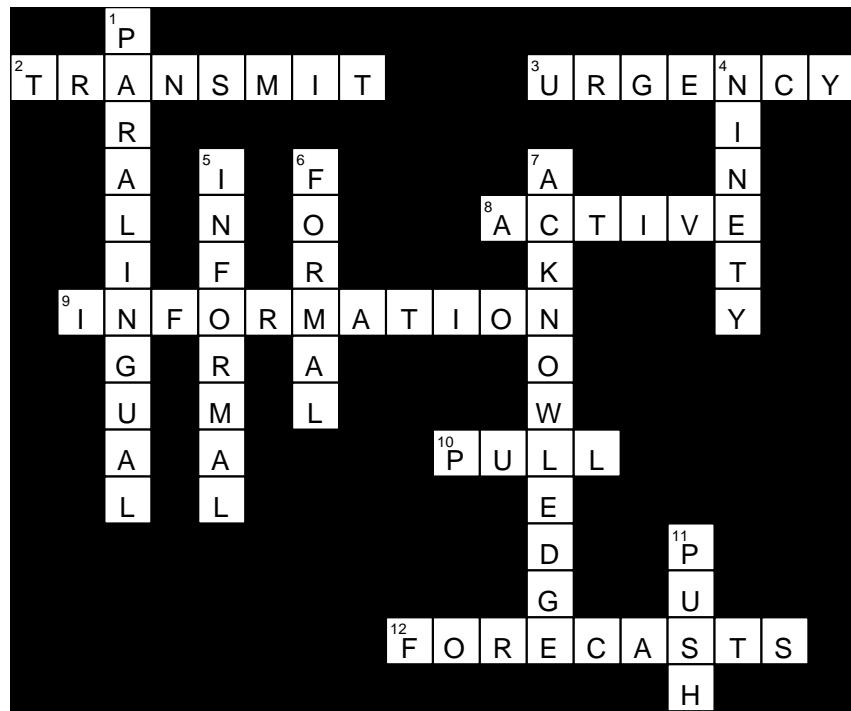
<input type="checkbox"/> Formal verbal	<input type="checkbox"/> Informal verbal
<input checked="" type="checkbox"/> Formal written	<input type="checkbox"/> Informal written

Anything that has to do with a contract is always formal written.



## Communicationcross

Take some time to sit back and give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.

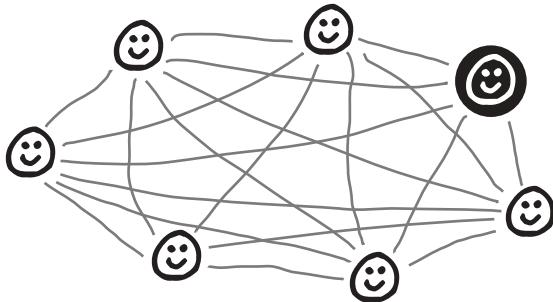




## Sharpen your pencil Solution

You'll need to know how to calculate the number of lines of communication for the exam...but don't worry, it's really easy once you get a little practice.

1. You're managing a project with five people on the team, plus one additional stakeholder—the sponsor. Draw in all the channels of communication on this picture.



2. Wow, that was a lot of work. Luckily, you won't need to do that again. Now do it the easy way: use the formula to figure out how many lines of communication there are for seven people.

$$\# \text{ lines for } 7 \text{ people} = \frac{7 \times (7 - 1)}{2} = (7 \times 6) \div 2 = 21$$

3. OK, now let's say that you've added two team members and two more stakeholders, so there are now 11 people on the project who need to communicate with one another. How many lines did you add?

First figure out how many lines there are for 11 people:

$$\# \text{ lines for } 11 \text{ people} = \frac{11 \times (11 - 1)}{2} = (11 \times 10) \div 2 = 55$$

So how many lines were added when four people joined the seven-person project?

$$\begin{aligned} \# \text{ lines added} &= \# \text{ lines for } 11 \text{ people} - \# \text{ lines for } 7 \text{ people} \\ &= 55 - 21 = 34 \end{aligned}$$

## Exam Questions

1. Keith, the project manager of a large publishing project, sends an invoice to his client. Which communication type is he using?
  - A. Formal verbal
  - B. Formal written
  - C. Informal written
  - D. Informal verbal
2. Which of the following is NOT an input to the Plan Communications Management process?
  - A. Enterprise environmental factors
  - B. Organizational process assets
  - C. Information gathering techniques
  - D. Project management plan
3. You take over for a project manager who has left the company and realize that the team is talking directly to the customer and having status meetings only when there are problems. The programming team has one idea about the goals of the project, and the testing team has another. Which document is the FIRST one that you should create to solve this problem?
  - A. Communications Management plan
  - B. Status report
  - C. Meeting agenda
  - D. Performance report
4. You ask one of your stakeholders how things are going on her part of the project and she says, “things are fine” in a sarcastic tone. Which is the BEST way to describe the kind of communication that she used?
  - A. Feedback
  - B. Active listening
  - C. Nonverbal
  - D. Paralingual
5. You’re managing an industrial design project. You created a Communications Management plan, and now the team is working on the project. You’ve been communicating with your team, and now you’re looking at the work performance data to evaluate the performance of the project. Which of the following BEST describes the next thing you should do?
  - A. Use formal written communication to inform the client of the project status.
  - B. Compare the work performance data against the time, cost, and scope baselines and look for deviations.
  - C. Update the organizational process assets with your lessons learned.
  - D. Hold a status meeting.

## Exam Questions

6. You have five people working on your team, a sponsor within your company, and a client, all of whom need to be kept informed of your project's progress. How many lines of communication are there?

- A. 28
- B. 21
- C. 19
- D. 31

7. Which of the following is NOT an example of active listening?

- A. Nodding your head in agreement while someone is talking
- B. Restating what has been said to be sure you understand it
- C. Asking questions for clarification
- D. Multitasking by checking your email during a conversation

8. Sue sent a message to Jim using the company's voicemail system. When he received it, Jim called her back. Which of the following is true?

- A. Sue encoded the voicemail; Jim decoded it, and then encoded his feedback message.
- B. Sue decoded her voicemail message; Jim encoded his phone call and decoded the feedback.
- C. Jim sent feedback to Sue, who encoded it.
- D. Sue decoded her voicemail message and Jim encoded his feedback.

9. You're managing a construction project. Suddenly the customer asks for some major changes to the blueprints. You need to talk to him about this. What's the BEST form of communication to use?

- A. Informal written
- B. Informal verbal
- C. Formal written
- D. Formal verbal

10. Kyle is the project manager of a project that has teams distributed in many different places. In order to make sure that they all get the right message, he needs to make sure that his project plan is translated into Spanish, Hindi, French, and German. What is Kyle doing when he has his communications translated?

- A. Encoding
- B. Decoding
- C. Active listening
- D. Effective listening

## Exam Questions

11. There are 15 people on a project (including the project manager). How many lines of communication are there?

- A. 105
- B. 112
- C. 113
- D. 52

12. Which communication process is in the Monitoring and Controlling process group?

- A. Manage Communications
- B. None of the communications processes
- C. Plan Communications Management
- D. Control Communications

13. You're working at a major conglomerate. You have a 24-person team working for you on a project with 5 major sponsors. The company announces layoffs, and your team is reduced to half its size. How many lines of communication are on your new, smaller team?

- A. 66
- B. 153
- C. 276
- D. 406

14. You've consulted your earned value calculations to find out the EAC and ETC of your project. Which of the following is the BEST place to put that information?

- A. Work performance information
- B. Forecasts
- C. Quality control measurements
- D. Lessons learned

15. Which of the following is an example of noise?

- A. An email that's sent to the wrong person
- B. A project manager who doesn't notice an important clause in a contract
- C. Garbled text and smudges that make a fax of a photocopy hard to read
- D. When the team is not paying attention during a status meeting

*Answers*~~Exam Questions~~**1. Answer: B**

Any communication that can be used for legal purposes is considered formal written communication. An invoice is a formal document.

See the word "technique"?  
That's a good indication that  
it's a tool and not an input.

**2. Answer: C**

Information gathering techniques are not part of Plan Communications Management.

**3. Answer: A**

The Communications Management plan is the first thing you need to create in this situation. It will help you organize the meetings that are taking place and get everyone on the same page. The Communications Management plan will help you to streamline communications so that the customer can use you as a single point of contact, too.

**4. Answer: D**

Paralingual communication happens when additional information is conveyed by the tone or pitch of your voice. It's when you use more than just words to communicate.

**5. Answer: B**

When you look at work performance data, you're in the Control Communications process. And what do you do with the work performance data? You compare it against the baselines to see if your project is on track! If it isn't, that's when you want to get the word out as quickly as possible.

A lot of people choose B here. Don't forget to include yourself! Look out for questions like this on the exam too.

**6. Answer: A**

The formula for lines of communication is  $n \times (n - 1) \div 2$ . In this problem there were seven people named, plus you.  $(8 \times 7) \div 2 = 28$ .

## Answers

# ~~Exam Questions~~

### 7. Answer: D

All of the other options show the speaker that you understand what is being said. That's active listening.

Active listening sometimes means saying things like "I agree," or "can you explain that a little further?"

### 8. Answer: A

This question is just asking if you know the definitions of encode, decode, and feedback. Encoding is making a message ready for other people to understand, while decoding it involves receiving the message and understanding it. Feedback means letting the sender know that you got the message.

Any time you see anything about a formal document in communication with a client, it's formal written.

### 9. Answer: C

Any time you are communicating with the customer about the scope of your project, it's a good idea to use formal written communication.

### 10. Answer: A

He has to encode his message so that others will understand it.

### 11. Answer: A

$(15 \times 14) \div 2 = 105$ . This one is just asking if you know the formula  $n \times (n-1) \div 2$ .

### 12. Answer: D

Control Communications is the only Monitoring and Controlling process in Communications Management.

*Answers*~~Exam Questions~~**13. Answer: B**

There are now 12 team members, 5 sponsors, and a project manager. That gives you 18 people. Use the formula:  $n \times (n - 1) \div 2$  to calculate this:  $18 \times 17 \div 2 = 153$ .

*Did you get one of the other answers?  
Make sure you included the five sponsors  
and the project manager!*

**14. Answer: B**

The idea behind forecasts is that you are using the earned value calculations that forecast the completion of the project to set everyone's expectations. That's why you use EAC (which helps you estimate your project's total cost) and ETC (which gives you a good idea of how much more money you think you'll spend between now and when it ends).

**15. Answer: C**

There are plenty of ways that communication can go wrong. When you send email to the wrong person, your communication had trouble—but that's **not** noise. Noise is the specific thing that interferes with the communication. In this case, the garbled text is a great example of noise.

*OH, I GET IT. I ALREADY CAME UP WITH GOOD COST AND TIME FORECASTS USING EAC AND ETC. NOW I CAN PACKAGE THEM UP AS FORECASTS AND SHARE THEM WITH THE TEAM.*





## 11 Project risk management

# Planning for the unknown



**Even the most carefully planned project can run into trouble.** No matter how well you plan, your project can always run into **unexpected problems**. Team members get sick or quit, resources that you were depending on turn out to be unavailable—even the weather can throw you for a loop. So does that mean that you're helpless against unknown problems? No! You can use **risk planning** to identify potential problems that could cause trouble for your project, **analyze** how likely they'll be to occur, take action to **prevent** the risks you can avoid, and **minimize** the ones that you can't.

## What's a risk?

There are no guarantees on any project! Even the simplest activity can run into unexpected problems. Any time there's anything that **might** occur on your project and change the outcome of a project activity, we call that a **risk**. A risk can be an event (like a fire), or it can be a condition (like an important part being unavailable). Either way, it's something that may or may not happen...but if it does, you will be forced to change the way you and your team work on the project.

If your project requires that you stand on the edge of a cliff, then there's a risk that you could fall.

If it's very windy out or the ground is slippery and uneven, then falling is more likely.



A risk is any uncertain event or condition that **might** affect your project. Not all risks are negative.

### Not all risks are negative

Some events (like finding an easier way to do an activity) or conditions (like lower prices for certain materials) can help your project! When this happens, we call it an **opportunity**...but it's still handled just like a risk.

# How you deal with risk

When you're planning your project, risks are still uncertain: they haven't happened yet. But eventually, some of the risks that you plan for *do* happen. And that's when you have to deal with them. There are four basic ways to handle a risk:

## 1 Avoid

The best thing that you can do with a risk is avoid it—if you can prevent it from happening, it definitely won't hurt your project.



The easiest way to avoid this risk is to walk away from the cliff...but that may not be an option on this project.

## 2 Mitigate

If you can't avoid the risk, you can mitigate it. This means taking some sort of action that will cause it to do as little damage to your project as possible.



## 3 Transfer

One effective way to deal with a risk is to pay someone else to accept it for you. The most common way to do this is to buy insurance.

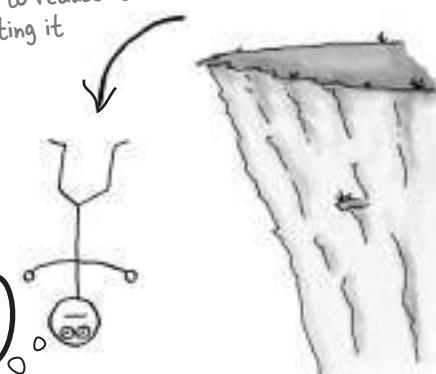


## 4 Accept

When you can't avoid, mitigate, or transfer a risk, then you have to accept it. But even when you accept a risk, at least you've looked at the alternatives and you know what will happen if it occurs.

If you can't avoid the risk, and there's nothing you can do to reduce its impact, then accepting it is your only choice.

LOOKS LIKE  
FALLING IS THE  
BEST OPTION.



# Plan Risk Management

By now, you should have a pretty good feel for how each of the planning processes work. The past few knowledge areas started out with their own planning process, and Risk Management is no different. You start with the **Plan Risk Management** process, which should look very familiar to you.



By the time a risk actually occurs on your project, it's too late to do anything about it. That's why you need to plan for risks from the beginning and keep coming back to do more planning throughout the project.

You'll need to see if there are standard templates, roles and responsibilities, or risk categories that your company uses.



Are people at your company risk takers? Do they play it safe? Every company has people with different attitudes about risk.

Enterprise environmental factors

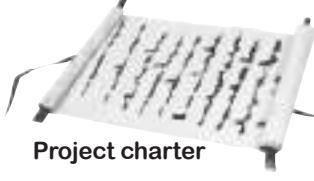
Organizational process assets

You'll learn more about this one in Chapter 13.

Stakeholder register



Inputs



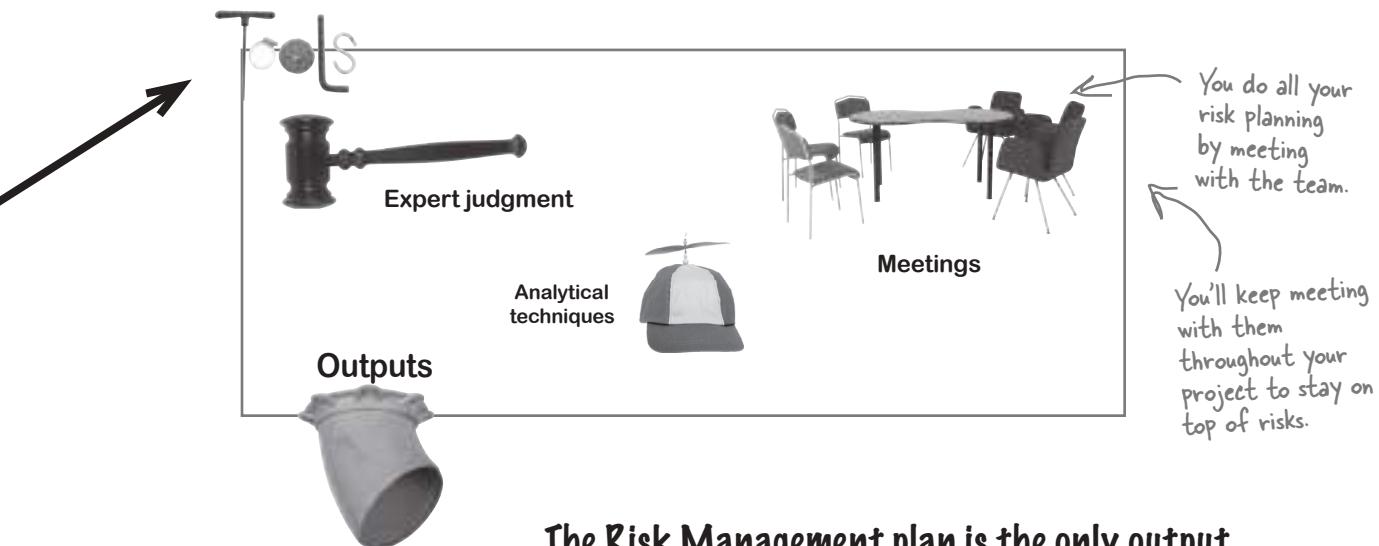
Project Management plan



**Are you starting to see a pattern here?**

**Watch it!**  
You may get a question on the exam that asks which processes use organizational process assets! Think about why you need them for Plan Risk Management and the other planning processes. That should help you remember which processes need them.

You can figure out why you need these Project Management plans and the scope statement. Take a minute to think it through.



The Risk Management plan is your guide to identifying and analyzing risks on your project.



Risk Management plan

It tells you who identifies and analyzes the risks, how they do it, and how often it happens.

## The Risk Management plan is the only output

It tells you how you're going to handle risk on your project—which you probably guessed, since that's what management plans do. It says how you'll assess risk on the project, who's responsible for doing it, and how often you'll do risk planning (since you'll have to meet about risk planning with your team throughout the project).

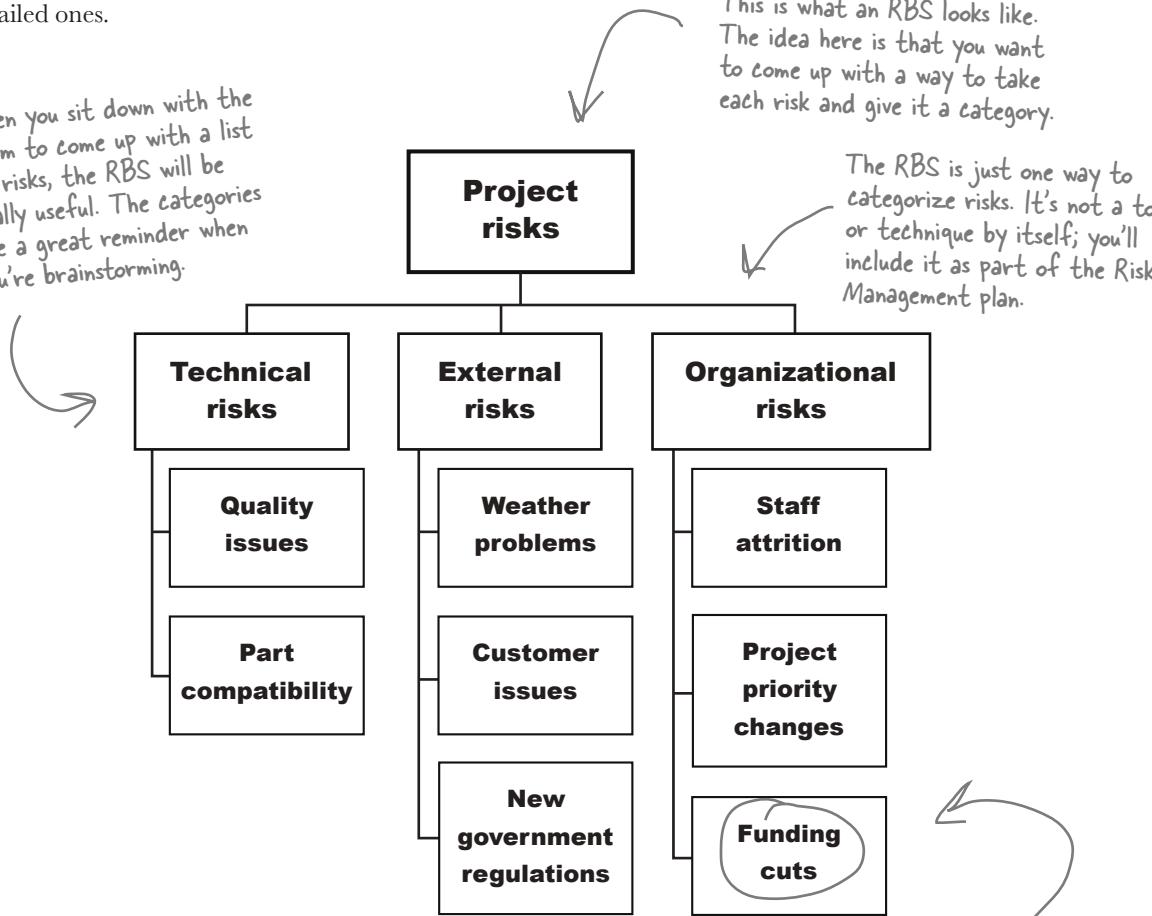
The plan has parts that are really useful for managing risk:

- It has a bunch of **risk categories** that you'll use to classify your risks. Some risks are technical, like a component that might turn out to be difficult to use. Others are external, like changes in the market or even problems with the weather. Risk categories help you to build a **risk breakdown structure (RBS)**.
- You'll need to describe the methods and approach you'll use for identifying and classifying risks on your project. This section of the document is called the **methodology**.
- It's important to come up with a plan to help you figure out how big a risk's impact is and how likely a risk is to happen. The impact tells you how much damage the risk will cause to your project. A lot of projects classify impact on a scale from minimal to severe, or from very low to very high. This section of the document is called the **definitions of probability and impact**.

## Use a risk breakdown structure to categorize risks

You should build guidelines for risk categories into your Risk Management plan, and the easiest way to do that is to use a **risk breakdown structure** (RBS). Notice how it looks a lot like a WBS? It's a similar idea—you come up with major risk categories, and then decompose them into more detailed ones.

When you sit down with the team to come up with a list of risks, the RBS will be really useful. The categories are a great reminder when you're brainstorming.





Take a look at how each of these project risks is handled and figure out if the risk is being avoided, mitigated, transferred, or accepted.

1. Stormy weather and high winds could cause very slippery conditions, so you put up a tent and wear slip-resistant footwear to keep from losing your footing.

Avoided

Mitigated

Transferred

Accepted

2. You buy a surge protector to make sure a lightning strike won't blow out all of your equipment.

Avoided

Mitigated

Transferred

Accepted

3. Flooding could cause serious damage to your equipment, so you buy an insurance policy that covers flood damage.

Avoided

Mitigated

Transferred

Accepted

4. The manufacturer issues a warning that the safety equipment you are using has a small but nonzero probability of failure under the conditions that you'll be facing. You replace it with more appropriate equipment.

Avoided

Mitigated

Transferred

Accepted

5. A mud slide would be very damaging to your project, but there's nothing you can do about it.

Avoided

Mitigated

Transferred

Accepted

6. A team member discovers that the location you planned on using is in a county that is considering regulations that could be expensive to comply with. You work with a surveying team to find a new location.

Avoided

Mitigated

Transferred

Accepted

7. Surrounding geological features could interfere with your communications equipment, so you bring a flare gun and rescue beacon in case it fails.

Avoided

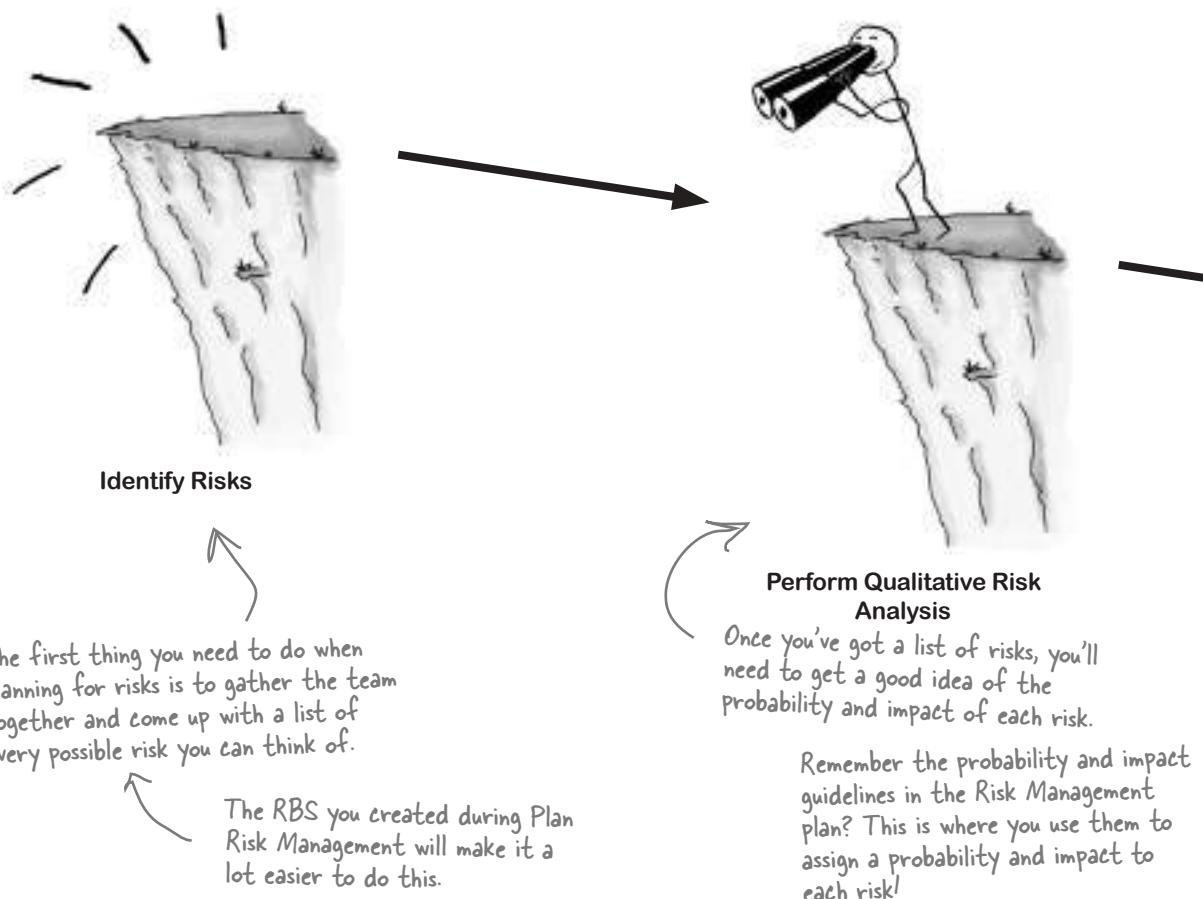
Mitigated

Transferred

Accepted

## Anatomy of a risk

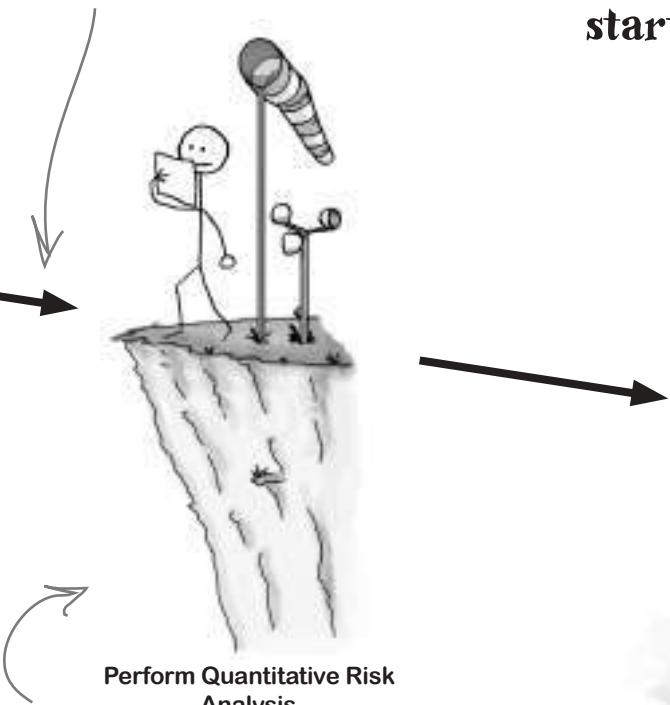
Once you're done with Plan Risk Management, there are four more Risk Management processes that will help you and your team come up with the list of risks for your project, analyze how they could affect it, and plan how you and your team will respond if any of the risks materialize when you're executing it.



There are two more Risk Management processes. You already saw Plan Risk Management. There's also a Monitoring and Controlling process called Control Risks that you use when a risk actually materializes.

By the time you get here, you've got a list of risks, with a probability and impact assigned to each. That's a great starting point, but sometimes you need more information if you want to make good decisions...

All four of these Risk Management processes are in the Planning process group—you need to plan for your project's risks before you start executing the project.



#### Perform Quantitative Risk Analysis

You can make better decisions with more precise information. That's what this process is about—assigning numerical values for the probability and impact of each risk.

All that's left now is to plan responses to each risk! This is where you decide whether to avoid, mitigate, transfer, or accept...and how you'll do it!



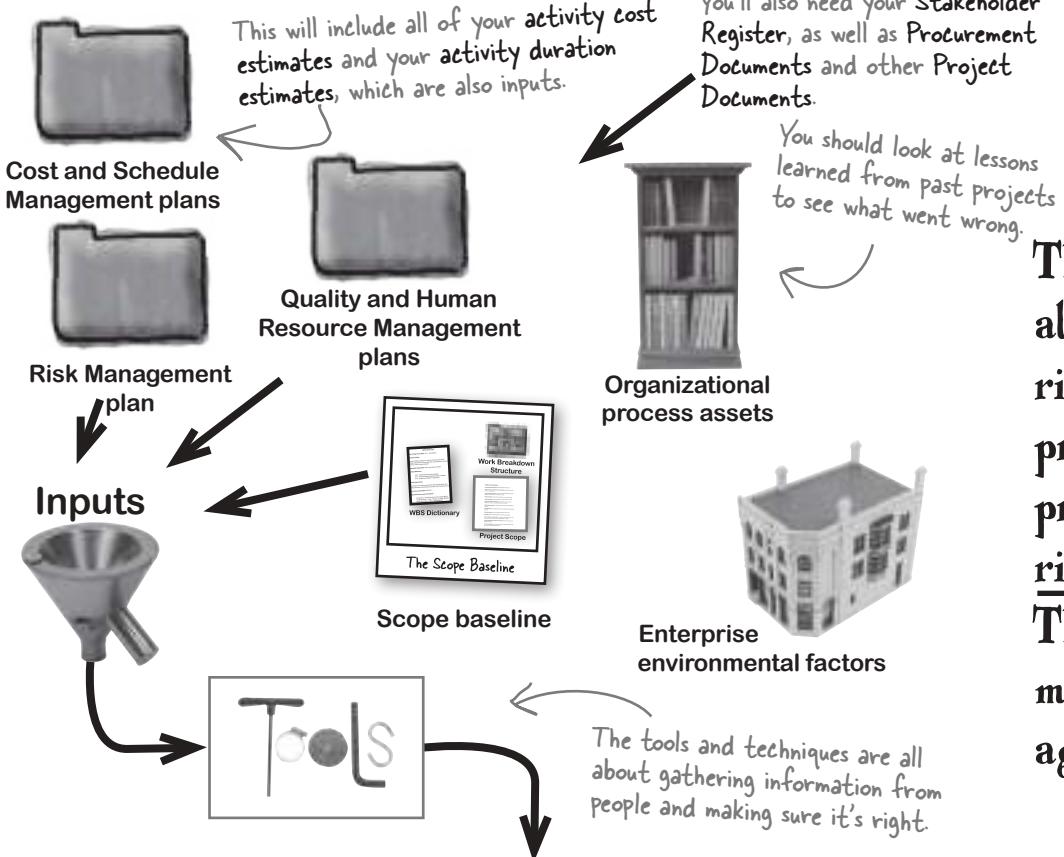
#### Plan Risk Responses



Some teams do Perform Qualitative Risk Analysis first, while others start with Perform Quantitative Risk Analysis. Some only do one or the other. Can you think of reasons they might do this?

# What could happen to your project?

You can't plan for risks until you've figured out which ones you're likely to run into. That's why the next Risk Management process is **Identify Risks**. The idea is that you want to figure out every possible risk that might affect your project. Don't worry about how unlikely the risk is, or how bad the impact would be—you'll figure that stuff out later.



**The goal of all of the risk planning processes is to produce the risk register. That's your main weapon against risk.**

The risk register is the only output—and it's the most important part of Risk Management. It's a list of all of the risks and some initial ideas about how you'd respond to them.

Identified Risks	Potential Responses	Root Causes
Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby
High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National weather service predicts 35% chance of high winds
Truck rental is unavailable	Pay to reserve equipment at a second company	Higher than expected demand for equipment in the area this season
Equipment failure during project	No responses were found by the team	Recent industry report cites higher-than-expected failure rates for critical equipment

# Information-gathering techniques for Identify Risks

You probably already guessed that the goal of Identify Risks is to identify risks—seems pretty obvious, right? And the most important way to identify those risks is to gather information from the team. That's why the first—and most important—technique in Identify Risks is called **information gathering techniques**. These are time-tested and effective ways to get information from your team, stakeholders, and anyone else who might have information on risks.



## Four useful information gathering techniques

There are a lot of different ways that you can find risks on your project. But there are only a few that you're most likely to use—and those are the ones that you will run across on the exam.

**Brainstorming** is the first thing you should do with your team. Get them all together in a room, and start pumping out ideas. Brainstorming sessions always have a **facilitator** to lead the team and help turn their ideas into a list of risks.

The facilitator is really important—without her, it's just a disorderly meeting with no clear goal.

The team usually comes up with risks that have to do with building the product, while the sponsor or someone who would use the product will think about how it could end up being difficult to use.

**Interviews** are a really important part of identifying risk. Try to find everyone who might have an opinion and ask them about what could cause trouble on the project. The sponsor or client will think about the project in a very different way than the project team.

**The Delphi technique** is a way to get opinions and ideas from experts. This is another technique that uses a facilitator, but instead of gathering team members in a room, the facilitator sends questionnaires to experts asking about important project risks. The facilitator will then take those answers and circulate them all to the experts—but each expert is kept **anonymous** so that they can give honest feedback.

The Delphi technique is always anonymous. People will give more honest opinions if they know their names won't be attached to them.

**Root cause identification** is analyzing each risk and figuring out what's actually behind it. Even though falling off of the cliff and having your tent blow away are two separate risks, when you take a closer look you might find that they're both caused by the **same thing**: high winds, which is the root cause for both of them. So you know that if you get high winds, you need to be on the lookout for *both* risks!



What's the big difference between brainstorming and the Delphi technique? Can you think of a situation where one would be more useful than the other?

## More Identify Risks techniques

Even though gathering information is the biggest part of Identify Risks, it's not the only part of it. There are other tools and techniques that you'll use to make sure that the risk register you put together lists as many risks as possible. The more you know about risk going into the project, the better you'll handle surprises when they happen. And that's what these tools and techniques are for—looking far and wide to get every risk possible.

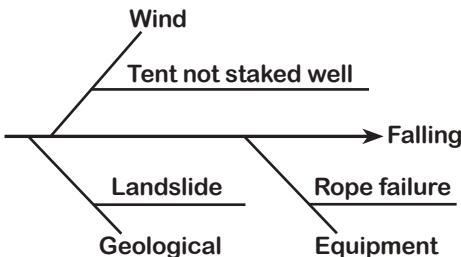
**Documentation reviews** are when you look at plans, requirements, documents from your organizational process assets, and any other relevant documents that you can find to squeeze every possible risk out of them.

The RBS you created in Plan Risk Management is a good place to start for this. You can use all the risks you categorized in it as a jumping-off point.



**Checklist analysis** means using checklists that you developed specifically to help you find risks. Your checklist might remind you to check certain assumptions, talk to certain people, or review documents you might have overlooked.

**Diagramming techniques** should be pretty familiar to you already. You can use the Ishikawa or fishbone diagrams from Quality Management to help you find the root cause of a risk, just like you did for a defect. You can also use flowcharts to see how parts of your system interact—any place where they get complex or uncertain is a good source of risks.



Fishbone or Ishikawa diagram

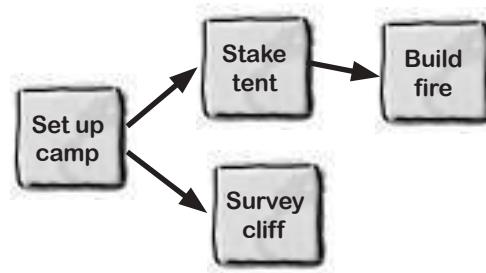
**Assumptions analysis** is what you're doing when you look over your project's assumptions. Remember how important assumptions were when you were estimating the project? Well, now it's time to look back at the assumptions you made and make sure that they really are things you can assume about the project. Wrong assumptions are definitely a risk.



The team made assumptions during planning to deal with incomplete information...and there's a risk that each assumption could turn out to be wrong.

**SWOT analysis** lets you analyze strengths, weaknesses, opportunities, and threats. You'll start by brainstorming strengths and weaknesses, and then examine the strengths to find opportunities, and you'll look at the weaknesses to come up with threats to the project.

**Expert judgment** lets you rely on past experience to identify risks.



Flowchart



Read each of these scenarios and identify which tool or technique is being used.  
If a scenario uses an information-gathering technique, specify which one.

1. Your project requires that you set up a campsite on the edge of a cliff. You gather your team members—including a geologist, a meteorologist, a tracker, and three campsite workers—and lead them in a directed discussion where they identify as many risks as possible.
  2. You look through your company's asset library and discover that two previous projects involved setting up camp in this area. You look through the lessons learned to figure out what went wrong, and what could have been avoided through better planning.
  3. You've sent a questionnaire to a park ranger and engineers at tent and hiking equipment companies to gather their opinions on the risk of falling off of a cliff. You remove their names from their responses, copy them, and send them back to everyone to get their feedback.
  4. You've identified a risk that is very complex, so you identify the root cause. You use an Ishikawa diagram to gain insight into it.
  5. You've reviewed your estimates and find that you had assumed that seasonal weather patterns would hold. If they change, then it could cause serious problems with the project.
  6. You meet individually with many different people: the sponsor, stakeholders, team members, and experts. You ask each of them detailed questions about what they think could go wrong on the project.
5. Assumptions analysis    6. Information-gathering techniques—Interviews  
3. Information-gathering techniques—Delphi technique    4. Diagramming techniques  
1. Information-gathering techniques—Brainstorming    2. Documentation reviews

# Where to look for risks

A good way to understand risks for the exam is to know where they come from. If you start thinking about how you find risks on your project, it will help you figure out how to handle them.

Here are a few things to keep in mind when you're looking for risks:

## ① **RESOURCES ARE A GOOD PLACE TO START.**

Have you ever been promised a person, equipment, conference room, or some other resource, only to be told at the last minute that the resource you were depending on wasn't available? What about having a critical team member get sick or leave the company at the worst possible time? Check your list of resources. If a resource might not be available to you when you need it, then that's a risk.

## ③ **"WHEN YOU ASSUME..."**

Have you ever heard that old saying about what happens when you assume? At the beginning of the project, your team had to make a bunch of assumptions in order to do your estimates. But some of those assumptions may not actually be true, even though you needed to make them for the sake of the estimate. It's a good thing you wrote them down—now it's time to go back and look at that list. If you find some of them that are likely to be false, then you've found a risk.

## ② **THE CRITICAL PATH IS FULL OF RISKS.**

Remember the critical path method from Chapter 6? Well, an activity on the critical path is a lot riskier than an activity with plenty of float, because any delay in that activity will delay the project.

If an activity that's not on the critical path has a really small float, that means a small problem could easily cause it to become critical—which could lead to big delays in your project.

## ④ **LOOK OUTSIDE YOUR PROJECT.**

Is there a new rule, regulation, or law being passed that might affect your project? A new union contract being negotiated? Could the price of a critical component suddenly jump? There are plenty of things outside of your project that are risks—and if you identify them now, you can plan for them and not be caught off guard.

Finding risks means talking to your team and being creative. Risks can be anywhere.



These areas are a good start, but there are plenty of other places on your project where you can find risks. Can you think of some of them?

# Now put it in the risk register

The point of the Identify Risks process is to...well, identify risks. But what does that really give you? You need to know enough about each risk to analyze it and make good decisions about how to handle it. So when you're doing interviews, leading brainstorming sessions, analyzing assumptions, gathering expert opinions with the Delphi technique, and using the other Identify Risks tools and techniques, you're gathering exactly the things you need to add to the risk register.



Each risk that you and the team come up with should go here.



It's a good idea for your Identify Risks meetings to include a discussion of how to respond to the risks, but you'll really dive into this later in the Plan Risk Responses process.



This is where the results of your root cause analysis go.



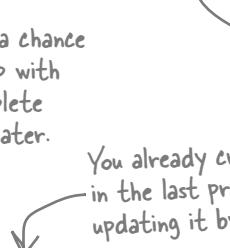
Identified Risks	Potential Responses	Root Causes
Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby
High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National weather service predicts 35% chance of high winds
Truck rental is unavailable	Pay to reserve equipment at a second company	Higher than expected demand for equipment in the area this season
Equipment failure during project	No responses were found by the team	Recent industry report cites higher-than-expected failure rates for critical equipment

Risk register

You might discover new risk categories, like Equipment. If you do, you'll go back to the RBS and add them.



You'll get a chance to come up with more complete responses later.



Some risks do not have an obvious response.

You already created the Risk Management plan in the last process. Now you're going back and updating it by adding the risk register.

**The risk register is built into the Risk Management plan. Updates to the risk register are the only output of the Identify Risks process.**

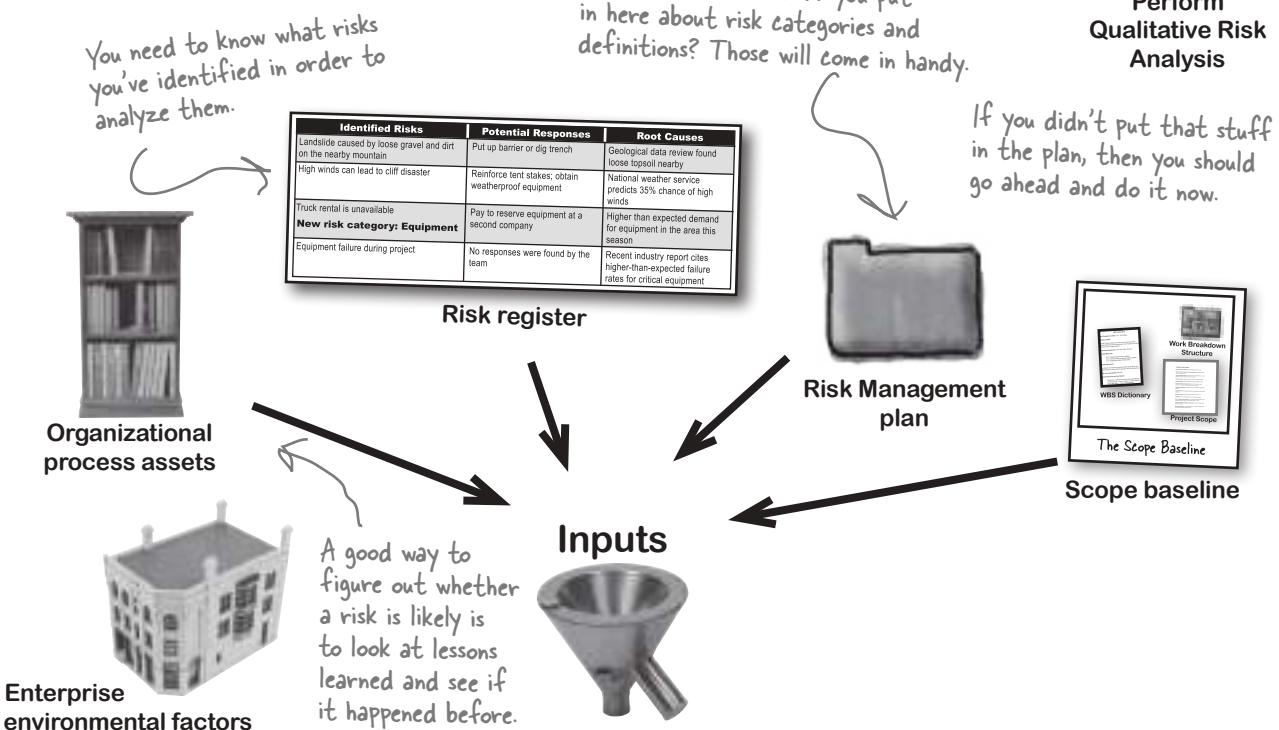
# Rank your risks

It's not enough to know that risks are out there. You can identify risks all day long, and there's really no limit to the number of risks you can think of. But some of them are likely to occur, while others are very improbable. It's the ones that have much better odds of happening that you really want to plan for.

Besides, some risks will cause a whole lot of damage to your project if they happen, while others will barely make a scratch...and you care much more about the risks that will have a big impact. That's why you need the next Risk Management process, **Perform Qualitative Risk Analysis**—so you can look at each risk and figure out how likely it is and how big its impact will be.



Perform Qualitative Risk Analysis



Why do you think enterprise environmental factors are *not* an input to the Perform Qualitative Risk Analysis process?



# Examine each risk in the register

Not all risks are created equal. Some of them are really likely to happen, while others are almost impossible. One risk will cause a catastrophe on your project if it happens; another will just waste a few minutes of someone's time.

**Risk data quality assessment** means making sure that the information you're using in your risk assessment is accurate. Sometimes it makes sense to bring in outside experts to check out the validity of your risk assessment data. Sometimes you can even confirm the quality of the data on your own, by checking some sample of it against other data sources.

**Risk urgency assessment** is checking out how soon you're going to need to take care of a particular risk. If a risk is going to happen soon, you'd better have a plan for how to deal with it soon, too.

**Expert judgment** definitely comes in handy when you're assessing risks. Who better to help you come up with things that might go wrong than experts who have been through similar projects before?

**Risk probability and impact assessment** is one of the best ways to be sure that you're handling your risks properly by examining how likely they are to happen, and how bad (or good) it will be if they do. This process helps you assign a probability to the likelihood of a risk occurring, and then figure out the actual cost (or impact) if it does happen. You can use these values to figure out which of your risks need a pretty solid mitigation plan, and which can be monitored as the project goes on.

**Probability and impact matrix** is a table where all of your risks are plotted out according to the values you assign. It's a good way of looking at the data so you can more easily make judgments about which risks require response. The ones with the higher numbers are more likely to happen and will have a bigger impact on your project if they do. So you'd better figure out how to handle those.

**Risk categorization** is all about grouping your risks so that you can come up with a better strategy for dealing with them. You might group them by the phase of the project where you'll see them, or by the source of the risk. Or you could come up with a bunch of additional categories that would help you to organize your responses better and be ready for the risk if it should happen.

Creating risk categories can help you deal with whole groups of risks in one response plan.

**Perform Qualitative Risk Analysis helps you prioritize each risk and figure out its probability and impact.**

Sometimes you'll find that some risks have obviously low probability and impact, so you won't put them in the main section of your register. Instead, you can add them to a separate section called the watchlist, which is just a list of risks. It'll include risks you don't want to forget about, but which you don't need to track as closely. You'll check your watchlist from time to time to keep an eye on things.

Probability	P&I					
	.9	.09	.27	.45	.63	.81
.7	.07	.21	.35	.49	.63	
.5	.05	.15	.25	.35	.45	
.3	.03	.09	.15	.21	.27	
.1	.01	.03	.05	.07	.09	
Impact	.1	.3	.5	.7	.9	



Here are some facts about the cliff project that were uncovered during qualitative analysis. Update the risk register on the facing page with the appropriate information.

Risk	Probability	Impact
1. Landslide	.1	.9
2. Winds	.7	.9
3. No truck	.3	.7
4. Storms	.5	.3
5. Supplies	.1	.5
6. Illness	.1	.7

During the Perform Qualitative Risk Analysis sessions, the team assigned a probability and impact number to each of the risks on the facing page.



Prob. & impact matrix						
Probability	.9	.09	.27	.45	.63	.89
	.7	.07	.21	.35	.49	.63
	.5	.05	.15	.25	.35	.45
	.3	.03	.09	.15	.21	.27
	.1	.01	.03	.05	.07	.09
Impact	.1	.3	.5	.7	.9	

This gives you a good picture of the threshold the company has set for evaluating risks.

You can figure out the priority of each risk based on its probability and impact. Low-priority risks have no shading, medium ones are light gray, and high ones are dark gray.

1. The organizational process assets at your company set a high-priority risk as any risk with a probability and impact score higher than 0.20. Medium-priority risks are those between 0.10 and 0.19, and low-priority are those between 0 and 0.09. Low-priority risks can be monitored on a watchlist, but high and medium ones must have a response strategy.

**Fill in the missing values in the Priority and Probability columns in the risk register on the right, using the Probability and Impact matrix to figure out which ones are low, medium, or high. For example, we filled in "High" under Priority for row #3 by looking up risk ("No truck") in the first table, finding the probability and impact values, and then using the Probability and Impact matrix. The probability is .3 and the impact is .7, so you can find the corresponding box in the matrix. Since it's dark gray, its priority is high.**

- 2 After analyzing your data, you came up with three risk categories for the project: natural, equipment, and human.

**Fill in the missing values in the Category column of the risk register with either "Natural," "Equipment," or "Human." We started you out by filling in a few of them.**

3. For this particular project, you'll need the equipment at the start of the project, so any equipment risks are considered high urgency. Natural and human risks are all medium urgency, except for ones that have to do with storms, which you consider low urgency for this project because of limited mitigation potential.

**Figure out the whether the urgency for each risk is low, medium, or high and fill in the Urgency column in the risk register.**

It's OK for some responses to be blank—you'll fill them in later during the Plan Risk Responses process.



	<b>Identified risks</b>	<b>Potential response</b>	<b>Root cause</b>	<b>Category</b>	<b>Priority</b>	<b>Urgency</b>
1.	Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby			
2.	High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National Weather Service predicts 35% chance of high winds	<b>Natural</b>		<b>Medium</b>
3.	Truck rental is unavailable		Higher-than-expected demand for equipment this season	<b>Equipment</b>	<b>High</b>	
4.	Storms predicted through the first two weeks of project schedule time	Create reserves to account for time lost due to storms	El Niño weather pattern		<b>Medium</b>	<b>Low</b>
5.	Supply shortage if we don't accurately predict food needs		Nearest store is 30 miles away	<b>Equipment</b>		
6.	If someone gets sick, it could be a problem getting medical care	Bring a doctor with us on the project	Nearest hospital is 50 miles away			

## Outputs



Qualitative analysis helps you figure out which risks are most important to your project's success. When you've finished your analysis, you should have a risk register that tells you a lot more about what could go wrong.

**The only output of Perform Qualitative Risk Analysis is project documents updates—including updates to the risk register.**

	<b>Identified risks</b>	<b>Potential response</b>	<b>Root cause</b>	<b>Category</b>	<b>Priority</b>	<b>Urgency</b>
1.	Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby	<b>Natural</b>	<b>Low</b>	<b>Medium</b>
2.	High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National Weather Service predicts 35% chance of high winds	<b>Natural</b>	<b>High</b>	<b>Medium</b>
3.	Truck rental is unavailable		Higher-than-expected demand for equipment this season	<b>Equipment</b>	<b>High</b>	<b>High</b>
4.	Storms predicted through the first two weeks of project schedule time	Create reserves to account for time lost due to storms	El Niño weather pattern	<b>Natural</b>	<b>Medium</b>	<b>Low</b>
5.	Supply shortage if we don't accurately predict food needs		Nearest store is 30 miles away	<b>Equipment</b>	<b>Low</b>	<b>High</b>
6.	If someone gets sick, it could be a problem getting medical care	Bring a doctor with us on the project	Nearest hospital is 50 miles away	<b>Human</b>	<b>Low</b>	<b>Medium</b>

# there are no Dumb Questions

**Q:** Who does Perform Qualitative Risk Analysis?

**A:** The whole team needs to work on it together. The more of your team members who are helping to think of possible risks, the better off your plan will be. Everybody can work together to think of different risks to their particular part of the work, and that should give an accurate picture of what could happen on the project.

**Q:** What if people disagree on how to rank risks?

**A:** There are a lot of ways to think about risks. If a risk has a large impact on your part of the project or your goals, you can bet that it will seem more important to you than the stuff that affects other people in the group. The best way to keep the right perspective is to keep everybody on the team evaluating risks based on how they affect the overall project goals. If everyone focuses on the effect each risk will have on your project's constraints, risks will get ranked in the order that is best for everybody.

**Q:** Where do the categories come from?

**A:** You can create categories however you want. Usually, people categorize risks in ways that help them come up with response strategies. Some people use project phase. That way, they can come up with a risk mitigation plan for each phase of a project, and they can cut down on the information they need to manage throughout. Some people like to use the source of the risk as a category. If you do that, you can find mitigation plans that can help you deal with each source separately. That might come in handy if you are dealing with a bunch of different contractors or suppliers and you want to manage the risks associated with each separately.

**Q:** How do I know if I've got all the risks?

**A:** Unfortunately, you never know the answer to that one. That's why it's important to keep monitoring your risk register throughout the project. It's important that you are constantly updating it and that you never let it sit and collect dust. You should be looking for risks throughout all phases of your project, not just when you're starting out.

**Q:** I'm still not clear on the difference between the Delphi technique and brainstorming.

**A:** It's easy to get those two confused because both are about people sitting and thinking of risks. Delphi is a technique where you ask experts (who may or may not be team members) to give their opinion anonymously, and then you evaluate those opinions. Brainstorming is just you and your team sitting in a room thinking of risks.

**Q:** What's the point in even tracking low-priority risks? Why have a watchlist at all?

**A:** Actually, watchlists are just a list of all of the risks that you want to monitor as the project goes on. You might be watching them to see if conditions change and make them more likely to happen. By keeping a watchlist, you make sure that all of the risks that seem low priority when you are doing your analysis get caught before they cause serious damage if they become more likely later in the project.

The conditions that cause a risk are called **triggers**. So, say you have a plan set up to deal with storms, and you know that you might track a trigger for lightning damage, such as a thunderstorm. If there's no thunderstorm, it's really unlikely that you will see lightning damage, but once the storm has started, the chance for the risk to occur skyrockets.

**Q:** I still don't get the difference between priority and urgency.

**A:** Priority tells you how important a risk is, while urgency tells you when you need to deal with it. Some risks could be high priority but low urgency, which means that they're really important, but not time-critical. For example, you might know that a certain supplier that provides critical equipment will go out of business in six months, and you absolutely need to find a new supplier. But you have six months to do it. Finding a new supplier is a high priority, because your project will fail if it's not taken care of. But it's not urgent—even if it takes you four months to find a new supplier, nothing bad will happen.

## Qualitative vs. quantitative analysis

Let's say you're a fitness trainer, and your specialty is helping millionaires get ready for major endurance trials. You get paid the same for each job, but the catch is that you get paid only if they succeed. Which of these clients would you take on?

**Running a marathon**

**vs.**

**Climbing Mount Everest**



One client wants you to help him train so that he can finish a marathon. He doesn't have to win, just get to the finish line.



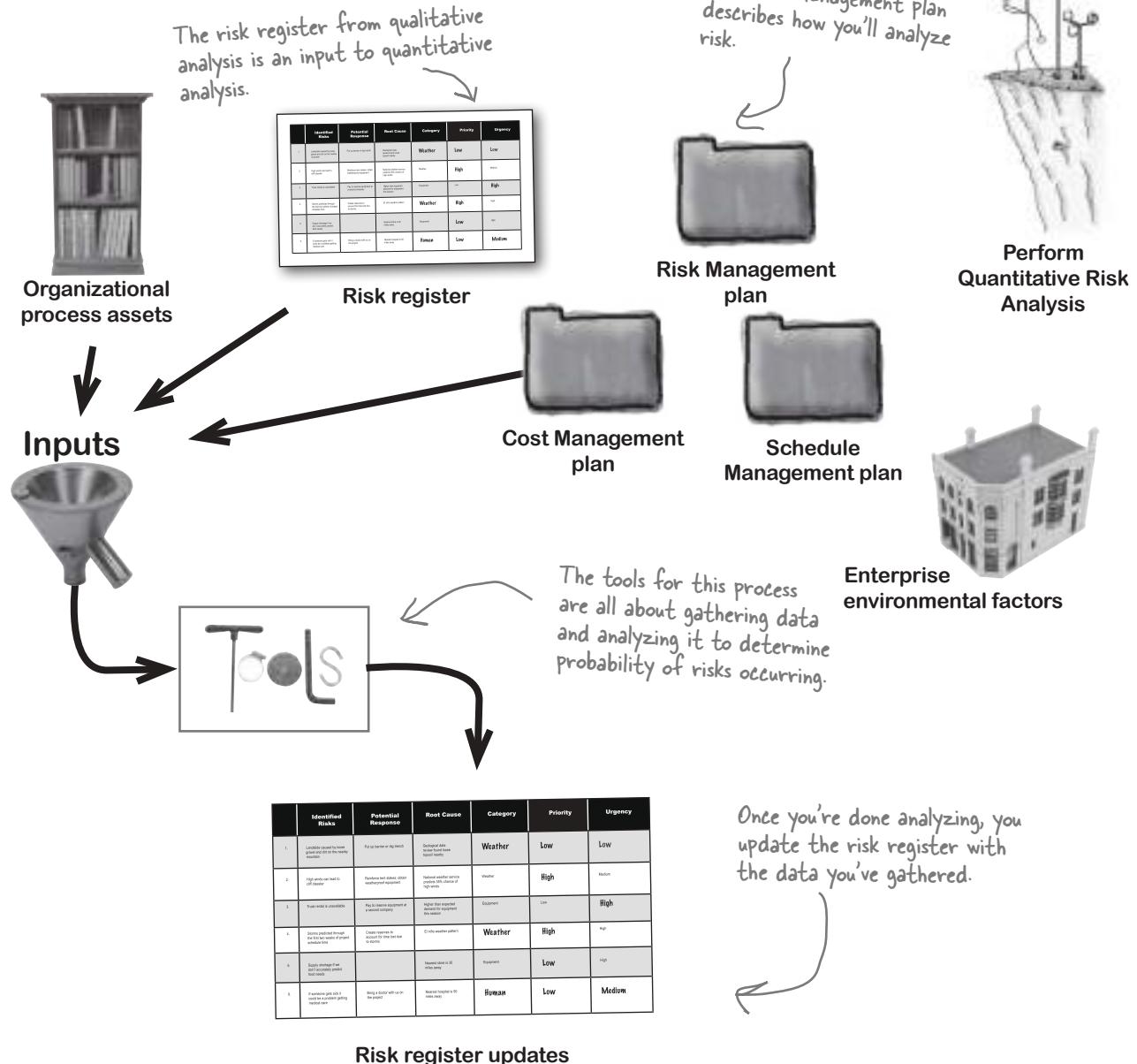
Another client wants you to help him get to the top of Mount Everest. He won't be satisfied unless he gets to the summit.

*It's much more likely that you can get even an out-of-shape millionaire to finish a marathon than it is that you can get him to climb Mount Everest successfully.*

In fact, since the 1950s, 10,000 people have attempted to climb Mount Everest, and only 1,200 have succeeded. 200 have died. Your qualitative analysis probably told you that the climbing project would be the *riskier* of the two. But having the numbers to back up that judgment is what quantitative analysis is all about.

# Perform Quantitative Risk Analysis

Once you've identified risks and ranked them according to the team's assessment, you need to take your analysis a little further and make sure that the numbers back you up. Sometimes you'll find that your initial assessment needs to be updated when you look into it further.



# First gather the data...

Quantitative tools are broken down into three categories: the ones that help you get more information about risks, the ones that help you to analyze the information you have, and expert judgment to help you put it all together. The tools for gathering data focus on gathering numbers about the risks you have already identified and ranked. These tools are called **data gathering and representation techniques**.

## Interviewing

Sometimes the best way to get hard data about your risks is to interview people who understand them. In a risk interview, you might focus on getting three-point cost estimates so that you can come up with a budget range that will help you mitigate risks later. Another good reason to interview is to establish ranges of probability and impact, and document the reasons for the estimates on both sides of the range.

## Probability distribution

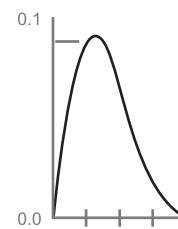
Sometimes taking a look at your time and cost estimate ranges in terms of their distribution will help you generate more data about them. You probably remember these distribution curves from your probability and statistics classes in school. Don't worry, you won't be asked to remember the formal definition of probability distributions or even to be able to create them. You just need to know that they are another way of gathering data for quantitative analysis.

## Expert judgment

It's always a good idea to contact the experts if you have access to them. People who have a good handle on statistics or risk analysis in general can be helpful when you are doing quantitative analysis. Also, it's great to hear from anybody who has a lot of experience with the kind of project you are creating, too.



**Beta Distribution**



**Triangular Distribution**



## ...then analyze it

Now that you have all the data you can get about your risk register, it's time to analyze that information. Most of the tools for analyzing risk data are about figuring out how much the risk will end up costing you. These tools are called **quantitative risk analysis and modeling techniques**.

**Sensitivity analysis** is all about looking at the effect one variable might have if you could completely isolate it. You might look at the cost of a windstorm on human safety, equipment loss, and tent stability without taking into account other issues that might accompany the windstorm (like rain damage or possible debris from nearby campsites). People generally use tornado diagrams to look at a project's sensitivity to just one risk factor.

**Expected monetary value analysis** lets you examine costs of all of the paths you might take through the project (depending on which risks occur) and assign a monetary value to each decision. So, if it costs \$100 to survey the cliff and \$20 to stake your tent, choosing to stake your tent *after* you've looked at the cliff has an expected monetary value of \$120.

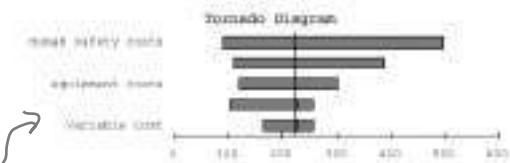
The main method of expected monetary value analysis you need to know for the test is **decision tree analysis**. For decision tree analysis, you just diagram out all of the decisions you think you will need to make to deal with risks. Then you add up all that you would need to spend to make each decision.

We'll talk about this in a couple of pages...

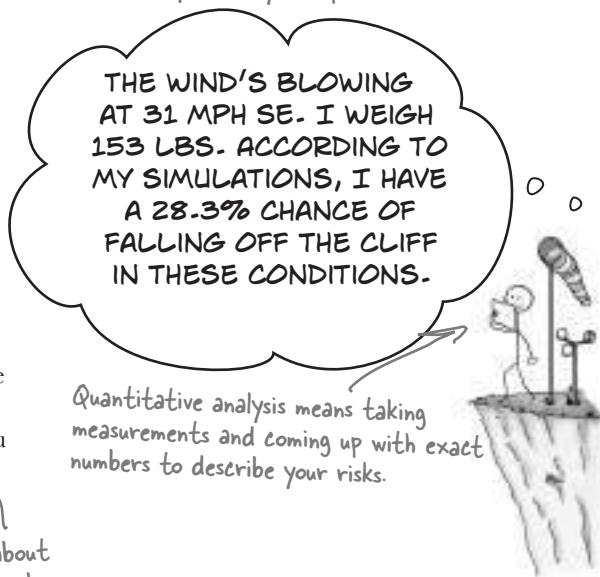
**Modeling and simulation.** It's also a good idea to run your project risks through modeling programs if you can. Monte Carlo analysis is one tool that can randomize the outcomes of your risks and the probabilities of them occurring to help you get a better sense of how to handle the risks you have identified.

Monte Carlo analysis lets you run a lot of simulations to come up with data about what could happen on your project.

## Tools



The tornado diagram lets you look at just one uncertain factor while assuming that all other data will stay where you expect it to.



This is the same technique you learned about back in Chapter 6.

# Calculate the expected monetary value of your risks

OK, so you know the probability and impact of each risk. How does that really help you plan? Well, it turns out that if you have good numbers for those things, you can actually figure out how much those risks are going to cost your project. You can do that by calculating the **expected monetary value** (or EMV) of each risk:



- Start with the probability and impact of each risk.

You can find these in your risk register.

Risk	Probability	Impact
High winds	35%	cost \$48 to replace equipment
Mudslide	5%	lose \$750 in damage costs
Wind generator is usable	15%	save \$800 in battery costs
Truck rental unavailable	10%	cost \$350 for last-minute rental

- Take the first risk and multiply the probability by the impact. For opportunities, use a positive cost. For threats, use a negative one. Then do the same for the rest of the risks.

Even though the impact of a mudslide is big, the probability is low so the EMV is small.

$$\text{High winds: } 35\% \times -\$48 = -\$16.80$$

$$\text{Mudslide: } 5\% \times -\$750 = -\$37.50$$

$$\text{Wind generator: } 15\% \times \$800 = \$120.00$$

$$\text{Truck rental: } 10\% \times -\$350 = -\$35.00$$

The wind generator risk is an opportunity because you'll save money if it happens. So when you do the EMV calculation, you use a positive number for the impact.

- Now that you've calculated the EMV for each of the risks, you can add them up to find the total EMV for all of them.

$$\text{EMV} = -\$16.80 + -\$37.50 + \$120.00 + -\$35.00 = -\$30.70$$

If you add \$30.70 to the budget, then it should be enough to account for these risks.



You'll need to know how to do EMV calculations for the test. Give them a shot now—they're pretty easy once you get the hang of them.

Take a look at this table of risks.

Risk	Probability	Impact
Navigation equipment failure	15%	costs \$300 due to getting lost
Unseasonably warm weather	8%	saves \$500 in excavation costs
Wild animals eat rations	10%	costs \$100 for replacements

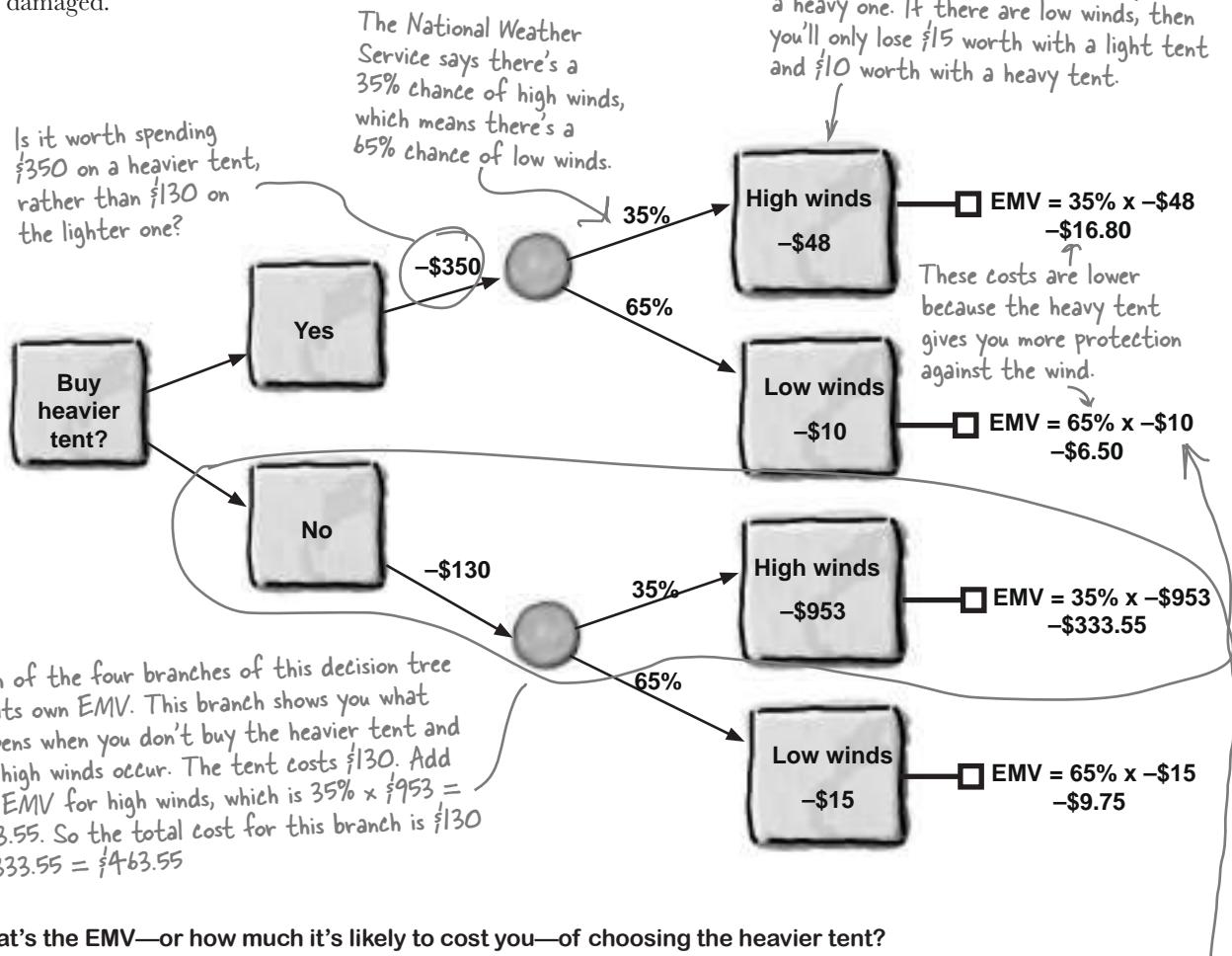
1. Calculate the EMV for each of these three risks.
2. If these are the only risks on the project, calculate the total EMV.
3. The latest weather report came out, and there is now a 20% chance of unseasonably warm weather. What's the new EMV for the project?
4. Now the cost of replacement rations goes up to \$150. What's the new EMV for the project?

—————> Answers on page 598.

# Decision tree analysis uses EMV to help you make choices

Tools

There's another way to do EMV—you can do it visually using something called a **decision tree**. This decision tree shows the hidden costs of whether or not you buy a heavier tent. The tent is more expensive—it costs \$350, while the lighter tent costs \$130. But the heavier tent has better protection against the wind, so if there are high winds, your equipment isn't damaged.



What's the EMV—or how much it's likely to cost you—of choosing the heavier tent?

If we add the EMV for high winds plus the EMV for low winds to the cost of the tent, we'll figure out the "real" cost of choosing the heavier tent. So that's  $-\$16.80 + -\$6.50 + -\$350 = -\$373.30$ .

This is just the EMV of the low winds if you buy the heavier tent. The probability of low winds is 65%, and the cost is \$10. So it's just like the other EMV calculations:  $65\% \times -\$10 = -\$6.50$ .

Compare that with the EMV of choosing the lighter tent. Which decision makes sense?

We can do the same thing for the bottom two branches of the tree. The "cheaper" tent costs  $-\$130 + -\$333.55 + -\$9.75 = -\$473.30$ . So it's actually more expensive!



Looking at the decision tree on the facing page, see if you can figure out the expected monetary value depending on the decisions the team makes.

Hint: Figure out the new EMV for each branch—that will tell you if the decision makes sense.

1. You hear a weather report that says there's now a 45% chance of high winds. Does it still make sense to buy the heavier tent?

2. If you don't buy the heavier tent, then you have room to take along a wind generator that can power your equipment, and that will save you \$1,100 in portable batteries if there's a heavy wind. If there's still a 45% chance of high winds, does it still make sense to buy the heavier tent?

→ Answers on page 599.

This is an opportunity. So it should have a **POSITIVE** value when you do the EMV calculation.

## <sup>there are no</sup> Dumb Questions

**Q:** I still don't get this Monte Carlo stuff. What's the deal?

**A:** All you really need to know about Monte Carlo analysis for the test is that it's a way that you can model out random data using software. In real life, though, it's a really cool way of trying to see what could happen on your project if risks do occur. Sometimes modeling out the data you already have about your project helps you to better see the real impact of a risk if it did happen.

**Q:** I can figure out how much the risk costs using EMV, or I can do it with decision tree analysis. Why do I need two ways to do this?

**A:** That's a good question. If you take a really careful look at how you do decision tree analysis, you might notice something... it's actually doing exactly the same thing as EMV. It turns out that those two techniques are really similar, except that EMV does it using numbers and decision tree analysis spells out the same calculation using a picture.

**Q:** I understand that EMV and decision trees are related, but I still don't exactly see how.

**A:** It turns out that there are a lot of EMV techniques, and decision tree analysis is just one of them. But it's the one you need to know for the test, because it's the one that

helps you make decisions by figuring out the EMV for each option. You can bet that you'll see a question or two that asks you to calculate the EMV for a project based on decision tree like the one on the facing page. As long as you remember that risks are negative numbers and that opportunities are positive ones, you should do fine.

**Q:** So are both quantitative analysis and qualitative analysis really just concerned with figuring out the impact of risks?

**A:** That's right. Qualitative analysis focuses on the impact as the team judges it in planning. Quantitative analysis focuses on getting the hard numbers to back up those judgments.

## Update the risk register based on your quantitative analysis results

When you've finished gathering data about the risks, you change your priorities, urgency ratings and categories (if necessary), and you update your risk register. Sometimes modeling out your potential responses to risk helps you to find a more effective way to deal with them. That's why the only output of the **Perform Quantitative Risk Analysis** is **Project Documents Updates**.

Outputs



Analysis showed us that this would be the most expensive risk if it were to occur. So it got upgraded to a high priority.

	<b>Identified risks</b>	<b>Potential response</b>	<b>Root cause</b>	<b>Category</b>	<b>Priority</b>	<b>Urgency</b>
1.	Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby	Natural	High	Medium
2.	High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National Weather Service predicts 35% chance of high winds	Natural	High	Medium
3.	Truck rental is unavailable	Pay to reserve equipment at a second company	Higher-than-expected demand for equipment this season	Equipment	High	High
4.	Storms predicted through the first two weeks of project schedule time	Create reserves to account for time lost due to storms	El Niño weather pattern	Natural	Medium	Low
5.	Supply shortage if we don't accurately predict food needs		Nearest store is 30 miles away	Equipment	Low	High
6.	If someone gets sick, it could be a problem getting medical care	Bring a doctor with us on the project	Nearest hospital is 50 miles away	Human	Low	Low

This one got downgraded when quantitative analysis showed that it was not very likely to happen on such a short-term project.



## BULLET POINTS: AIMING FOR THE EXAM

- The main output of all of the Risk Management planning processes is **updated project documents**, and the main document that gets updated is the **risk register**.
- The first step in Risk Management is **Identify Risks**, where you work with the whole team to figure out what risks could affect your project.
- Qualitative and quantitative analysis are all about **ranking risks** based on their probability and impact.
- Qualitative analysis is where you take the **categories** in your risk plan and **assign** them to each of the risks that you've identified.
- Quantitative analysis focuses on **gathering numbers** to help evaluate risks and **making the best decisions** about how to handle them.
- **Decision tree analysis** is one kind of **expected monetary value** analysis. It focuses on adding up all of the costs of decisions being made on a project so that you can see the overall value of risk responses.
- To calculate EMV, be sure to **treat all negative risks as negative numbers** and all opportunities as **positive ones**. Then add up all of the numbers on your decision tree.
- Don't forget **watchlists**. They let you monitor lower-priority risks so that you can see if triggers for those risks occur and you need to treat them as higher priorities.
- All of the processes in Risk Management are **Planning or Monitoring and Controlling processes**. There are **no Executing** processes here. Since the goal is to plan for risks, there is no need to focus on actually doing the work. By then, it's too late to plan for risks.

**Your risk register should include both threats and opportunities.**

**Opportunities have positive impact values, while threats have negative ones. Don't forget the plus or minus sign when you're calculating EMV.**



How would you handle the risks listed in the risk register so far?

# How do you respond to a risk?

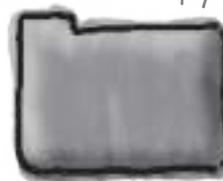
After all that analysis, it's time to figure out what you're going to do if a risk occurs. Maybe you'll be able to keep a reserve of money to handle the cost of the most likely risks. Maybe there's some planning you can do from the beginning to be sure that you avoid it. You might even find a way to transfer some of the risk with an insurance policy.

However you decide to deal with each individual risk, you'll update your risk responses in the risk register to show your decisions when you're done. When you're done with **Plan Risk Responses**, you should be able to tell your change control board what your response plans are and who will be in charge of them so they can use them to evaluate changes.

You've updated your risk register as part of all of your analysis so far. It should contain everything you know about the risks facing your project, and even some preliminary responses you might have thought of along the way.

Identified Risk	Potential Impact	Next Event	Category	Priority	Urgency
Risk 1	Medium	Within 1 month	Weather	Low	Low
Risk 2	High	Within 1 month	Health	High	Medium
Risk 3	Medium	Within 1 month	Technology	Medium	Medium
Risk 4	Medium	Within 1 month	Weather	High	Medium
Risk 5	Medium	Within 1 month	Health	Low	Low
Risk 6	Medium	Within 1 month	Health	Low	Medium

Risk register



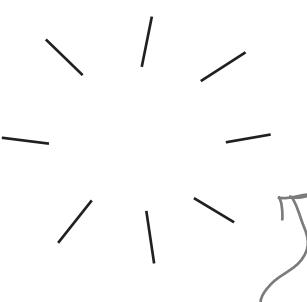
Risk Management plan

You might consult the Risk Management plan to figure out who is responsible for various activities in the Plan Risk Responses process, and for guidelines to help you prioritize your risks.



Plan Risk Responses

**Plan Risk Responses** is figuring out what you'll do if risks happen.



Inputs



Notice that organizational process assets aren't here. You can't use a template for this one. It's all about figuring out the responses that make sense for your project's SPECIFIC risks.



## It isn't always so bad

Remember the strategies for handling negative risks—avoid, mitigate, transfer, and accept—from earlier? Well, there are strategies for handling positive risks, too. The difference is that **strategies for positive risks** are all about how you can try to get the most out of them. The strategies for handling negative and positive risks are the tools and techniques for the Plan Risk Responses process.

The strategies for negative risks are also tools and techniques for this process. They're the ones you already learned: avoid, mitigate, transfer, and accept. Acceptance is a technique for both negative and positive risks.

### 1 Exploit

This is when you do everything you can to make sure that you take advantage of an opportunity. You could assign your best resources to it. Or you could allocate more than enough funds to be sure that you get the most out of it.

### 2 Share

### Share

Sometimes it's harder to take advantage of an opportunity on your own. Then you might call in another company to share in it with you.

### 3 Enhance

### Accept

This is when you try to make the opportunity more probable by influencing its triggers. If getting a picture of a rare bird is important, then you might bring more food that it's attracted to.

Just like accepting a negative risk, sometimes an opportunity just falls in your lap. The best thing to do in that case is to just accept it!

## Response planning can even find more risks

**Secondary risks** come from a response you have to another risk. If you dig a trench to stop landslides from taking out your camp, it's possible for someone to fall into the trench and get hurt.

**Residual risks** remain after your risk responses have been implemented. So even though you reinforce your tent stakes and get weatherproof gear, there's still a chance that winds could destroy your camp if they are strong enough.

I GET IT. SO, I HAVE TO GO BACK AND ANALYZE SECONDARY RISKS. BUT RESIDUAL RISKS JUST SIT THERE, SO I CAN DEAL WITH THEM LATER.



**which response strategy?**



Which risk response technique is being used in these situations? Match each technique to its scenario.

**Mitigate**

If the weather's good, then there's a chance you could see a meteor shower. If the team gets a photo that wins the meteor photo contest, you can get extra funding. You have your team stay up all night with their telescopes and cameras ready.

**Avoid**

You hear that it's going to rain for the first three days of your trip, so you bring waterproof tents and indoor projects for the team to work on in the meantime.

**Accept**

You read that there's a major bear problem in the spring on the cliff where you are planning to work. You change your project start date to happen in the fall.

**Transfer**

On your way up the cliff, you meet another team that is looking to survey the area. You offer to do half of the surveying work while they do the other half and then trade your findings with each other.

**Exploit**

There's a high probability of water damage to some of your equipment, so you buy insurance to avoid losses.

**Share**

There's always the chance that someone could make a mistake and fall off the cliff. No matter how much you plan for the unexpected, sometimes mistakes happen.

**Enhance**

About 10 years ago a really rare bird, the black-throated blue warbler, was seen on this cliff. If you could get a picture of it, it would be worth a lot of money. So, you bring special seeds that you have read are really attractive to this bird, and you set up lookout points around the cliff with cameras ready to get the shot.

—————> **Answers on page 600.**

# Add risk responses to the register

It's time to add—you guessed it—more updates to project documents, including the risk register. All of your risk responses will be tracked through change control. Changes that you need to make to the plan will get evaluated based on your risk responses, too. It's even possible that some of your risk responses will need to be added into your contract.

Every risk needs to have one person who owns the response plan.



During Plan Risk Responses, the team agreed to buy insurance for this one.

	Identified risks	Response strategy	Root cause	Risk owner	Cat	Priority	Urgency
1.	Landslide caused by loose gravel and dirt on the nearby mountain	Put up barrier or dig trench	Geological data review found loose topsoil nearby	Joe S.	Natural	High	Medium
2.	High winds can lead to cliff disaster	Reinforce tent stakes; obtain weatherproof equipment	National Weather Service predicts 35% chance of high winds	Tanya T.	Natural	High	Medium
3.	Truck rental is unavailable	Pay to reserve equipment at a second company	Higher-than-expected demand for equipment this season	Joe S.	Equipment	High	High
4.	Storms predicted through the first two weeks of project schedule time	<b>Buy storm insurance in case the equipment is damaged</b>	El Niño weather pattern	Michael R.	Natural	Medium	Low
5.	Supply shortage if we don't accurately predict food needs		Nearest store is 30 miles away	James S.	Equipment	Low	High
6.	If someone gets sick, it could be a problem getting medical care	Bring a doctor with us on the project	Nearest hospital is 50 miles away	Tanya T.	Human	Low	Low
7.	Someone could fall in the landslide trench	Set up a trench patrol to make sure no one gets hurt	Dig trench for landslides	Joe S.	Human	Low	Low



Project Management plan updates

The PM plan needs to be updated so that integrated change control can include the risk responses.



Project documents updates



## Risk Management Exposed

This week's interview:  
Stick figure who hangs out on cliffs

**Head First:** We've seen you hanging out on cliffs for a while now. Apparently, you've also been paying people to stand on the cliff for you, or getting a friend to hold a trampoline at the foot of the cliff; we've even seen you jump off of it. So now that I've finally got a chance to interview you, I want to ask the question on everyone's mind: "Are you insane? Why do you spend so much time up there?"

**Stick Figure:** First off, let me dispel a few myths that are flying around out there about me. I'm not crazy, and I'm not trying to get myself killed! Before Risk Management entered my life I, like you, would never have dreamed of doing this kind of thing.

**Head First:** OK, but I'm a little skeptical about your so-called "Risk Management." Are you trying to say that because of Risk Management you don't have to worry about the obvious dangers of being up there?

**Stick Figure:** No. Of course not! That's not the point at all. Risk Management means you sit down and make a list of all of the things that could go wrong. (And even all the things that could go right.) Then you really try to think of the best way to deal with anything unexpected.

**Head First:** So you're doing this Risk Management stuff to make it less dangerous for you?

**Stick Figure:** Yes, exactly! By the time I'm standing up there on that cliff, I've really thought my way through pretty much everything that might happen up there. I've thought through it both qualitatively and quantitatively.

**Head First:** Quantitatively?

**Stick Figure:** Yes. You don't think I'd go up there without knowing the wind speed, do you? Chance of landslides? Storms? The weight of everything I'm carrying? How likely I am to fall in weather conditions? I think about all of that and I measure it. Then I sit down and come up with risk response strategies.

**Head First:** OK, so you have strategies. Then what?

**Stick Figure:** Then I constantly monitor my risks while I'm on the cliff. If anything changes, I check to see if it might trigger any of the risks I've come up with. Sometimes I even discover new risks while I'm up there. When I do, I just add them to the list and work on coming up with responses for them.

**Head First:** I see. So you're constantly updating your list of risks.

**Stick Figure:** Yes! We call it a **risk register**. Whenever I have new information, I put it there. It means that I can actually hang out on these cliffs with a lot of confidence. Because, while you can't guarantee that nothing will go wrong, you can be prepared for whatever comes your way.

**Head First:** That's a lot of work. Does it really make a difference?

**Stick Figure:** Absolutely! I'd never be able to sleep at night knowing that I could fall off the cliff at any time. But I've planned for the risks, and I've taken steps to stay safe...and I sleep like a baby.



# You can't plan for every risk at the start of the project

Even the best planning can't predict everything—there's always a chance that a new risk could crop up that you hadn't thought about. That's why you need to constantly monitor how your project is doing compared to your risk register. If a new risk happens, you have a good chance of catching it before it causes serious trouble. When it comes to risk, the earlier you can react, the better for everybody. And that's what the **Control Risks** process is all about.

Risk ID	Risk Description	Risk Type	Probability	Impact	Risk Score	Status
R-001	Delays in vendor delivery	Delivery Risk	Medium	Medium	3	Open
R-002	Scope Creep due to stakeholder requests	Scope Risk	High	Medium	5	Open
R-003	Budget overruns due to cost increases	Budget Risk	Medium	Medium	3	Open
R-004	Team members leaving the project	Resource Risk	Medium	Medium	3	Open
R-005	External dependencies failing	External Risk	Medium	Medium	3	Open
R-006	Regulatory changes impacting the project	Regulatory Risk	Medium	Medium	3	Open
R-007	Technological advancements rendering current work obsolete	Technological Risk	Medium	Medium	3	Open
R-008	Geopolitical events causing political instability	Geopolitical Risk	Medium	Medium	3	Open
R-009	Market fluctuations affecting demand	Market Risk	Medium	Medium	3	Open
R-010	Compliance issues with regulations	Compliance Risk	Medium	Medium	3	Open

The park ranger's come by to let you know about some recent bear sightings on this cliff.

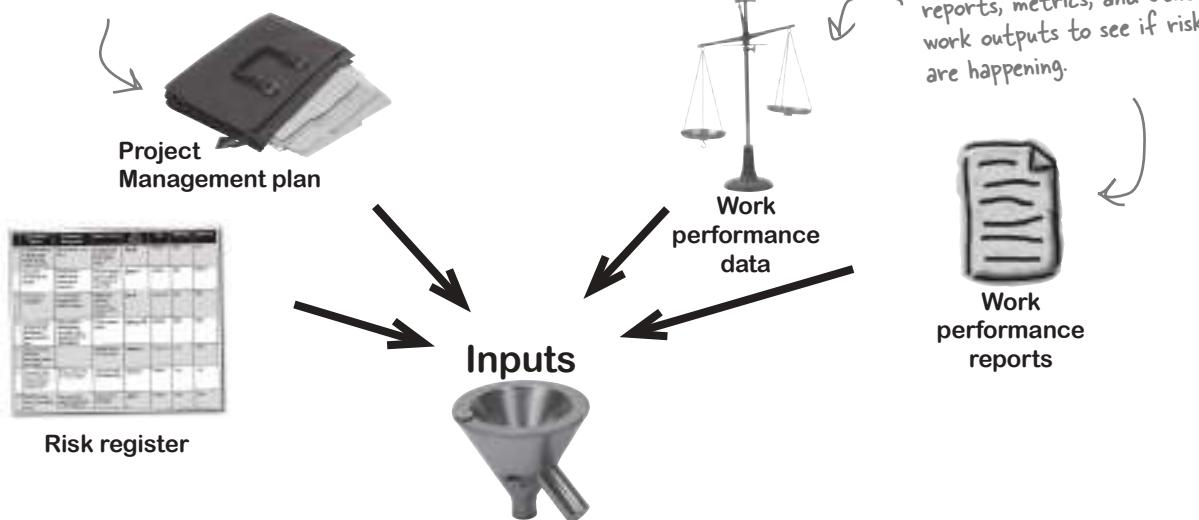


The risk register doesn't say anything about handling bears. Looks like this is a new risk altogether...

## Control Risks is another change control process

Risk responses are treated just like changes. You monitor the project in every status meeting to see how the risks in the risk register are affecting it. If you need to implement a risk response, you take it to your change control board, because it amounts to a change that will affect your project constraints.

You compare all of your actual data to your plans using the risk register and the PM plan.



You should keep monitoring your risks at every meeting until the project is closed.

That's why the tools and techniques include status meetings.



**Risk monitoring should be done at every status meeting.**



# How to control your risks

Controlling risks means keeping your finger on the pulse of the project. If you are constantly reviewing all of the data your project is producing, you will be able to react quickly if a new risk is uncovered, or if it looks like one of your response strategies needs to spring into action. Without careful monitoring, even your best plans won't get implemented in time to save your project if a risk happens.

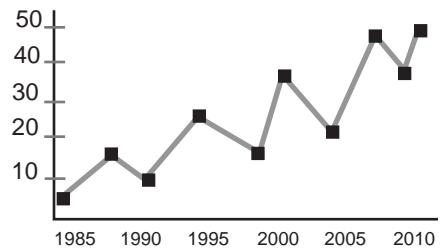
## Risk reassessment

You should have some regularly scheduled reassessment meetings to go over all of the information you have to date and see if your risk register still holds true. In a reassessment, your main goal is to find any new risks that have come up. That's why it's important to reassess your risk register every so often, and be sure that all of the risks in it are still the right ones.



## Variance and trend analysis

Comparing the actual project performance to the plan is a great way to tell if a risk might be happening. If you find that you're significantly over budget or behind schedule, a risk could have cropped up that you didn't take into account. Looking for trends in your defects or schedule variance, for example, might show patterns that indicate that risks have occurred before you would have found that out on your own.



## Reserve analysis

Just like you keep running tabs on your budget, you should always know how much money you have set aside for risk response. As you spend it, be sure to subtract it so you know if you have enough to cover all of your remaining risks. If you start to see that your reserves are running low and there are still a lot of risks being identified, you might be in trouble. Keeping tabs on your reserves means that you will always know if you need to set aside more funds or make different choices about how to handle risks as they come up.



Sometimes this kind of reserve is called a "contingency"—because its use is contingent on a certain risk happening.



## More control risk tools and techniques

There are just a few more tools in the **Control Risks** process. They're all focused on finding new risks if they crop up, dealing with changes to the risks you've already planned for, and responding quickly to risks you know how to handle.

**Risk audits** are when you have an outside party come in and take a look at your risk response strategies to judge how effective they are. Sometimes risk audits will point out better ways of handling a specific risk so that you can change your response strategy going forward.



Auditors will also look at how effective your overall processes for risk planning are.

**Technical performance measurement** means comparing the performance of your project with its planned performance. So if you expected to hit a specific milestone, you could check performance information on your product at that time to see if it measured up to the plan. If not, that might indicate that there are risks you didn't plan for.

**Meetings** are the most important way to keep the team up to date on risk planning—so important that **they should happen throughout the entire project**. The more you talk about risks with the team, the better. Every single status meeting should have risk review on the agenda. Status meetings are a really important way of noticing when things might go wrong, and of making sure that you implement your response strategy in time. It's also possible that you could come across a new opportunity by talking to the team.



Never stop looking for new risks and adapting your strategies for dealing with them.





## Exercise

Here are some risk monitoring and control activities. Can you determine which of the tools is being used in each one?

1. At every milestone, you do a new round of Identify Risks and make sure that the risks in your risk register still apply to the project.

- Reassessment       Audit
- Technical performance measurement
- Trend analysis       Reserve analysis

2. You check to make sure that you have all of the features developed in your project that you had planned when you reach the “feature complete” milestone. When you find that you are missing one of the planned features, you realize that a new risk has shown up—you missed one of the required features in your functional specification.

- Reassessment       Audit
- Technical performance measurement
- Trend analysis       Reserve analysis

3. You take a look at the number of defects you have found in your project per phase and find that it is higher in your project than it has been in most other projects that the company is doing. You dig a little deeper and find some previously unplanned risks that have been causing trouble on your project.

- Reassessment       Audit
- Technical performance measurement
- Trend analysis       Reserve analysis

4. Your company sends a risk expert in to take a look at your risk response strategies. She finds that you are missing a few secondary risks that might be caused by the responses you have planned. So you update your risk register to include the secondary risks.

- Reassessment       Audit
- Technical performance measurement
- Trend analysis       Reserve analysis

5. You decide to implement a risk response that costs \$4,000. You check to make sure that you have enough money to cover the rest of the risks that might happen from here on out in the project.

- Reassessment       Audit
- Technical performance measurement
- Trend analysis       Reserve analysis

Answers:  
1—Reassessment  
2—Technical performance measurement  
3—Trend analysis  
4—Audit  
5—Reserve analysis

## <sup>there are no</sup> Dumb Questions

**Q:** Why do I need to ask about risks at every status meeting?

**A:** Because a risk could crop up at any time, and you need to be prepared. The better you prepare for risks, the more secure your project is against the unknown. That's also why the triggers and watchlists are really important. When you meet with your team, you should figure out if a trigger for a risk response has happened. And you should check your watchlist to make sure none of your low-priority risks have materialized.

For the test, you need to know that status meetings aren't just a place for you to sit and ask each member of your team to tell you his or her status. Instead, you use them to figure out decisions that need to be made to keep the project on track or to head off any problems that might be coming up. In your status meetings, you need to discuss all of the issues that involve the whole team and come up with solutions to any new problems you encounter. So, it makes sense that you would use your status meetings to talk about your risk register and make sure that it is always up to date with the latest information.

**Q:** I still don't get trend analysis. How does it help me find risks?

**A:** It's easy to miss risks in your project—sometimes all the meetings in the world won't help your team see some of them. That's why a tool like trend analysis can be really useful. Remember the control chart from Chapter 8? This is really similar, and it's just as valuable. It's just a way to see if things are happening that you did not plan for.

**Q:** Hey, didn't you talk about risks back in the Time Management chapter too?

**A:** Wow—it's great that you remembered that! The main thing to remember about risks from Chapter 6 is that having a very long critical path or, even worse, multiple critical paths means you have a riskier project. The riskiest is when all of the activities are on the critical path. That means that a delay to even one activity can derail your whole project.

**Q:** Shouldn't I ask the sponsor about risks to the project?

**A:** Actually the best people to ask about risks are the project team itself. The sponsor knows why the project is needed and how much money is available for it, but from there, it's really up to the team to manage risks. Since you are the ones doing the work, it makes sense that you would have a better idea of what has gone wrong on similar projects and what might go wrong on this one. Identify Risks, Perform Qualitative and Quantitative Risk Analysis, and Plan Risk Responses are some of the most valuable contributions the team makes to the project. They can be the difference between making the sponsor happy and having to do a lot of apologizing.

**Q:** Why do we do risk audits?

**A:** Risk audits are when you have someone from outside your project come in and review your risk register—your risks and your risk responses—to make sure you got it right. The reason we do it is because risks are so important that getting a new set of

eyes on them is worth the time.

**Q:** Hold on, didn't we already talk about reserves way back in the Cost Control chapter? Why is it coming up here?

**A:** That's right, back in Chapter 7 we talked about a **management reserve**, which is money set aside to handle any unknown costs that come up on the project. That's a different kind of reserve than the one for controlling risks. The kind of reserve used for risks is called a **contingency reserve**, because its use is *contingent* on a risk actually materializing.

Project managers sometimes talk about both kinds of reserves together, because they both have to show up on the same budget. When they do, you'll sometimes hear talk of "known unknowns" and "unknown unknowns." The management reserve is for unknown unknowns—things that you haven't planned for but could impact your project. The contingency reserve is for known unknowns, or risks that you know about and explicitly planned for and put in your risk register.

**The better you  
prepare for risks,  
the more secure  
your project  
is against the  
unknown.**



By now, you know what comes out of a typical Monitoring and Controlling process. Draw in the missing outputs for Control Risks.

### Outputs



You'll find all sorts of things that need to be fixed. But you can't just go update the plan—you need this as an input to kick off change control.)



### Control Risks

This one's all about helping others to learn from what's happened on your project.



### Work performance information

This set of documents needs to be updated any time your plans change.



--	--	--	--

For this one, think about what you do once you have evaluated work performance information and found that something needs to happen.





By now, you know what comes out of a typical Monitoring and Controlling process. Draw in the missing outputs for Control Risks.

**Outputs**



**Risk monitoring and control is exactly like the other change control processes.**

**Control Risks**



Change requests



Organizational process asset updates



Work performance information

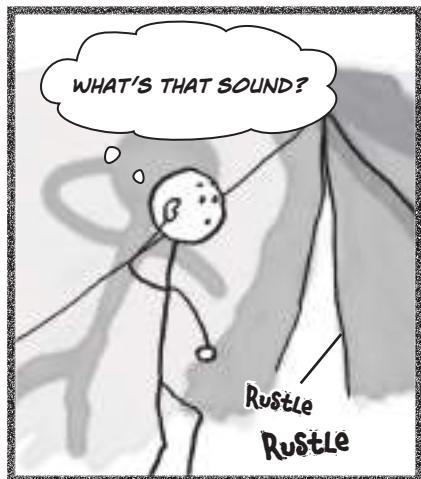


Project Management plan updates



Project document updates

Project document updates are always outputs from a Monitoring and Controlling process.



\* Note from the authors: We're not exactly sure why he feels his mission was accomplished after spraying a bear in the face and then jumping off of a cliff. But it seems to work!

# Question Clinic: The “which-is-NOT” question



YOU'LL SEE SOME QUESTIONS ON THE EXAM THAT LIST INPUTS, OUTPUTS, TOOLS, OR CONCEPTS AND ASK YOU TO DETERMINE WHICH ONE OF THEM IS NOT PART OF THE GROUP. USUALLY, YOU CAN FIGURE THEM OUT BY GOING THROUGH THE ANSWER CHOICES ONE BY ONE AND ELIMINATING THE ONE THAT DOESN'T BELONG.

This is the one with tornado diagrams. It's got to be part of the Group.

This one is definitely a quantitative analysis technique. Multiplying probability with the value of positive and negative outcomes of the project is all about putting numbers to risk.

Remember reading something about Monte Carlo back in Chapter 6? It might be right...right? But wait, it's also a tool for using random numbers to model out possible risks on the project. It's definitely part of quantitative analysis.

117. Which of the following is not a quantitative analysis technique?

- A. Sensitivity analysis
- B. Expected monetary value
- C. Monte Carlo analysis
- D. Reserve analysis

D's definitely the right answer. It's about numbers, but it isn't concerned with assigning numbers to the risk. It's about keeping tabs on the contingency reserve when risks materialize, so it's a Monitoring and Controlling process. This has to be it!

TAKE YOUR TIME AND THINK YOUR WAY THROUGH IT. ALL OF THEM WILL HAVE SOMETHING IN COMMON BUT ONE. AS LONG AS YOU REMEMBER THE GROUP YOU'RE FITTING THEM INTO, YOU WON'T HAVE ANY TROUBLE.

Take your time  
answering  
which-is-NOT  
questions.

# HEAD LIBS

Fill in the blanks to come up with your own “which-is-NOT” question!

Which of the following is NOT a \_\_\_\_\_?  
(input, output, tool, process, or concept)

- A. \_\_\_\_\_  
(input, output, tool, or process that is in the group)
- B. \_\_\_\_\_  
(input, output, tool, or process that is in the group)
- C. \_\_\_\_\_  
(input, output, tool, or process that is in the group)
- D. \_\_\_\_\_  
(the right answer)



Join the Head First PMP community at <http://www.headfirstlabs.com/PMP>  
You can add your Head Libs answer, and see what Head Libs other project managers  
came up with!



You'll need to know how to do EMV calculations for the test. Give them a shot now—they're pretty easy once you get the hang of them.

Take a look at this table of risks.

Risk	Probability	Impact
Navigation equipment failure	15%	costs \$300 due to getting lost
Unseasonably warm weather	8%	save \$500 in excavation costs
Wild animals eat rations	10%	costs \$100 for replacements

1. Calculate the EMV for each of these three risks.

$$\text{Navigation equipment failure: } 15\% \times -\$300 = -\$45.00$$

$$\text{Unseasonably warm weather: } 8\% \times \$500 = \$40.00$$

$$\text{Wild animals eat rations: } 10\% \times -\$100 = -\$10.00$$

Don't forget to use a positive value here because it's an opportunity, not a threat.

2. If these are the only risks on the project, calculate the total EMV.

$$\text{Total EMV} = -\$45.00 + \$40.00 + -\$10.00 = -\$15.00$$

You get the total EMV by adding up the EMV for each risk.

3. The latest weather report came out, and there is now a 20% chance of unseasonably warm weather. What's the new EMV for the project?

$$\text{Unseasonably warm weather: } 20\% \times \$500 = \$100.00$$

$$\text{The new total EMV} = -\$45.00 + \$100.00 + -\$10.00 = \$45.00$$

The EMV is now positive, which means the project should cost less than you originally budgeted.

4. Now the cost of replacement rations goes up to \$150. What's the new EMV for the project?

$$\text{Wild animals eat rations: } 10\% \times -\$150 = -\$15.00$$

$$\text{The new total EMV} = -\$45.00 + \$100.00 + -\$15.00 = \$40.00$$



## Exercise Solution

1. You hear a weather report that says there's now a 45% chance of high winds. Does it still make sense to buy the heavier tent?

**EMV of choosing the heavier tent:**  $-\$350 \text{ plus } (45\% \times -\$48) \text{ plus } (55\% \times -\$10) = -\$377.10$

**EMV of choosing the lighter tent:**  $-\$130 \text{ plus } (45\% \times -\$953) \text{ plus } (55\% \times -\$15) = -\$567.10$

**It still makes sense to choose the heavier tent.**

2. If you don't buy the heavier tent, then you have room to take along a wind generator that can power your equipment, and that will save you \$1,100 in portable batteries if there's a heavy wind. If there's still a 45% chance of high winds, does it still make sense to buy the heavier tent?

**EMV of choosing the heavier tent:**  $-\$350 \text{ plus } (45\% \times -\$48) \text{ plus } (55\% \times -\$10) = -\$377.10$

**EMV of choosing the lighter tent:**  $-\$130 \text{ plus } (45\% \times \$147) \text{ plus } (55\% \times -\$15) = -\$72.10$

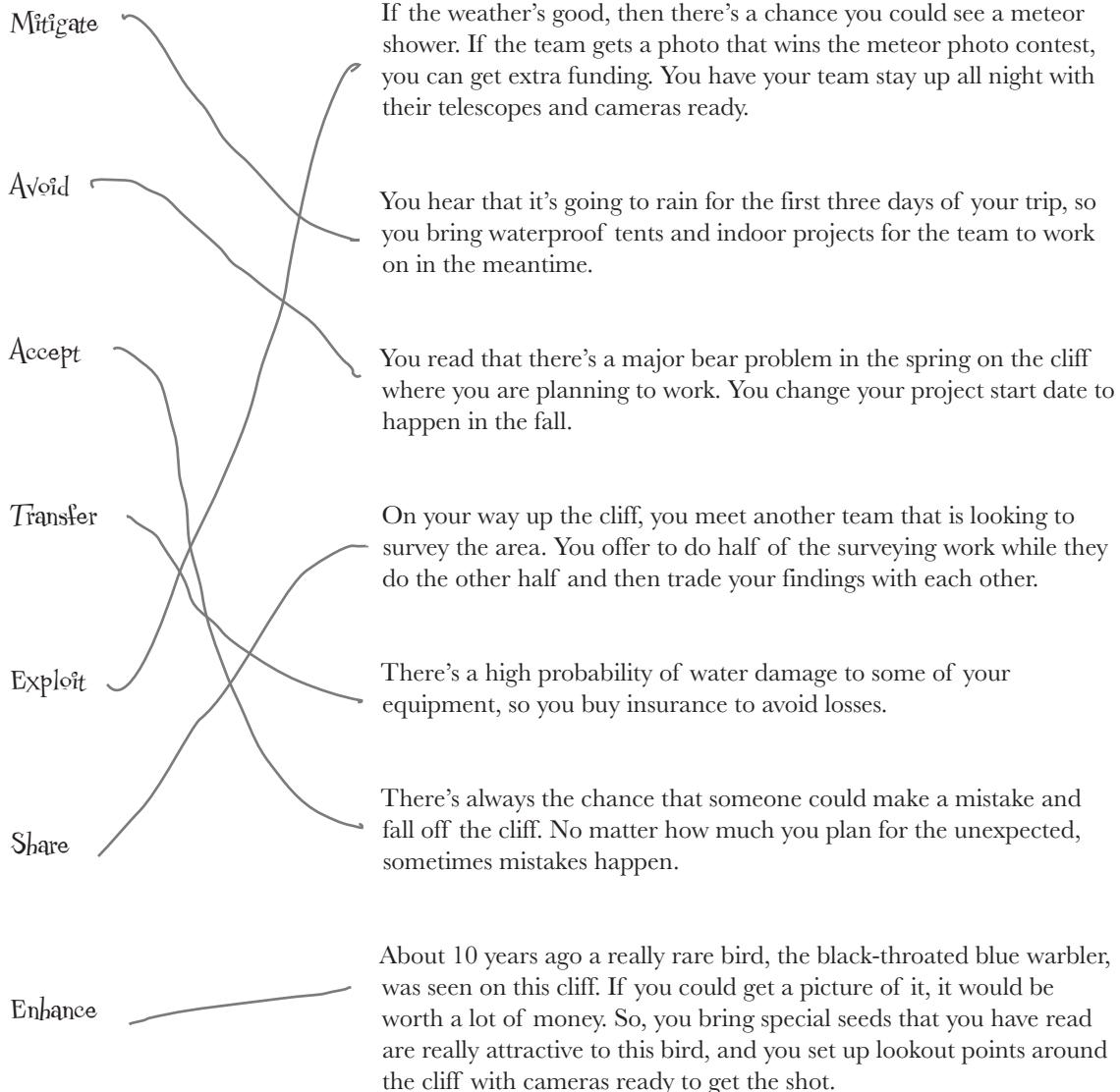
**Now it makes sense to choose the lighter tent.**

When the probability of high winds changed to 45%, then the probability of low winds also changed: to 55%.

So where did this  $\$147$  come from? Well, if there's a heavy wind, then the generator turns this into an opportunity. You'll still see  $\$953$  in equipment damage, but that's offset by the  $\$1,100$  in savings for portable batteries. That puts you ahead by  $\$147$ —but only if there's a heavy wind!

## \* WHAT'S MY PURPOSE \*

Which risk response technique is being used in these situations? Match each technique to its scenario.



## Exam Questions

1. The project manager for a construction project discovers that the local city council may change the building code to allow adjoining properties to combine their sewage systems. She knows that a competitor is about to break ground in the adjacent lot and contacts him to discuss the possibility of having both projects save costs by building a sewage system for the two projects.

This is an example of which strategy?

- A. Mitigate
- B. Share
- C. Accept
- D. Exploit

2. Which of the following is NOT a risk response technique?

- A. Exploit
- B. Transfer
- C. Mitigate
- D. Confront

3. You are using an RBS to manage your risk categories. What process are you performing?

- A. Plan Risk Management
- B. Identify Risks
- C. Perform Qualitative Risk Analysis
- D. Perform Quantitative Risk Analysis

4. Which of the following is used to monitor low-priority risks?

- A. Triggers
- B. Watchlists
- C. Probability and Impact matrix
- D. Monte Carlo analysis

## Exam Questions

5. You're managing a construction project. There's a 30% chance that weather will cause a three-day delay, costing \$12,000. There's also a 20% chance that the price of your building materials will drop, which will save \$5,000. What's the total EMV for both of these?

- A. -\$3,600
- B. \$1,000
- C. -\$2,600
- D. \$4,600

6. Joe is the project manager of a large software project. When it's time to identify risks on his project, he contacts a team of experts and has them all come up with a list and send it in anonymously. What technique is Joe using?

- A. SWOT
- B. Ishikawa diagramming
- C. Delphi
- D. Brainstorming

7. Susan is the project manager on a construction project. When she hears that her project has run into a snag due to weeks of bad weather on the job site, she says "No problem, we have insurance that covers cost overruns due to weather." What risk response strategy did she use?

- A. Exploit
- B. Transfer
- C. Mitigate
- D. Avoid

8. You're performing Identify Risks on a software project. Two of your team members have spent half of the meeting arguing about whether or not a particular risk is likely to happen on the project. You decide to table the discussion, but you're concerned that your team's motivation is at risk. The next item on the agenda is a discussion of a potential opportunity on the project in which you may be able to purchase a component for much less than it would cost to build.

Which of the following is NOT a valid way to respond to an opportunity?

- A. Exploit
- B. Transfer
- C. Share
- D. Enhance

## Exam Questions

9. Risks that are caused by the response to another risk are called:

- A. Residual risks
- B. Secondary risks
- C. Cumulative risks
- D. Mitigated risks

10. What's the main output of the Risk Management processes?

- A. The Risk Management plan
- B. The risk breakdown structure
- C. Work performance information
- D. The risk register and project documents updates

11. Tom is a project manager for an accounting project. His company wants to streamline its payroll system. The project is intended to reduce errors in the accounts payable system and has a 70% chance of saving the company \$200,000 over the next year. It has a 30% chance of costing the company \$100,000.

What's the project's EMV?

- A. \$170,000
- B. \$110,000
- C. \$200,000
- D. \$100,000

12. What's the difference between management reserves and contingency reserves?

- A. Management reserves are used to handle known unknowns, while contingency reserves are used to handle unknown unknowns.
- B. Management reserves are used to handle unknown unknowns, while contingency reserves are used to handle known unknowns.
- C. Management reserves are used to handle high-priority risks, while contingency reserves are used to handle low-priority risks.
- D. Management reserves are used to handle low-priority risks, while contingency reserves are used to handle high-priority risks.

## Exam Questions

**13. How often should a project manager discuss risks with the team?**

- A. At every milestone
- B. Every day
- C. Twice
- D. At every status meeting

**14. Which of the following should NOT be in the risk register?**

- A. Watchlists of low-priority risks
- B. Relative ranking of project risks
- C. Root causes of each risk
- D. Probability and impact matrix

**15. Which of the following is NOT true about Risk Management?**

- A. The project manager is the only person responsible for identifying risks
- B. All known risks should be added to the risk register
- C. Risks should be discussed at every team meeting
- D. Risks should be analyzed for impact and priority

**16. You're managing a project to remodel a kitchen. You find out from your supplier that there's a 50% chance that the model of oven that you planned to use may be discontinued, and you'll have to go with one that costs \$650 more. What's the EMV of that risk?**

- A. \$650
- B. -\$650
- C. \$325
- D. -\$325

**17. Which risk analysis tool is used to model your risks by running simulations that calculate random outcomes and probabilities?**

- A. Monte Carlo analysis
- B. Sensitivity analysis
- C. EMV analysis
- D. Delphi technique

## Exam Questions

18. A construction project manager has a meeting with the team foreman, who tells him that there's a good chance that a general strike will delay the project. They brainstorm to try to find a way to handle it, but in the end decide that if there's a strike, there is no useful way to minimize the impact to the project. This is an example of which risk response strategy?

- A. Mitigate
- B. Avoid
- C. Transfer
- D. Accept

19. You're managing a project to fulfill a military contract. Your project team is assembled, and work has begun. Your government project officer informs you that a supplier that you depend on has lost the contract to supply a critical part. You consult your risk register and discover that you did not plan for this. What's the BEST way to handle this situation?

- A. Consult the Probability and Impact matrix
- B. Perform Quantitative and Perform Qualitative Risk Analysis
- C. Recommend preventive actions
- D. Look for a new supplier for the part

20. Which of the following BEST describes risk audits?

- A. The project manager reviews each risk on the risk register with the team
- B. A senior manager audits your work and decides whether you're doing a good job
- C. An external auditor reviews the risk response strategies for each risk
- D. An external auditor reviews the project work to make sure the team isn't introducing a new risk

## Answers

~~Exam Questions~~**1. Answer: B**

Sharing is when a project manager figures out a way to use an opportunity to help not just her project but another project or person as well.

It's OK to share an opportunity with a competitor—that's a win-win situation.

**2. Answer: D**

Confronting is a conflict resolution technique.

**3. Answer: A**

You use an RBS to figure out and organize your risk categories even before you start to identify them. Then you decompose the categories into individual risks as part of Identify Risks.

**4. Answer: B**

Your risk register should include watchlists of low-priority risks, and you should review those risks at every status meeting to make sure that none of them have occurred.

**5. Answer: C**

The expected monetary value (or EMV) of the weather risk is the probability (30%) times the cost (\$12,000), but don't forget that since it's a risk, that number should be negative. So its EMV is  $30\% \times -\$12,000 = -\$3,600$ . The building materials opportunity has an EMV of  $20\% \times \$5,000 = \$1,000$ . Add them up and you get  $-\$3,600 + \$1,000 = -\$2,600$ .

When you're calculating EMV, negative risks give you negative numbers.

**6. Answer: C**

Using the Delphi technique, experts supply their opinions of risks for your project anonymously so that they each get a chance to think about the project without influencing each other.

Common sense would tell you that the answer is D, but brainstorming doesn't have to be anonymous. So, it's got to be Delphi.

*Make it Stick*



*Answers*~~Exam Questions~~**7. Answer: B**

Wow, did you see that huge red herring?

Susan bought an insurance policy to cover cost overruns due to weather. She transferred the risk from her company to the insurance company.

**8. Answer: B**

You wouldn't want to transfer an opportunity to someone else! You always want to find a way to use that opportunity for the good of the project. That's why the response strategies for opportunities are all about figuring out ways to use the opportunity to improve your project (or another, in the case of sharing).

**9. Answer: B**

A secondary risk is a risk that could happen because of your response to another risk.

The key to this one is to remember that the money the project makes is positive, and the money it will cost is negative.

**10. Answer: D**

The processes of Risk Management are organized around creating the risk register, and updating it as part of project documents updates.

**11. Answer: B**

$\$200,000 \times 0.70 = \$140,000$  savings, and  $\$100,000 \times 0.30 = -\$30,000$  expenses. Add them together and you get \$110,000.



That's why it's useful to figure out the EMV for a risk—so you know how big your contingency reserve should be.

**12. Answer: B**

Contingency reserves are calculated during Perform Quantitative Risk Analysis based on the risks you've identified. You can think of a risk as a "known unknown"—an uncertain event that you know about, but which may not happen—and you can add contingency reserves to your budget in order to handle them. Management reserves are part of Cost Management—you use them to build a reserve into your budget for any unknown events that happen.

## ~~Exam Questions~~

### **13. Answer: D**

Risk monitoring and response is so important that you should go through your risk register at every status meeting!

### **14. Answer: D**

The Probability and Impact matrix is a tool that you use to analyze risks. You might find it in your Project Management plan, but it's not included in the risk register.

### **15. Answer: A**

It's really important that you get the entire team involved in the Identify Risks process. The more people who look for risks, the more likely it is that you'll find the ones that will actually occur on your project.

### **16. Answer: D**

Even though this looks a little wordy, it's just another EMV question. The probability of the risk is 50%, and the cost is -\$650, so multiply the two and you get -\$325.

### **17. Answer: A**

This is just the definition of Monte Carlo analysis. That's where you use a computer simulation to see what different random probability and impact values do to your project.

### **18. Answer: D**

There are some risks that you just can't do anything about. When that happens, you have to accept them. But at least you can warn your stakeholders about the risk, so nobody is caught off guard.

Answers

## ~~Exam Questions~~

### 19. Answer: D

You've got an unplanned event that's happened on your project. Is that a risk? No. It's a project problem, and you need to solve that problem. Your Probability and Impact matrix won't help, because the probability of this happening is 100%—it's already happened. No amount of risk planning will prevent or mitigate the risk. And there's no sense in trying to take preventive actions, because there's no way you can prevent it. So the best you can do is start looking for a new part supplier.

### 20. Answer: C

It's a good idea to bring in someone from outside of your project to review your risks. The auditor can make sure that each risk response is appropriate and really addresses the root causes of each risk.

I SEE—THIS WASN'T  
A RISK AT ALL, IT WAS  
JUST A PROBLEM THAT CAME  
UP DURING THE PROJECT. I  
BET BETTER RISK PLANNING  
MIGHT HAVE HELPED THE  
TEAM PREPARE FOR THIS!





## 12 Procurement management

### *Getting some help*



**Some jobs are just too big for your company to do on its own.** Even when the job isn't too big, it may just be that you don't have the expertise or equipment to do it. When that happens, you need to use **Procurement Management** to find another company to **do the work for you**. If you find the **right seller**, choose the **right kind of relationship**, and make sure that the **goals of the contract are met**, you'll get the job done, and your project will be a success.

## **Victim of her own success**

Kate's last project went really well. In fact, maybe a little too well. The company's customer base grew so much that now the IT department's technical support staff is overwhelmed. Customers who call up looking for technical support have to spend a long time on hold, and that's not good for the company.



## Calling in the cavalry



WE'VE GOT A NEW  
PROJECT FOR YOU, KATE. WE  
FIGURE IT'S GOING TO TAKE ABOUT  
18 MONTHS TO RAMP UP THE NEW  
TECH SUPPORT CALL CENTER. CAN  
YOU HANDLE IT?

**Kate:** No problem. The hard part will be figuring out how to manage the transition. Are we going to try to expand the team immediately, or call in a supplier to help us out?

**Ben:** Whoa, hold on there! Is going outside the company even an option?

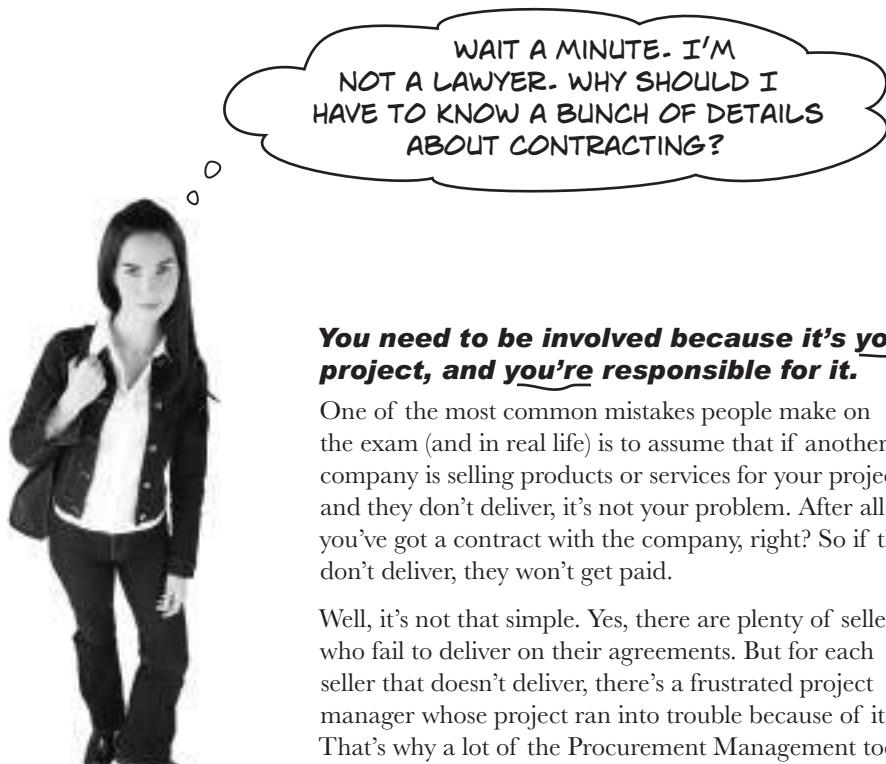
**Kate:** Look, our tech support team is already at full capacity, and it'll take months to upgrade the facilities to handle more people...not to mention to hire and train the staff. We may be able to handle it ourselves, but there's a good chance that the easiest way to get the job done is to go outside our company to find a vendor to do the work.

**Ben:** But isn't it kind of risky thinking about working with another company? I mean, what if it goes out of business during our project? Or what if it costs too much?

**Kate:** Well, we'll need to make sure that we answer those questions. But this isn't the first time our company's brought on a contractor like this. The legal department has done this kind of thing before. I'll set up a meeting with somebody over there and see if they can help us out.

**Ben:** OK, you can follow up on that. But I'm still not sure about this.

**Sometimes you need to hire an outside company to do some of your project work. That's called procurement, and the outside company is called the seller.**



**You need to be involved because it's your project, and you're responsible for it.**

One of the most common mistakes people make on the exam (and in real life) is to assume that if another company is selling products or services for your project and they don't deliver, it's not your problem. After all, you've got a contract with the company, right? So if they don't deliver, they won't get paid.

Well, it's not that simple. Yes, there are plenty of sellers who fail to deliver on their agreements. But for each seller that doesn't deliver, there's a frustrated project manager whose project ran into trouble because of it. That's why a lot of the Procurement Management tools and techniques are focused on selecting the *right* seller and communicating exactly what you'll need to the people doing the work.



**The PMP exam is based on contracting laws and customs in the United States.**

Are you used to working in a country that ISN'T the U.S.? Then you should be especially careful about these processes. You may be used to working with agreements in a way that isn't exactly the same as how they'll work on the exam questions. Luckily, the U.S. government publishes a lot of information on contracting at <http://www.acquisition.gov/>. Take a look at the site if you want a little more background.



## Agreement Process Magnets

There are four Procurement Management processes. They're pretty easy to understand—you can probably guess which ones are which from their descriptions. Connect the description of each process with its name, and then try to guess which process group it's in.

### Descriptions of each process

Plan out what you'll purchase, and how and when you will need the contracts to be negotiated for your project.

### Process names

.....

### Process groups

.....

Decide on the seller (or sellers) you are going to work with, and finalize and sign the contract.

.....

.....

Keep tabs on the contract. Make sure your company is getting what you paid for.

.....

.....

Confirm that the work was done right and that all obligations are fulfilled on both sides.

.....

.....

Planning

Plan  
Procurement  
Management

Executing

Conduct  
Procurements

Close Procurements

Control  
Procurements

Closing

Monitoring and  
Controlling



## Agreement Process Magnets Solutions

There are four Procurement Management processes. They're pretty easy to understand—you can probably guess which ones are which from their descriptions. Connect the description of each process with its name, and then try to guess which process group it's in.

### Descriptions of each process

Plan out what you'll purchase, and how and when you will need the contracts to be negotiated for your project.

Decide on the seller (or sellers) you are going to work with, and finalize and sign the contract.

Keep tabs on the contract. Make sure your company is getting what you paid for.

Confirm that the work was done right and that all obligations are fulfilled on both sides.

This process is for making changes to the contract, and correcting any problems with the seller's work.

### Process names

Plan Procurement Management

Conduct Procurements

Control Procurements

Close Procurements

### Process groups

Planning

Executing

Monitoring and Controlling

Closing

## Ask the legal expert



HI KATE. I'M STEVE FROM  
LEGAL. BEN SAID YOU NEEDED  
TO TALK TO ME—DO YOU HAVE A  
MINUTE?

Thanks for coming by, Steve. We're looking for a contractor to handle tech support while we bring on more people in our call center. How do we normally handle this stuff?

Here's how it usually works. I'll actually write the contract and do the negotiation. But before I do that, I'll need to sit down with you to understand what the contract has to accomplish.

**Kate:** So I'm not involved at all?

**Steve:** Oh, you're definitely involved. You need to help with the negotiations, because you're the only person who really understands what we're trying to accomplish with the contract.

**Kate:** OK, that makes sense. So when do we get started?

**Steve:** Well, not so fast. We need to be really sure that the way we pick our vendors is absolutely fair. We've got some company guidelines that you'll need to follow. And once we've got the contract signed and the work is under way, we'll need to meet to make sure the contract is really being followed. And if there's a problem and we need to negotiate a change to the contract, you'll need me to do it.

**Kate:** OK, I can handle that. So should I start working on something to send out to sellers?

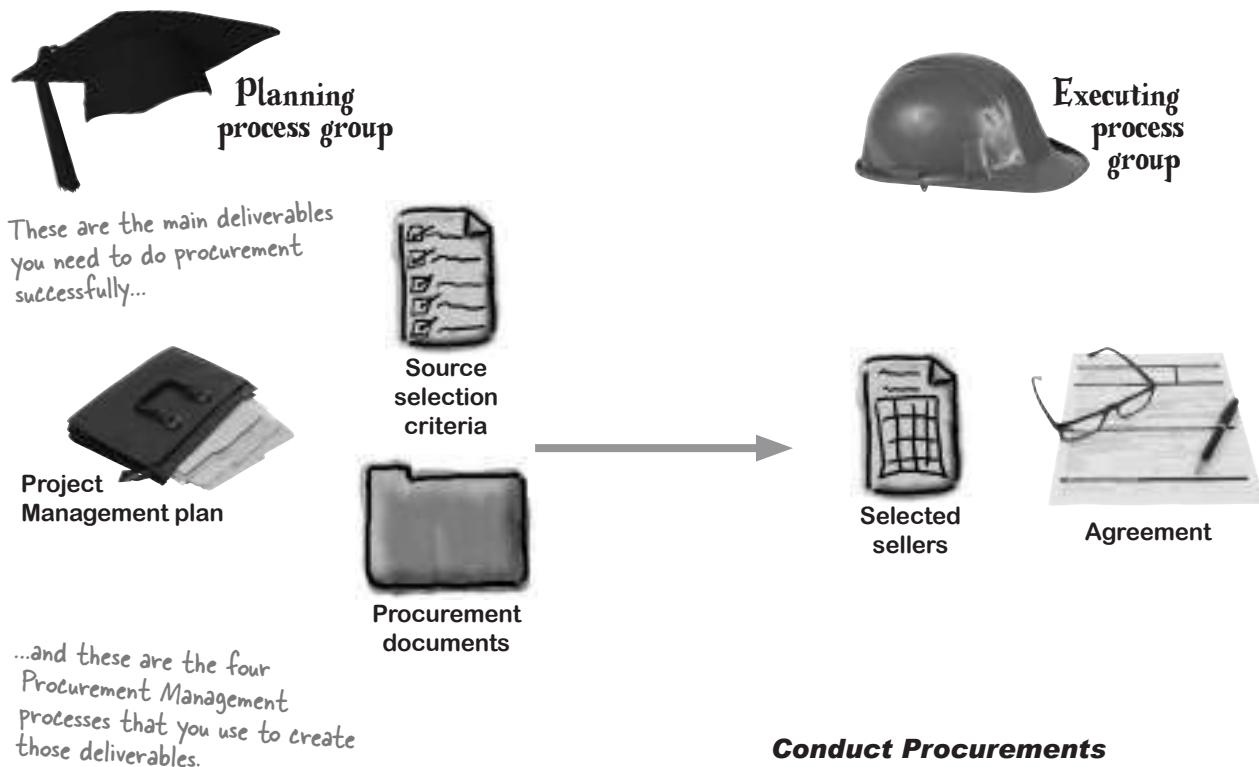
**Steve:** Not quite. Before we even get started with all of that, are you sure we really need to contract this work?



What should Kate do to figure out if it's really a good idea to contract the work?

## Anatomy of an agreement

Procurement is pretty intuitive, and the **four Procurement Management processes** follow a really sensible order. First you plan what you need to contract; then you plan how you'll do it. Next, you send out your contract requirements to sellers. They bid for the chance to work with you. You pick the best one, and then you sign the contract with them. Once the work begins, you monitor it to make sure the contract is being followed. When the work is done, you close out the contract and fill out all the paperwork.



**Plan Procurement Management** Here's where you take a close look at your needs, to be sure that you really need to create a contract. You figure out what kinds of contracts make sense for your project, and you try to define all of the parts of your project that will be contracted out.

You'll need to plan out each individual contract for the project work and work out how you'll manage it. That means figuring out what metrics it will need to meet to be considered successful, how you'll pick a seller, and how you'll administer the contract once the work is happening.

### Conduct Procurements

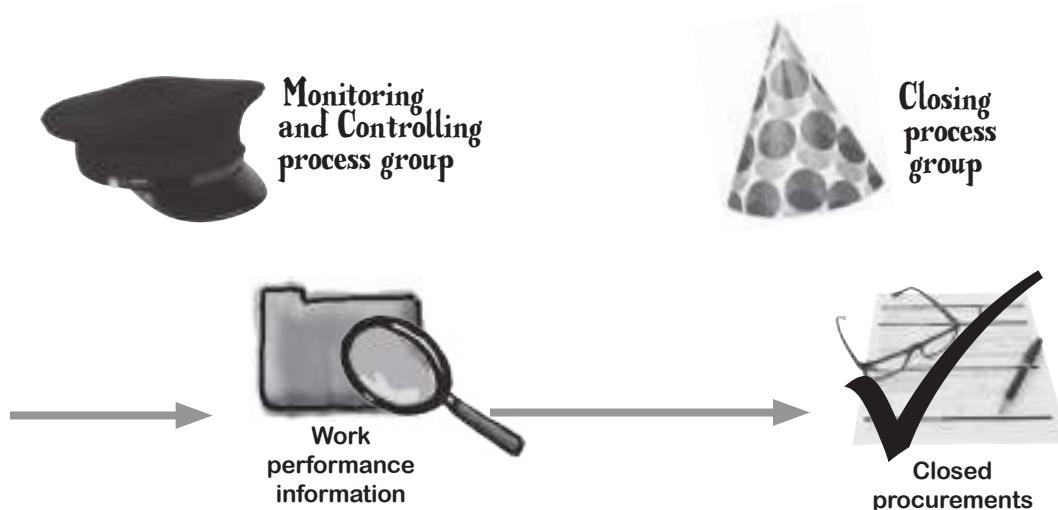
This process is all about getting the word out to potential agreement or contract partners about the project and how they can help you. You hold **bidder conferences** and find qualified sellers that can do the work.

Next, you evaluate all of the responses to your procurement documents and find the seller that suits your needs the best. When you find them, you sign the contract, and then the work can begin.

## You can have several contracts for a single project

The first Procurement Management process is **Plan Procurement**

**Management.** It's a familiar planning process, and you use it to plan out all of your procurement activities for the project. The other three processes are done for every contract. Here's an example. Say you're managing a construction project, and you've got one contract with an electrician and another one with a plumber. That means you'll go through those three processes two separate times, once for each contractor.



The work performance information tells you if there are problems with your agreement—so Control Procurements is just like any other Monitoring and Controlling process.

### **Control Procurements**

When the contract is under way, you stay on top of the work and make sure the contract is adhered to. You monitor what the contractor is producing and make sure everything is running smoothly. Occasionally, you'll need to make changes to the contract. Here's where you'll find and request those changes.

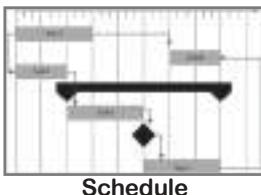
### **Close Procurements**

When the work is done, you'll close your contract out. You'll make sure that the product that is produced meets the criteria for the contract, and that the contractor gets paid.

# Start with a plan for the whole project

You need to think about all of the work that you will contract out for your project before you do anything else. The **Plan Procurement Management process** is all about figuring that out, and writing up a plan for how you'll do it.

Your cost estimates and your schedule play a big part in how you plan out your procurement.



## Activity cost estimates

Your resource requirements and requirements document tell you a lot about the work you need to do and how this contract will fit into it.



## Activity resource requirements

You need to consider the level of expertise your company has with the product or work you're thinking of contracting, as well as the job and contracting markets you operate in.



## Enterprise environmental factors

## Inputs



Project Management plan



Organizational process assets

**Make or buy analysis** means figuring out whether or not you should be contracting the work or doing it yourself. It could also mean deciding whether to build your own solution to your problem or buy one that is already available. Most of the same factors that help you make every other major project decision will help you with this one. How much does it cost to build it versus buy it? How will this decision affect the scope of your project? How about your project schedule? Do you have time to do the work and still meet your commitments? As you plan out what you will and won't contract, you need to have thought through your reasoning pretty carefully.

There are some resources (like heavy equipment) that your company can buy, rent, or lease depending on the situation. You'll need to examine leasing versus buying costs and determine the best way to go forward.



Requirements documentation

Contracting adds an extra dimension of risk to your project because your seller will have different management and policies. So managing risks is especially important!



Risk register



Stakeholder register

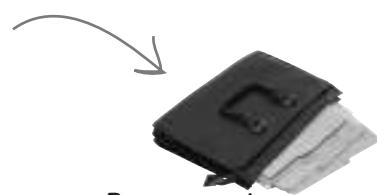


Planning process group

Past contracts can be a useful resource in setting up a new procurement.

This plan will have:

- ⑥ The planned delivery dates for the work or products you are contracting
- ⑥ The company's standard documents you will use
- ⑥ The contract types you plan to use, and any metrics that will be used to measure the contractor's performance
- ⑥ Any constraints or assumptions you need to know about all of the contracts you plan to create for your project



Procurement Management plan



Procurement statement of work

This is just a list of the work that will be contracted. This statement of work will be given to potential contracting partners later.



Make or buy decisions

After doing your make or buy analysis, you write down what you learned so that other people understand your rationale.



Procurement documents

You'll use this output to help you find the sellers that will do the work.



Change requests

And you'll use this one to help you figure out which seller you want to hire.



Project document updates



Source selection criteria

**Expert judgment** means asking someone who's made the same kind of decision before to help you look at all the information you have for your project and make the right decision. Experts can be really helpful in evaluating technology, or providing insight into how your work might be done in different sourcing scenarios.

**Market research** You will want to check out reviews of possible vendors to work with. Sometimes procurement teams will go to conferences or read published reports that evaluate vendors doing similar contracts to help make decisions.

**Meetings** help your team put their heads together and make sure they're covering all of the project's needs when setting up a procurement.



I STILL DON'T BUY IT. WHY  
SHOULD I GO OUTSIDE OF MY  
COMPANY? WHY CAN'T I JUST HAVE  
MY TEAM DO ALL THE WORK?

***Because sometimes it's not worth having your team do part of the job.***

If your company needed to renovate your office, would you hire the carpenter, electrician, and builders? Would you buy the power tools, cement mixer, trucks, and ladders? Of course not. You'd hire a contractor to do the work, because it would cost too much to buy all that stuff for one job, and you wouldn't want to hire people just for the job and then fire them when it was done. Well, the same goes for a lot of jobs on your projects. You don't always want to have your company build everything. There are a lot of jobs where you want to hire a **seller**.

There are a lot of words for the company you're hiring: contractor, consultant, external company...but for the PMP exam, you'll typically see the term "seller."



**It's natural to feel a little nervous about this contracting stuff.**

A lot of project managers have only ever worked with teams inside their own companies. All this talk of contracts, lawyers, proposals, bids, and conferences can be intimidating if you've never seen it before. But don't worry. Managing a project with a contractor is really similar to managing one that uses your company's employees. There are just a few new tools and techniques that you need to learn...but they're not hard, and you'll definitely get the hang of them really quickly.



## Make or Buy Magnets

Figure out whether or not Kate and Ben should contract out the tech support work by organizing these facts about the project into make or buy columns. The first few have been done for you.

This really is how a lot of people handle make or buy decisions—looking at all of the information you have for the project and using it to determine whether the facts line up under “Make” or “Buy.”

### Make

Training the contractor's employees will be less valuable because we won't be able to use their knowledge when the contract is up.

It might be hard to control the quality of the contractor's work.

The contract team can have a staff trained and ready within a month from the signed contract.

The cost for equipment and training for a 10-person team is around \$50,000. Contracts could be drawn up to cut that cost down a lot.

### Buy

The next big product release is six months away.

We think the procurement process will take around three months, and ramping up staff in the call center will take eight months.

Our estimate is that it will cost around \$30,000 per month to hire an additional 10 people and reduce wait time to 10 minutes per call. The cheapest contract for this is around \$40,000 per month.

Contracting companies who specialize in tech support have access to a lot of information and best practices that could make the project go more smoothly.



## Make or Buy Magnets Solutions

Figure out whether or not Kate and Ben should contract out the tech support work by organizing these facts about the project into make or buy columns. The first few have been done for you.

### Make

There's no way they are going to be able to support even more customers with a new product in six months if they don't have the staff then.

It might be hard to control the quality of the contractor's work.

Our estimate is that it will cost around \$30,000 per month to hire an additional 10 people and reduce wait time to 10 minutes per call. The cheapest contract for this is around \$40,000 per month.

Training the contractor's employees will be less valuable because we won't be able to use their knowledge when the contract is up.

Even though the staff costs will be higher with the contractor, not having to pay for equipment and training could offset the higher labor cost.

### Buy

The next big product release is six months away.

We think the procurement process will take around three months and ramping up staff in the call center will take eight months.

The cost for equipment and training for a 10-person team is around \$50,000. Contracts could be drawn up to cut that cost down a lot.

The contract team can have a staff trained and ready within a month from the signed contract.

Contracting companies who specialize in tech support have access to a lot of information and best practices that could make the project go more smoothly.

Sometimes contractors can bring their expertise from running lots of similar projects and make everything run more smoothly than it would if you do it yourself.

## The decision is made

Doing make or buy analysis just means understanding the reasons for the contract and deciding whether or not to contract out the work. Once you've done that, if you still think contracting is an option, then you should have a good idea of what you need to get out of the contracting process.



# Types of contractual agreements

It's a good idea to know a little bit about the most commonly used contract types. They can help you come up with a contract that will give both you and the seller the best chance of success.

## Fixed price contracts

Some PMP exam questions might just refer to a contract type by its acronym (FP, CPFF, etc.).

**Fixed price (FP)** means that you are going to pay one amount regardless of how much it costs the contractor to do the work. A fixed-price contract only makes sense in cases where the scope is very well known. If there are any changes to the amount of work to be done, the seller doesn't get paid any more to do it.

**Fixed price plus incentive fee (FPIF)** means that you are going to pay a fixed price for the contract and give a bonus based on some performance goal. You might set up a contract where the team gets a \$50,000 bonus if they manage to deliver an acceptable product before the contracted date. If the fixed-price contract does not include a fee, it's often referred to as a **firm fixed-price (FFP)** contract.

## Cost-reimbursable contracts

Don't worry about trying to cram these into your head right now—you'll get a lot of practice with them throughout the chapter.

**Costs plus fixed fee (CPFF)** means what it says. You pay the seller back for the costs involved in doing the work, plus you agree to an amount that you will pay on top of that.

**Costs plus award fee (CPAF)** is similar to the CPFF contract, except that instead of paying a fee on top of the costs, you agree to pay a fee based on the buyer's evaluation of the seller's performance.

**Costs plus incentive fee (CPIF)** means you'll reimburse costs on the project and pay a fee if some performance goals are met. Kate could set up her project using this contract type by suggesting that the team will get a \$50,000 bonus if they keep the average wait time for the calls down to seven minutes per customer for over a month. If she were on a CPIF contract, she would pay the team their costs for doing the work, and also the \$50,000 bonus when they met that goal.

## Time and materials

A lot of people say that the T&M contract is a lot like a combination of a cost-plus and fixed-price contract, because you pay a fixed price per hour for labor, but on top of that you pay for costs like in a cost-plus contract.

**Time and materials (T&M)** is used in labor contracts. It means that you will pay a rate for each of the people working on your project plus their materials costs. The "time" part means that the buyer pays a fixed rate for labor—usually a certain number of dollars per hour. And the "materials" part means that the buyer also pays for materials, equipment, office space, administrative overhead costs, and anything else that has to be paid for. The seller typically purchases those things and bills the buyer for them. This is a really good contract to use if you don't know exactly how long your contract will last, because it protects both the buyer and seller.

**Even if your project has several contracts, they don't all have to be the same type. That's why you need to administer each one separately.**



This is a tough one—take your time and think about each kind of contract.

There are advantages and disadvantages to every kind of contract. Different kinds of contracts carry different risks to both the buyer and seller. Can you think of some of them?

Here's a hint: FP contracts don't have much risk for the buyer.

#### Firm fixed price (FFP)

Risks to the buyer .....

Risks to the seller .....

#### Fixed price plus incentive fee (FPIF)

Risks to the buyer .....

Risks to the seller .....

#### Cost plus fixed fee (CPFF)

Risks to the buyer .....

Risks to the seller .....

#### Cost plus award fee (CPAF)

CPAF contracts are really risky for the seller, not the buyer. Can you figure out why?

Risks to the buyer .....

Risks to the seller .....

#### Cost plus incentive fee (CPIF)

Risks to the buyer .....

Risks to the seller .....

#### Time and materials (T&M)

Risks to the buyer .....

Risks to the seller .....

## Sharpen your pencil Solution

There are advantages and disadvantages to every kind of contract. Different kinds of contracts carry different risks to both the buyer and seller. Can you think of some of them?

There are a lot of right answers—even if yours aren't here, it doesn't mean that they're wrong.

A fixed-price contract has a lot more risk for the seller than the buyer.

### Firm fixed price (FFP)

Risks to the buyer **The only risk is if the seller doesn't deliver because of costs.**

Risks to the seller **Unexpected costs could be bigger than the contract itself.**

### Fixed price plus incentive fee (FPIF)

Risks to the buyer **There's still not much risk to the buyer in fixed-price contracts.**

Risks to the seller **The seller still has the same risks as FP, but may make more.**

### Cost plus fixed fee (CPFF)

CPFF contracts have risks for both the buyer and the seller.

Risks to the buyer **If the costs are too high, the buyer will have to pay a lot more.**

Risks to the seller **A fixed fee on top of costs might not be worth it for the seller.**

### Cost plus award fee (CPAF)

CPAF contracts are risky for the sellers, because the buyer subjectively determines their performance, and can decide they didn't perform well enough.

Risks to the buyer **There aren't many risks to the buyer.**

Risks to the seller **If the buyer determines the seller underperformed, he can withhold the fee.**

### Cost plus incentive fee (CPIF)

Incentive fees are a really good way to reduce the risk to the buyer on a cost-plus contract.

Risks to the buyer **There's still a risk of cost overruns, but it's not as bad.**

Risks to the seller **The incentive fee isn't guaranteed, so it might not be paid.**

### Time and materials (T&M)

A lot of T&M contracts include a "cost not to exceed" clause to make sure this doesn't happen. If the contract doesn't have this, it can get really risky for the buyer!

Risks to the buyer **If costs are too high, the contract could get expensive.**

Risks to the seller **The contract might not cover high overhead costs.**

Take a minute and try to figure out why the T&M contract is a really good choice if you don't know how long the job will last.

# More about contracts

There are just a few more things you need to know about any contract to do procurement work.

## **Every contract needs to outline the work to be done and the payment for that work.**

- You might see an exam question that mentions “consideration”—that’s just another word for the payment.
- Remember in Risk Management how you used insurance to transfer risk to another company? You did that using a special kind of contract called an insurance policy.
- You might get a question that asks about **force majeure**. This is a kind of clause that you’ll see in a contract. It says that if something like a war, riot, or natural disaster happens, you’re excused from the terms of the contract.

## **Always pay attention to the point of total assumption.**

- The **point of total assumption** is the point at which the seller assumes the costs. In a fixed-price contract, this is the point where the costs have gotten so large that the seller basically runs out of money from the contract and has to start paying the costs.

## **You should always make sure both the buyer and seller are satisfied.**

- When you negotiate a contract, you should make sure that the buyer and the seller **both** feel comfortable with the terms of the contract. You don’t want the people at the seller’s company to feel like they got a raw deal—after all, you’re depending on them to do good work for your project.



You might see this kind of question about whether to make or buy. Here's a chance to get a little more practice with making contract decisions.

Kate has **18 months** to build up the capacity her company needs to handle all the technical support calls. See if you can figure out whether it's a better deal for Kate to make or buy.

1. If they handle the extra work within the company instead of finding a seller, it will cost an extra \$35,000 in overtime and \$11,000 in training costs in total, on top of the \$4,400 per person per month for the five-person team needed to do the extra support work. What's the total cost of keeping the work within the company?
2. Kate and Ben talked to a few companies and estimate that it will cost \$20,000 per month to hire another company to do the work, but they'll also need to spend \$44,000 in setup costs. What will contracting the work cost?
3. So does it make more sense to make or buy? Why?

→ Answers on page 650.

*how will you evaluate each seller?*

## Figure out how you'll sort out potential sellers

The two big outputs of Plan Procurement are the **procurement documents** and **source selection criteria**. The procurement documents are what you'll use to find potential sellers who want your business. The **source selection criteria** are what you'll use to figure out which sellers you want to use.



A big part of Procurement Management is making sure that both the buyers and sellers are treated fairly. Writing out source selection criteria beforehand is a good way to make sure each seller gets a fair shake.



You'd be amazed at how many sellers respond to bids that they have no business responding to. You definitely need to make sure the seller has the skill and capacity to do the work you need.

***There are a bunch of different documents you might want to send to sellers who want to bid on your work.***

You'll usually include the **procurement statement of work (SOW)** so that sellers know exactly what work is involved.

An **invitation for bid (IFB)** is a document that tells sellers that you want them to submit proposals. You'll also hear of people using **requests for information (RFI)** and **requests for proposals (RFP)**.

There's another kind of invitation—an **invitation for quote (IFQ)**. This is a way to tell sellers that you want them to give you a quote on a fixed-price contract to do the work.

A **purchase order** is something you'll send out to a seller who you know that you want to work with. It's an agreement to pay for certain goods or services.

In some cases you'll want to allow for more flexibility in your contract. If you're hiring a seller to build something for you that you've never built before, you'll often encourage them to help you set the scope instead of locking it down.

***Decide in advance on how you want to select the sellers.***

There are a lot of ways you can select a potential seller. Figuring out if a seller is appropriate for your work is something that takes a lot of talking and thinking—and there's no single, one-size-fits-all way of selecting sellers. But there are some things that you should definitely look for in any seller:

- Can the seller actually do the work you need done?
- How much will the seller charge?
- Can the seller cover any costs and expenses necessary to do the job?
- Are there subcontractors involved that you need to know about?
- Does the seller really understand everything in the SOW and contract?
- Is the seller's project management capability up to the task?

**You always put together procurement documents and source selection criteria before you start talking to individual sellers who want your business.**



## Contract Magnets

Which of the magnets are part of the procurement documents, and which of them are part of the source selection criteria?



Procurement documents

Get a financial statement or credit report and verify that the seller is insured

Procurement statement of work

Meet with the project manager and review project processes

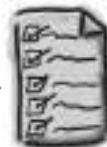
Notification to sellers requesting a quotation for fixed-price work

Sample contract for review

Go over final pricing plan and contract terms

Request for proposals

Review the SOW with the seller to make sure it's understood



Source selection criteria

## WHAT'S MY PURPOSE?

Here are some of the proposals that Kate is evaluating. Match each one up to the contract type that's most important for the proposal.

The buyer will pay for the cost of phone service, rent on the facilities, and employees, plus an additional \$2,500 per month.

Fixed price

The buyer will pay the seller a total of \$285,000 for 18 months of technical support services.

Fixed-price incentive fee

The buyer will pay for the cost of phone service and rent on the facilities, plus \$4,500 per month for employees' time. Costs will not exceed \$14,500 per month.

Cost plus fixed fee

The buyer will pay for the cost of phone service, rent on the facilities, and employees. An additional \$2,750 will be awarded each month that the seller provides an average of 10 issues resolved per person per day and an average wait time of under 3 minutes.

Cost plus incentive fee

The buyer will pay for the cost of phone service, rent on the facilities, and employees. An additional \$5,000 will be paid for exceptional performance.

Cost plus award fee

The buyer will pay the seller a total of \$285,000 for 18 months of technical support services. An additional \$2,750 will be awarded each month that the seller provides an average of 10 issues resolved per person per day and an average wait time of under 3 minutes.

Time and materials

→ Answers on page 630.

# Get in touch with potential sellers

The next step in procurement is pretty straightforward. You use the **Conduct Procurements process** to, well, get the word out to sellers and see what kind of responses you get. Once you narrow down your list of sellers to a few who look like they might be good candidates, you evaluate all of their responses against your source selection criteria and choose the vendor you're going to work with. All that's left to do after that is to get it all on paper...and then you award the contract!

## Use outputs from the Plan Procurement Management process to find the right seller

When you perform the Conduct Procurements process, you'll start with some of the outputs you created in Plan Procurement Management. Here's how you'll use them:



**Make or buy decisions**

The make or buy decisions you made will come in handy because they'll tell you what you need to find a contractor to help out with and what you'll do yourself.



**Procurement documents**

Procurement documents will have all of the information that you'll actually give to potential sellers to help them bid on your contract. Two of the most commonly used procurement documents are the RFI and the RFP.

### RFI: Request for information

documents are sent to potential sellers to ask for information about their capability to do the work.

**RFP: Request for proposal** is when you give a seller the opportunity to examine your procurement documents and write up a proposal of how they'd do the work.



**Source selection criteria**

Use the source selection criteria to evaluate the sellers that respond to you. By evaluating all of your sellers using the same criteria, you'll be sure that you evaluate everyone fairly and find the right seller for your company.



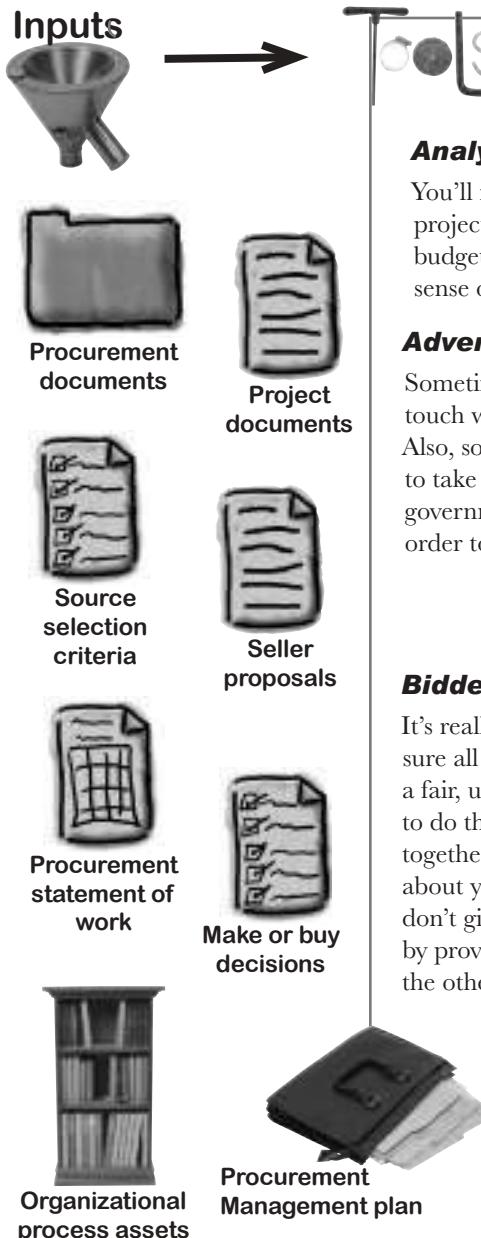
**Procurement statement of work**

The procurement statement of work is where you write out all of the work that needs to be done by a contractor. It tells you the scope of the work that you're going to contract to another company.

# Pick a partner



You've figured out what services you want to procure, and you've gone out and found a list of potential sellers. Now it's time to choose one of them to do the project work—and that's exactly what you do in **Conduct Procurements**.



## **Analytical techniques**

You'll need to determine whether or not the vendor is capable of completing the project in the required time frame and understand how well it can deliver to your budget. If you check out its track record on past projects, you'll have a better sense of how it'll perform.

## **Advertising**

Sometimes the best way to get in touch with sellers is to place an ad. Also, sometimes you are **required** to take out an ad (like for some government-funded projects), in order to give all sellers full notice.

## **Independent estimates**

A lot of the time, you don't have the expertise in your company to figure out whether or not a seller is quoting you a fair price. That's why you'll often turn to a third party to come up with an estimate of what the work should cost.

## **Bidder conferences**

It's really important that you make sure all of the bidders can compete in a fair, unbiased way. And the best way to do that is to get them all in a room together, so that they can ask questions about your contract. That way, you don't give any one seller an advantage by providing inside information that the other sellers don't have access to.

## **Expert judgment**

Here's another case where it's really good to bring in someone from outside your project to help evaluate each proposal. You should bring in someone with a lot of specific expertise in the work being done to make sure the seller is up to the job.

The whole point of the Conduct Procurements process is, well, to conduct procurements...and here they are. Along with the contract, this is the most important output of the process.



Selected sellers



Agreements

Finally! Everyone's signed on the dotted line, and you've got your contract.

### Procurement negotiation

When you send out a package of procurement documents to a potential seller, it usually has some information about the contract you want to sign: the type of contract, some of the terms, maybe some rough calculations and estimates of the total costs, and other numbers. But not all sellers will want to sign that particular contract, even ones who you'll eventually want to work with. That's why you need to negotiate the terms of the contract.

This is one of those times where your company's lawyers will probably do most of the talking—but that doesn't mean you're not a critical part of the process. Your job is to provide the expertise and in-depth understanding. After all, you're the one who understands your project and your project's needs better than anyone else.

### Proposal evaluation techniques

You're going to have to work closely with the seller to figure out if his proposal really is appropriate for the work. You need to be very careful before you choose someone to do the work. That's what this tool is for—it's a kind of "catch-all" that's there to remind you that there's no single way to evaluate a proposal. You need to look at the whole picture—the seller, your needs, and the job.

### Outputs



In the course of selecting a source, you might find changes that need to be made to your requirements or other documents.



Project documents updates

If your contract makes some of the seller's resources available to you, you'll need this in order to update your Staffing Management plan.

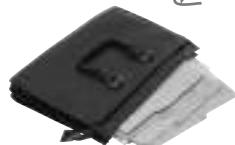


Resource calendars

Any time you do negotiations, you usually end up making some adjustments to your plans—so you'll need to use these for change control.



Change requests



Project Management plan updates



When Kate selects a seller, she'll need to help her company's legal team negotiate the terms of the contract. Which type of contract do you think is right for Kate's project?



Kate is putting out an RFP to find a seller to provide technical support for her company. Can you figure out which Conduct Procurements tool she's using?

1. Kate works with her company's seller evaluation committee, which follows a documented, formal evaluation review process to determine which seller should be selected for the contract.
2. Kate contacts an IT trade journal and places a classified ad to try to find sellers.
3. The CEO's brother-in-law runs a company that's bidding on the contract. Kate needs to make sure he gets fair—not preferential—treatment. She doesn't want to give him an unfair advantage, but she also doesn't want to exclude him from the bidding process. So she gathers representatives from all sellers into a room where they can ask questions about the contract out in the open and hear the responses to each question.
4. Kate's company takes part in an equal-opportunity program in which seller companies owned by minorities must be given notice of any RFPs. She uses a website approved by the program to find seller companies with performance data from similar projects.

→ Answers on page 650.

## there are no Dumb Questions

**Q:** Do I always need to hold a bidder conference whenever I do procurement?

**A:** No, you don't always need a bidder conference. Sometimes your company has a preferred supplier who you always deal with, so you don't have to advertise for sellers. And sometimes there's a **sole source** for a particular service or part—there may only be one company that provides it. In that case, advertising and bidder conferences would be pointless.

The bidder conference has two goals. The first is to make sure that you answer all of the questions from potential sellers. But the other is to make sure that all potential sellers are treated equally and have access to the same information.

**Q:** I'm still not clear on why I'd want to use a cost-plus contract.

**A:** One of the best reasons to use a cost-plus contract is to make sure that the seller you're working with doesn't end up getting a raw deal. A fixed-price contract can be pretty risky for a seller. When the seller uses a cost-plus contract—like a cost plus incentive fee, or cost plus fixed fee—it means that there's a built-in guarantee that the seller won't have to swallow cost overruns. If you're reasonably certain that the costs can be contained, or if you set up a good incentive system, then a cost plus contract can be a really good one for making sure that both the buyer and seller are treated fairly.

**Q:** Why all this talk about treating the seller fairly? I'm trying to get the best deal I can. Doesn't that mean I should try to get as many concessions from sellers as possible?

**A:** One of the most important parts of procurement is that both the buyer and seller should feel like they're getting a good deal. You should never expect a seller to have to take on a bad contract. After all, you're depending on the seller to deliver a necessary piece of your project. That's why the goal in any procurement should always be for the buyer and seller to both feel like they were treated fairly.

**Q:** How do I use organizational process assets to find a seller?

**A:** When you're conducting procurements, you need to actually find sellers to do the work. Many companies have a list of sellers who they consider qualified to work for them because of past project performance. You'll usually find a list like this on file, and that's what the **qualified seller list** is.



Kate needs to use most of the tools and techniques in Conduct Procurements. Which technique is Kate using in each of these scenarios?

1. This is the first time that Kate's company has contracted out technical support services, so she hires a consultant to help her and the legal team estimate a fair price for the contract.  
.....
2. Kate sets up criteria for each seller. Before sellers can submit a bid, they must show that they have handled technical support contracts before and have facilities that can handle over 150 simultaneous calls.  
.....
3. The CIO and the director of the IT department at Kate's company spent a lot of time setting up the company's existing technical support department, so Kate meets with them to get their technical opinions.  
.....
4. Kate sent a notification out to all potential sellers who responded to her RFP informing them that she was calling a meeting with all of them. She made sure that all prospective sellers had a clear understanding of the work that needed to be done, and she answered all questions from each seller out in the open.  
.....
5. Kate reviews all of the sellers' past performance on similar projects to determine whether or not there might be risks if she were to award the contract to any of them.  
.....
6. Kate and her company's legal team sit down with the sellers and work out the terms of the contract. There's a lot of back and forth, but they settle on an agreement that everyone is comfortable with.  
.....

## + WHAT'S MY PURPOSE?

Here are some of the proposals that Kate is evaluating. Match each one up to the contract type that's most important for the proposal.

The buyer will pay for the cost of phone service, rent on the facilities, and employees, plus an additional \$2,500 per month.

*↑ The contract lays out the costs, and then adds a fixed dollar amount fee on top of that. That's a fixed fee, so it's a CPFF contract.*

The buyer will pay the seller a total of \$285,000 for 18 months of technical support services.

*Since a preset price will be paid, this is a fixed price (or lump sum) contract.*

The buyer will pay for the cost of phone service and rent on the facilities, plus \$4,500 per month for employees' time. Costs will not exceed \$14,500 per month.

*A lot of T&M contracts will have a "not to exceed" clause to limit risk for the buyer.*

The buyer will pay for the cost of phone service, rent on the facilities, and employees. An additional \$2,750 will be awarded each month that the seller provides an average of 10 issues resolved per person per day and an average wait time of under 3 minutes.

*Notice how the incentive fee was tied to specific quality measurements. That's a great way to motivate the seller to do a good job.*

The buyer will pay for the cost of phone service, rent on the facilities, and employees. An additional \$5,000 will be paid for exceptional performance.

*This is the same agreement from the fixed-price contract, but it's got the incentive fee from the CPIF contract. So it's fixed-price incentive fee.*

The buyer will pay the seller a total of \$285,000 for 18 months of technical support services. An additional \$2,750 will be awarded each month that the seller provides an average of 10 issues resolved per person per day and an average wait time of under 3 minutes.

Fixed price

Fixed-price incentive fee

Cost plus fixed fee

Cost plus incentive fee

Cost plus award fee

Time and materials



Kate needs to use most of the tools and techniques in Conduct Procurements. Which technique is Kate using in each of these scenarios?

1. This is the first time that Kate's company has contracted out technical support services, so she hires a consultant to help her and the legal team estimate a fair price for the contract.

### Independent estimates

It's often hard to come up with a fair price yourself, because the skills you need to do that are usually the same skills that you need to do the job. Sometimes you don't have those skills in your company, which could be why you looked for a seller in the first place.

2. Kate sets up criteria for each seller. Before sellers can submit a bid, they must show that they have handled technical support contracts before and have facilities that can handle over 150 simultaneous calls.

### Proposal evaluation techniques

When you screen out potential sellers, it makes the job of selecting a seller a lot easier.

3. The CIO and the director of the IT department at Kate's company spent a lot of time setting up the company's existing technical support department, so Kate meets with them to get their technical opinions.

### Expert judgment

You've seen a whole lot of other processes that have this same technique. Expert judgment always means getting an opinion from someone outside your project.

4. Kate sent a notification out to all potential sellers who responded to her RFP informing them that she was calling a meeting with all of them. She made sure that all prospective sellers had a clear understanding of the work that needed to be done, and she answered all questions from each seller out in the open.

### Bidder conferences

5. Kate reviews all of the sellers' past performance on similar projects to determine whether or not there might be risks if she were to award the contract to each of them.

### Analytical techniques

6. Kate and her company's legal team sit down with the sellers and work out the terms of the contract. There's a lot of back and forth, but they settle on an agreement that everyone is comfortable with.

### Procurement negotiations

Project managers don't usually do the negotiation themselves. They'll get involved and provide expertise and knowledge, but usually rely on a lawyer or legal department to work out the actual terms of the contract.

## Two months later...

Kate's procurement project had been going really well...or so she thought. But it turns out there's a problem.



KATE, THE CEO CALLED ME AT 3 A.M. THERE'S A JANITOR'S STRIKE AT THE SELLER'S TECHNICAL SUPPORT OFFICE, AND THAT'S CAUSING ALL SORTS OF HAVOC. NOW OUR WAIT TIMES ARE EVEN LONGER THAN THEY WERE THREE MONTHS AGO. WHAT ARE YOU GOING TO DO ABOUT THIS?

Kate never even thought to ask about the janitors union when the legal team was negotiating the contract.



***Keep an eye out for questions that ask about unions, even when they don't have to do with contracts or Procurement Management.***

When you work with a union, even if it's through a seller, then the union contract (also called a **collective bargaining agreement**) can have an impact on your project. That means you need to consider the union itself a stakeholder, and when you do your planning you need to make sure any union rules and agreements are considered as constraints.



What could Kate have done to prevent this problem? Could she have detected it sooner? What should she do now?

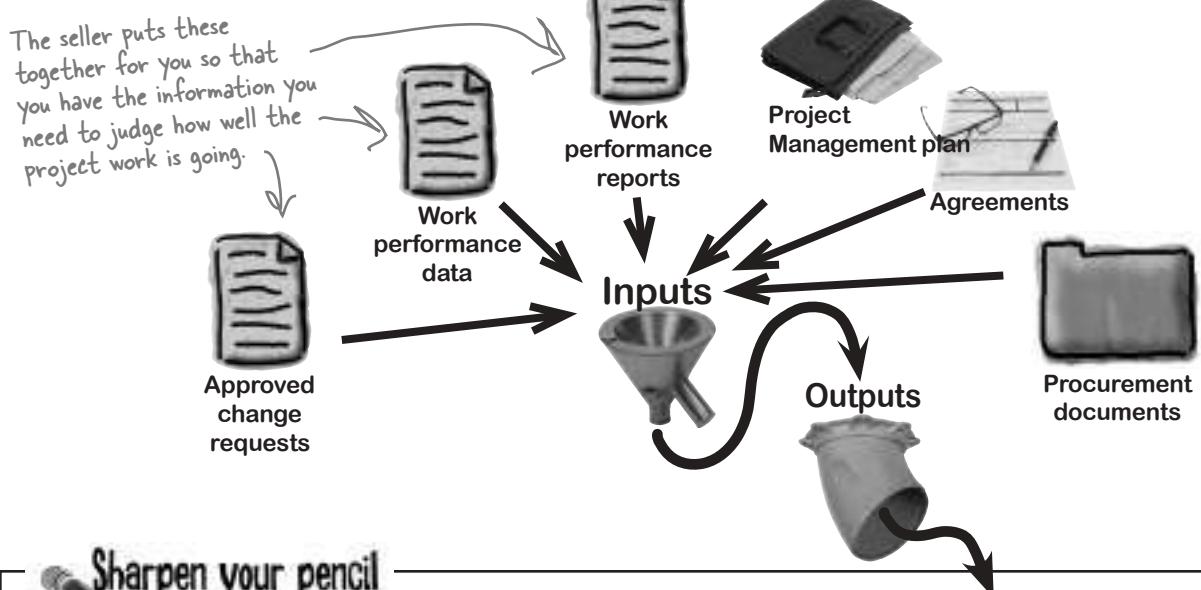


# Keep an eye on the contract

You wouldn't just start off a project and then assume everything would go perfectly, would you? Well, you can't do that with a contract either. That's why you use the **Control Procurements process**.

The idea behind the Control Procurements process is that staying on top of the work that the seller is doing is more difficult than working with your own project. That's because when you hire a seller to take over part of your project, the team who's doing the work doesn't report to you. That's why **the first three inputs are especially important**. The approved change requests are the way that you change the terms of the contract if something goes wrong, and the work performance data and work performance reports are how the seller tells you how the project is going.

The tools and techniques for the Control Procurements process are on the next page.



Control Procurements is a typical Monitoring and Controlling process, which means you should be able to figure out most of the outputs. The first one's filled in—can you fill in the others?

1. Work performance information

4.

2. Updates to

.....

5. Updates to

3. Updates to

.....

→ Answers on page 652.

# Stay on top of the seller

The **tools and techniques for Control Procurements** are all there to help you work with the seller. Some of them help you look for any potential problems with the seller and make changes to correct them. Others help you with the day-to-day administration work that you need to do in order to keep your project running.



## Tools and techniques to keep your project running

### Payment systems

Your partner won't be very happy if you don't pay. The payment system is how your company pays its sellers. It's usually established by an Accounting or Accounts Receivable department.

### Records management system

There are a lot of records produced by a typical contract: invoices, receipts, communications, memos, emails, instructions, clarifications, etc. You'll need to put a system in place to manage them.

There are seven tools and techniques for the Control Procurements process.

## Tools and techniques to find and fix problems

### Claims administration

When there's a dispute between a buyer and a seller, that's called a **claim**. Most contracts have some language that explains exactly how claims should be resolved—and since it's in the contract, it's legally binding, and both the buyer and seller need to follow it.

### Performance reporting

The easiest way for you to keep track of the contract work being done is to write up performance reports. These are exactly like the performance reports that you saw earlier in the book—you'll use them to monitor the project work and report on the progress to your company's management.



You can conduct a performance review to get the data you need for your performance report.

### Procurement performance reviews

Most contracts lay out certain standards for how well the seller should do the job. Is the seller doing all the work that was agreed to? Is the work being done on time? The buyer has the right to make sure this is happening, and the way to do this is to go over the performance of the seller's team.

### Inspections and audits

This tool is how the buyer makes sure that the product that the seller produces is up to snuff. This is where you'll check up on the actual product or service that the project is producing to make sure that it meets your needs and the terms of the contract.

### Contract change control system

This is just like all of the other change control systems that you've seen already. It's a set of procedures that are set up to handle changes in the contract. You might have a different one for every contract in your project.

**Buyer-conducted performance reviews let buyers check all of the work that the sellers are doing.**



Which of the tools and techniques from Control Procurements should Kate use for each situation?

1. An important client calls technical support, but ends up spending two hours waiting on hold. Kate doesn't find out until the seller calls her directly. She needs a better way to manage information about how the seller is performing.
- .....

2. The CEO's mother calls technical support, but spends two hours waiting for him to answer. Kate needs to make sure the seller is delivering the quality it promised.
- .....

3. Kate gets a call from the Accounting department about a duplicate invoice that was accidentally paid twice.
- .....

4. According to the statement of work, the seller is supposed to have weekly training sessions with technical support staff, but Kate isn't sure they're being conducted as often as they should be.
- .....

5. A manager at the seller says that it's not responsible for training sessions, but Kate thinks it is.
- .....



## Exercise Solution

Which of the tools and techniques from Control Procurements should Kate use for each situation?

1. An important client calls technical support, but ends up spending two hours waiting on hold. Kate doesn't find out until the seller calls her directly. She needs a better way to manage information about how the seller is performing.

### Records management system

A records management system can help Kate by giving her a place to store all the reports from the seller.

2. The CEO's mother calls technical support, but spends two hours waiting for them to answer. Kate needs to make sure the seller is delivering the quality it promised.

### Inspections and audits

You use inspections and audits when you want to review the quality of the product or service being produced.

3. Kate gets a call from the Accounting department about a duplicate invoice that was accidentally paid twice.

### Payment system

4. According to the statement of work, the seller is supposed to have weekly training sessions with technical support staff, but Kate isn't sure they're being conducted as often as they should be.

### Procurement performance review

If you need to check whether work is being done well, you can use a procurement performance review.

5. A manager at the seller says that it's not responsible for training sessions, but Kate thinks it is.

### Claims administration

there are no  
**Dumb Questions**

**Q:** Should I only care about unions when I'm working with contracts?

**A:** Unions come up in procurement and contracts whenever a seller has an existing contract with a union. That contract is called a **collective bargaining agreement**, and if that agreement impacts the work that the seller is going to do for you, then you need to make sure that your legal department considers it when they work out the terms of the contract.

But unions are also important when you're doing Human Resource Management. If your company has a collective bargaining agreement with a union, then you need to consider the terms of that contract as **external constraints** to your project plan. Here's an example: let's say you're managing a construction project, and your workers are all union members. Then you need to make sure that you consider any overtime rules and other restrictions on resource availability when you put together your team, your budget, and your plan.

**Whenever you see "inspection" or "audit," it means that you're looking at the products that the seller delivered to see if they meet your standards.**

**Q:** Once a contract is signed, does that mean it's never allowed to change?

**A:** No. This confuses some people, because when you sign a contract, it's legally binding—which means you must abide by the terms of the contract. But that doesn't mean those terms can't change. If both the buyer and the seller agree to make a change to the contract, then they have every right to do so. That's why you have a contract change control system—so you can make sure these changes are made properly.

But you can't always assume that you have the ability to change a contract that you're not happy with. Once your company has agreed to a contract, then you're absolutely required to meet its terms and complete your side of it. If you want to make a change to it, you need to negotiate that change, and it's possible that the seller won't agree to it—just like you have every right to refuse an unreasonable change that the seller requests.

**Q:** Does the type of contract make a difference in how changes are handled?

**A:** No, it doesn't. While the type of contract definitely affects a lot of things, changes are always handled the same way. You always use the contract change control system to handle the changes.

That's why the contract change control system is so important. It tells you the exact rules that you need to go through in order to make a change to a contract. No contract is perfect, and most of the time there are little tweaks that both the buyer and seller want to make. This gives them the tools they need to make only the changes that they need, without either team agreeing to a change that they don't want included in the contract.

**Q:** I still don't get the difference between a performance review and an audit.

**A:** The difference is that performance reviews are about the **work**, while inspections and audits are about the **deliverables and products**.

You'll use a performance review when you want to make sure that the team at the seller is doing every activity that they should. For example, if you have a contract that requires the seller to perform certain quality control or project management tasks, you might conduct a performance review where you observe the team and verify that they do those tasks. On the other hand, if you want to make sure that the products that the team is producing meet your requirements and standards, you'll send out an auditor to inspect the products that the seller is making to verify that they meet the requirements.

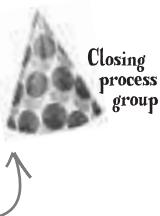
**Q:** So do project managers usually get involved in contract negotiations?

**A:** Project managers don't usually do the negotiating themselves, but they do often get involved in contract negotiations. Remember, nobody knows more about the project than the project manager—you know what work needs to be done, what requirements the product must meet, and what kind of budget you need to stay within. So even though a lawyer or legal department will do the actual negotiation, they won't know if the seller is capable of doing the job without the project manager's help.

# Close the contract when the work is done

When the seller's work is done, it's time to close the contract, and that's when you use the **Close Procurements** process. Even if your contract ends disastrously (or in court), you still need to close out the contract so that you can make sure all of your company's responsibilities are taken care of—and that you learn from the experience.

There's only one other process in the Closing group. Take a minute and flip back to Chapter 4 to refresh your memory.



## Inputs



Project Management plan



Procurement documents

## Tools

### Procurement audits

Once you've closed out the contract, you go over everything that happened on the project to figure out the lessons learned and look for anything that went right or wrong.

### Records management system

When you were working with the legal team to put the contract together, you looked at information about past contracts. So where did it come from? Past project managers stored their contracts and other documents in the records management system.

## Outputs



Closed procurements

The way you close out a contract is by giving notice—a formal written one—that the contract is complete... and instructions for doing that should be part of the contract terms.

### Procurement negotiations

You need to make sure that all of the terms of the contract have been met and there are no outstanding claims on it. If the buyer or the seller have outstanding claims from the relationship, they need to get resolved, sometimes through legal arbitration or, in the worst-case scenario, in court.



Organizational process asset updates

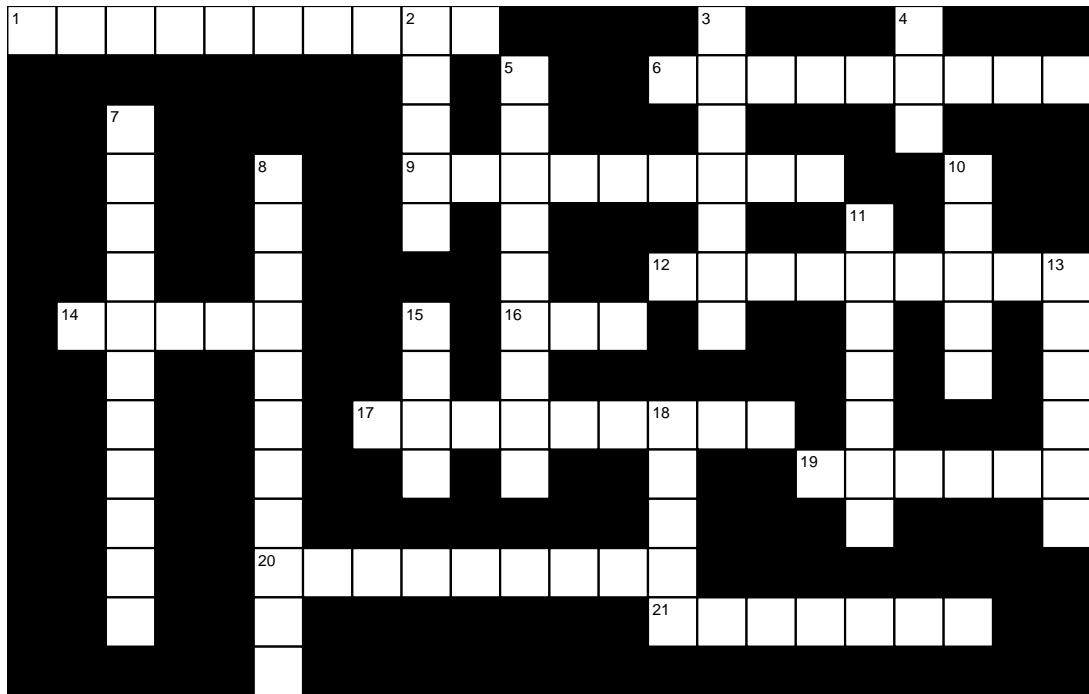
Any lessons you learned from the procurement audits should be added here, along with any documentation and a copy of the formal acceptance that you gave to the seller.





# Contractcross

Give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



## Across

1. The kind of contract where the buyer pays a lump sum.
6. In a T&M contract, the buyer pays for \_\_\_\_\_, which includes equipment, office space, administrative overhead costs, and anything else (other than labor) that has to be paid for.
9. The procurement \_\_\_\_\_ of work defines the portion of the project's scope that the seller will work on for the contract.
12. The potential sellers submit seller \_\_\_\_\_ to a buyer to explain how the contract will be fulfilled.
14. An invitation for \_\_\_\_\_ is a document that asks sellers for the price of the work.
16. The \_\_\_\_\_ contract has high risk to the seller because the seller must cover costs that go beyond the price.
17. This kind of analysis is determine whether to procure a service or stay within the company.
19. The buyer selects the \_\_\_\_\_ selection criteria before contacting potential sellers.
20. This kind of fee is used in cost-plus contracts to encourage the seller to increase performance.
21. The \_\_\_\_\_ management system stores all of the documents, communications, and information relating to the contract.

## Down

2. Even if the buyer fails to deliver on a contract and it has to be terminated early, you still need to perform the \_\_\_\_\_ Procurements process.
3. A force \_\_\_\_\_ clause protects both the buyer and seller from things like war and natural disasters preventing the completion of the contract.
4. An invitation for \_\_\_\_\_ is a document that tells sellers you want them to submit proposals.
5. Some organizations maintain a \_\_\_\_\_ seller list of sellers pre-screened based on past experience with them.
7. \_\_\_\_\_ documents contain all of the information the seller wants to communicate to potential buyers.
8. A buyer is sometimes required to use \_\_\_\_\_ in order to announce a project to all potential sellers.
10. A disagreement between the buyer and seller is called a \_\_\_\_\_.
11. The contract-related process in the Monitoring and Controlling group is called \_\_\_\_\_ Procurements.
13. The company or organization that's performing services for the contract.
15. In this kind of contract, the seller is paid the costs as well as a fee that's determined based on the buyer's evaluation of performance.
18. The company or organization that's procuring services.

→ Answers on page 652.

## Kate closes the contract

The 18-month contract's ready to close! The seller did a great job handling technical support, and that gave Kate and Ben the time they needed to ramp up their own company's team and facilities.



## Question Clinic: BYO questions



SEE IF YOU CAN COME UP  
WITH QUESTIONS ON YOUR  
OWN! GIVE IT A SHOT:

Write a which-is-BEST question about Qualitative Risk Analysis.

See page 188.

See page 350.

Write a red herring question about Conduct Procurements.

Write a calculation question about CPI.

See page 528.

See page 324.

Write a which-is-NEXT question about the Scope Management processes.

HERE'S A GREAT STUDY TOOL. ANY TIME YOU GET A PRACTICE QUESTION WRONG, OR DON'T UNDERSTAND A PARTICULAR CONCEPT, WRITE A QUESTION ABOUT IT! THAT'S A GREAT WAY TO HELP YOU REMEMBER STUFF FOR THE EXAM.



Did you come up with a good question? Join the Head First PMP community and upload your question at <http://www.headfirstlabs.com/PMP>



Kate has **18 months** to build up the capacity her company needs to handle all the technical support calls. See if you can figure out whether it's a better deal for Kate to make or buy.

1. If they handle the extra work within the company instead of finding a seller, it will cost an extra \$35,000 in overtime and \$11,000 in training costs in total, on top of the \$4,400 per person per month for the five-person team needed to do the extra support work. What's the total cost of keeping the work within the company?

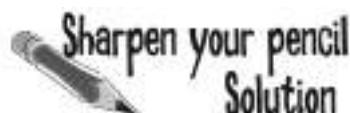
The total cost for keeping the work is the monthly cost ( $\$4,400$  per person  $\times$  5 people  $\times$  18 months  $= \$396,000$ ) plus the extra costs ( $\$35,000$  overtime and  $\$11,000$  training costs).  $\$396,000 + \$35,000 + \$11,000 = \$442,000$  total costs for keeping the work inside the company ("making").

2. Kate and Ben talked to a few companies and estimate that it will cost \$20,000 per month to hire another company to do the work, but they'll also need to spend \$44,000 in setup costs. What will contracting the work cost?

The cost for hiring another company to do the work is  $\$20,000$  per month  $\times$  18 months plus the  $\$44,000$  in setup costs.  $(\$20,000 \times 18) + \$44,000 = \$404,000$  total costs for contracting out the work ("buying").

3. So does it make more sense to make or buy? Why?

In this case, it makes more sense to buy because the costs of making ( $\$442,000$ ) are greater than the costs of buying ( $\$404,000$ ).



Kate is putting out an RFP to find a seller to provide technical support for her company. Can you figure out which Conduct Procurements tool she's using?

1. Kate checks works with her company's seller evaluation committee, which follows a documented, formal evaluation review process to determine which seller should be selected for the contract.

### Proposal evaluation techniques

2. Kate contacts an IT trade journal and places a classified ad to try to find sellers.

### Advertising

3. The CEO's brother-in-law runs a company that's bidding on the contract. Kate needs to make sure he gets fair—not preferential—treatment. She doesn't want to give him an unfair advantage, but she also doesn't want to exclude him from the bidding process. So she gathers representatives from all sellers into a room where they can ask questions about the contract out in the open and hear the responses to each question.

### Bidder conference

4. Kate's company takes part in an equal-opportunity program in which seller companies owned by minorities must be given notice of any RFPs. She uses a website approved by the program to find seller companies with performance data from similar projects.

### Analytical techniques



## Contract Magnets Solution

Which of the magnets are part of the procurement documents, and which of them are part of the source selection criteria?



Procurement documents

Procurement statement of work

Request for proposals

Sample contract for review

Notification to sellers requesting a quotation for fixed-price work



Source selection criteria

Review the SOW with the seller to make sure it's understood

Meet with the project manager and review project processes

Go over final pricing plan and contract terms

Get a financial statement or credit report and verify that the seller is insured



Control Procurements is a typical Monitoring and Controlling process, which means you should be able to figure out most of the outputs. The first one's filled in—can you fill in the others?

1. Work performance information

2. Updates to

**Organizational process assets**

3. Updates to

**Project documents**

4. Change requests

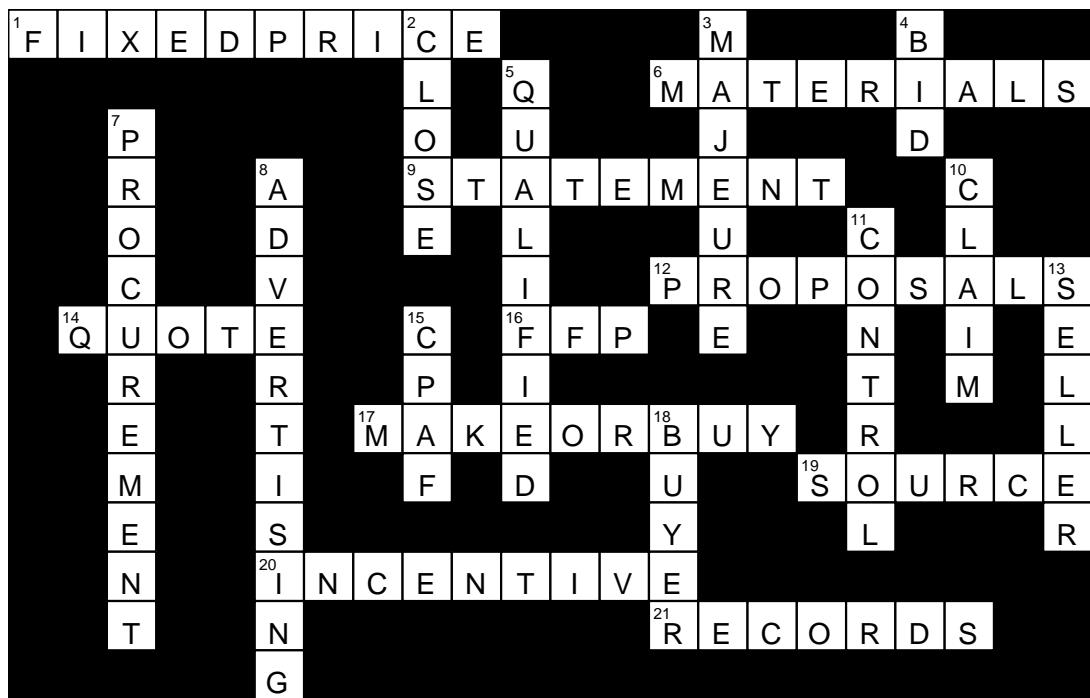
5. Updates to

**Project Management Plan**



## Contractcross Solutions

Give your right brain something to do. It's your standard crossword; all of the solution words are from this chapter.



## Exam Questions

1. Tom is a project manager for a software company. He is contracting a long-term software project with an external company. That company charges him \$20/hour per employee and \$300 overhead per month. What kind of contract is he using?

- A. FP
- B. CPAF
- C. CR
- D. T&M

2. Which of the following is NOT true about bidder conferences?

- A. All potential sellers should meet separately with the buyer.
- B. Potential sellers should ask questions in an open forum so other sellers can hear the answers.
- C. Bidder conferences are a good way to make sure sellers are treated fairly.
- D. All sellers are given the same procurement documents.

3. You work for a seller that is bidding on a contract. Which type of contract has the MOST risk for your company?

- A. CPIF
- B. T&M
- C. FP
- D. CPAF

4. Which of the following BEST describes the “point of total assumption” for a contract?

- A. The point in a cost-plus contract where the buyer assumes that the seller will need to be paid
- B. The total cost of a T&M contract
- C. The point in a fixed-price contract where the seller has to assume all costs going forward
- D. The total number of resources required for a contract

5. You’re trying to decide whether or not to contract out a construction job. To do it within your company, you will have to hire an engineer for \$35,000 and pay a construction team \$15,000 per week. A contractor quotes you a price of \$19,000 per week, and your expert agrees that you won’t find a lower price than that. The job will take 16 weeks. What’s the BEST way to proceed?

- A. Pay the contractor to do the job.
- B. Select a T&M contract.
- C. Don’t contract out the work; hire the engineer and pay the construction team to do the work.
- D. Make sure the contract has a force majeure clause.

## Exam Questions

6. You're managing a project that might have to contract out work, and you're comparing the relative advantages and disadvantages of finding a seller versus having your company do the work itself. Which process are you in?

- A. Plan Procurement Management
- B. Plan Contracting
- C. Conduct Procurements
- D. Request Seller Responses

7. You're using a qualified seller list. Which process are you in?

- A. Plan Procurement Management
- B. Plan Contracting
- C. Conduct Procurements
- D. Request Seller Responses

8. You've been contracted by an industrial design firm to manage its contracting. Your client asks you to take over the negotiations for an important contract to design a new remote-control lighting system. You've narrowed it down to one seller, and now you're working with the legal department at the buyer to negotiate the terms of the contract. Which of the following BEST describes your goal?

- A. You want to get the best deal for your client by making sure the seller's price is as low as possible, no matter what it costs them.
- B. You want to get a fair deal for both the buyer and the seller.
- C. You want to make sure that the seller gets as much money as possible.
- D. You want to prolong the negotiation so that you earn a higher fee.

9. You've been contracted by a construction company to manage its contracting. It has a choice of either buying an excavator or renting it. To buy it, the company would have to pay \$105,000, but owning it will require approximately \$10,000 in maintenance costs per year. The price to rent the excavator is \$5,000 per month, with a one-time service charge of \$2,000. What's the minimum number of months the company needs to use the excavator in order for it to make sense to buy it rather than rent?

- A. 8 months
- B. 16 months
- C. 21 months
- D. 25 months

10. Which of the following contracts has the MOST risk for the buyer?

- A. FP
- B. CPAF
- C. CPIF
- D. T&M

## Exam Questions

11. You're managing a project that is difficult to estimate, so you don't have a good idea of when the project will end. Which of the following contracts is BEST?

- A. FP
- B. CPAF
- C. CPIF
- D. T&M

12. You're looking for a seller to do work for your project. When do you send out an RFP?

- A. After you create the procurement documents, but before you select the seller
- B. Before you plan contracting, but after you Plan Procurement Management
- C. After the bidder conference, but before you select the seller
- D. During Control Procurements

13. You're creating source selection criteria for your contract. What process are you in?

- A. Conduct Procurements
- B. Control Procurements
- C. Close Procurements
- D. Plan Procurement Management

14. You're managing a project when you and the seller both agree that you need to have the seller add more resources to the project in order to finish on time. The number of resources is written into the contract. What's the BEST way to proceed?

- A. Your project will be late because you can't change the contract once it's signed.
- B. You need to convince the buyer to sign a new contract.
- C. You need to use the contract change control system to make the change to the contract.
- D. You need to use claims administration to resolve the issue.

15. Which of the following BEST explains the difference between a seller audit during Control Procurements and a procurement audit during Close Procurements?

- A. The seller audit reviews the products being created, while the procurement audit reviews how well the seller is doing the job.
- B. The procurement audit reviews the products being created, while the seller audit reviews how well the seller is doing the job.
- C. The seller audit reviews the products being created, while the procurement audit is used to examine successes and failures and gather lessons learned.
- D. The procurement audit reviews the products being created, while the seller audit is used to examine successes and failures and gather lessons learned.

## Answers

~~Exam Questions~~

## 1. Answer: D

This contract is a time and materials contract. It's charging a rate for labor and overhead for materials.



*Eliminating the wrong answers works really well with questions like this.*

## 2. Answer: A

One of the most important things about a bidder conference is that no one seller is given better access to the buyer. They should all have the same opportunity to gather information, so that no single seller is given preferential treatment.



*Sellers should meet in the same room, and any time one of them asks the question, everyone else should hear the answer.*

## 3. Answer: C

A fixed-price contract is the riskiest sort of contract for the seller. That's because there's one price for the whole contract, no matter what happens. So if it turns out that there's a lot more work than expected, or the price of parts or materials goes up, then the seller has to eat the costs.

## 4. Answer: C

This is just the definition of the point of total assumption.

## 5. Answer: C

This is a simple make-or-buy decision, so you can work out the math. The contractor's quote of \$19,000 per week for a 16-week job means that buying will cost you  $\$19,000 \times 16 = \$304,000$ . On the other hand, if you decide to keep the work in-house, then it will cost you \$35,000 for the engineer, plus \$15,000 per week for 16 weeks:  $\$35,000 + (16 \times \$15,000) = \$275,000$ . It will be cheaper to make it rather than buy it!



*Answers*~~Exam Questions~~**6. Answer: A**

This question describes make-or-buy analysis, which is part of the Plan Procurement Management process.

**7. Answer: C**

One of the most important things that you do when you're finding sellers during the Conduct Procurements process is to select the sellers that will do the work. And the qualified seller list is an input that you use for that.

Your company should already have  
a qualified seller list on file.

**8. Answer: B**

One of the most important parts of Procurement Management is that both the buyer and the seller want to feel like they're getting a good deal. Every procurement should be a win-win situation for both parties!

**9. Answer: D**

This may look like a tough problem, but it's actually pretty easy. Just figure out how much the rental would cost you for each of the answers:

- A. 8 months       $8 \text{ months} \times \$5,000 \text{ per month} + \$2,000 \text{ service charge} = \$42,000$
- B. 16 months      $16 \text{ months} \times \$5,000 \text{ per month} + \$2,000 \text{ service charge} = \$82,000$
- C. 21 months      $21 \text{ months} \times \$5,000 \text{ per month} + \$2,000 \text{ service charge} = \$107,000$
- D. 25 months      $25 \text{ months} \times \$5,000 \text{ per month} + \$2,000 \text{ service charge} = \$127,000$

Now look at what the excavator would cost for 25 months. It would cost \$105,000 plus \$20,000 for the maintenance costs, for a total of \$125,000. So at 25 months, the excavator is worth buying—but before that, it makes more sense to rent.

**10. Answer: D**

The time and materials (T&M) contract is the riskiest one for the buyer, because if the project costs are much higher than the original estimates, the buyer has to swallow them, while the seller keeps getting paid for the time worked.

If this seems a little out of place, remember that renting equipment is a kind of contract, and the same kind of make-or-buy decision is necessary.

# Answers

## ~~Exam Questions~~

### 11. Answer: D

Both cost-plus and fixed-price contracts are based on the idea that you know how long the contract is going to last. A seller would only agree to a fixed-price contract if there's a good idea of how much it's going to cost. And a cost-plus contract will hurt the buyer if it goes over. Only the time and materials contract will give both the buyer and seller a fair deal if neither has a good idea of how long the work will take.



That's the only time you really should  
use a T&M contract.

### 12. Answer: A

Contracting is a pretty linear process—first you plan the contract, then you put together a package of procurement documents to send to potential sellers, and then you select a seller and start the work. So you send out a request for proposals after you've put together the procurement document package so that you can select a seller for the job.

### 13. Answer: D

You put together the source selection criteria as part of the Plan Procurement Management process. That way, you can use the criteria when you're looking at the responses you get from sellers.

### 14. Answer: C

You can always change a contract, as long as both the buyer and the seller agree to it. When you do that, you need to use the contract change control system—just like with any other change.



This is not what claims administration is for. Since the buyer  
and seller agree, there is no claim.

### 15. Answer: C

It's easy to get mixed up with all of these audits, but if you think about how they're used, it gets less confusing. When you're performing Control Procurements, the most important part of your job is to figure out if the products that the seller is producing meet your requirements. By the time closure happens, the products have all been completed—if there was a problem, you should have caught it during Control Procurements. All you can do now is come up with any lessons learned so that you can avoid mistakes in the future.

## 13 Stakeholder management

# *Keeping everyone engaged*

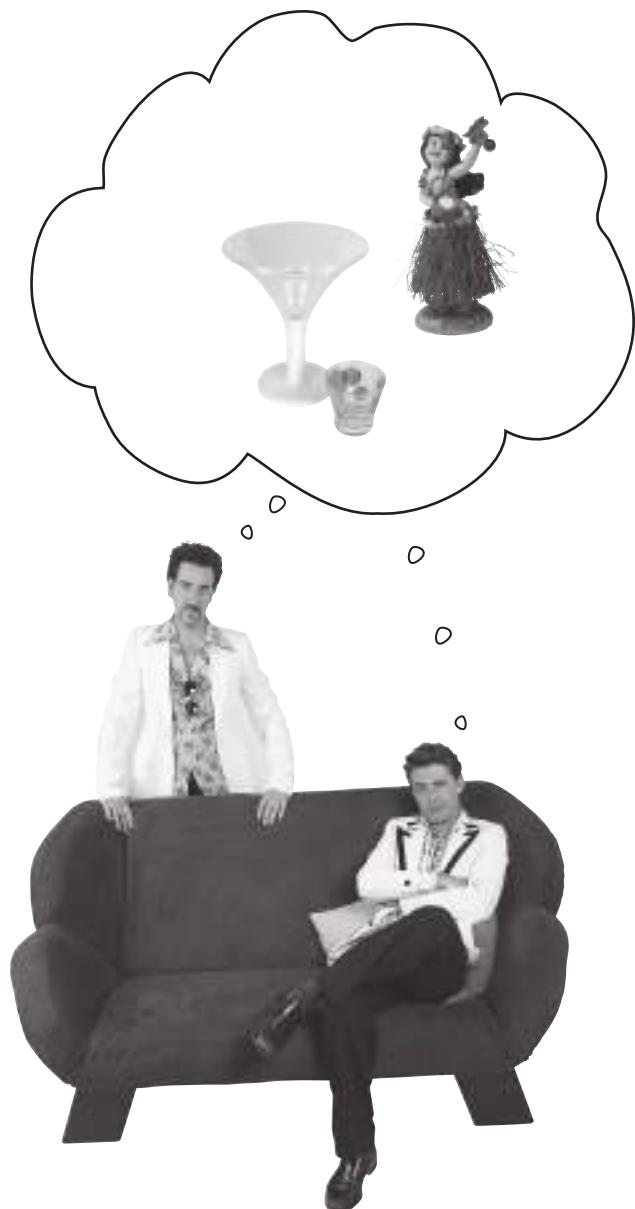
BUT IT WASN'T UNTIL I MAPPED OUT ALL OF THE PARTY GUESTS IN A POWER AND INTEREST GRID THAT I REALLY KNEW HOW TO KEEP THEM SATISFIED.



**Project management is about knowing your audience.** If you don't get a handle on the people who are affected by your project, you might discover that they have needs you aren't meeting. If your project is going to be successful, you've got to satisfy your stakeholders. Luckily, there's the **Stakeholder Management** knowledge area, which you can use to understand your stakeholders and figure out what they need. Once you really understand how important those needs are to your project, it's a lot easier to **keep everyone satisfied**.

## Party at the Head First Lounge (again)!

Jeff and Charles had a great time upgrading the lounge in Chapter 10. They've been doing so well since they upgraded that they want to have another party to ring in the summer.



# Not everybody is thrilled

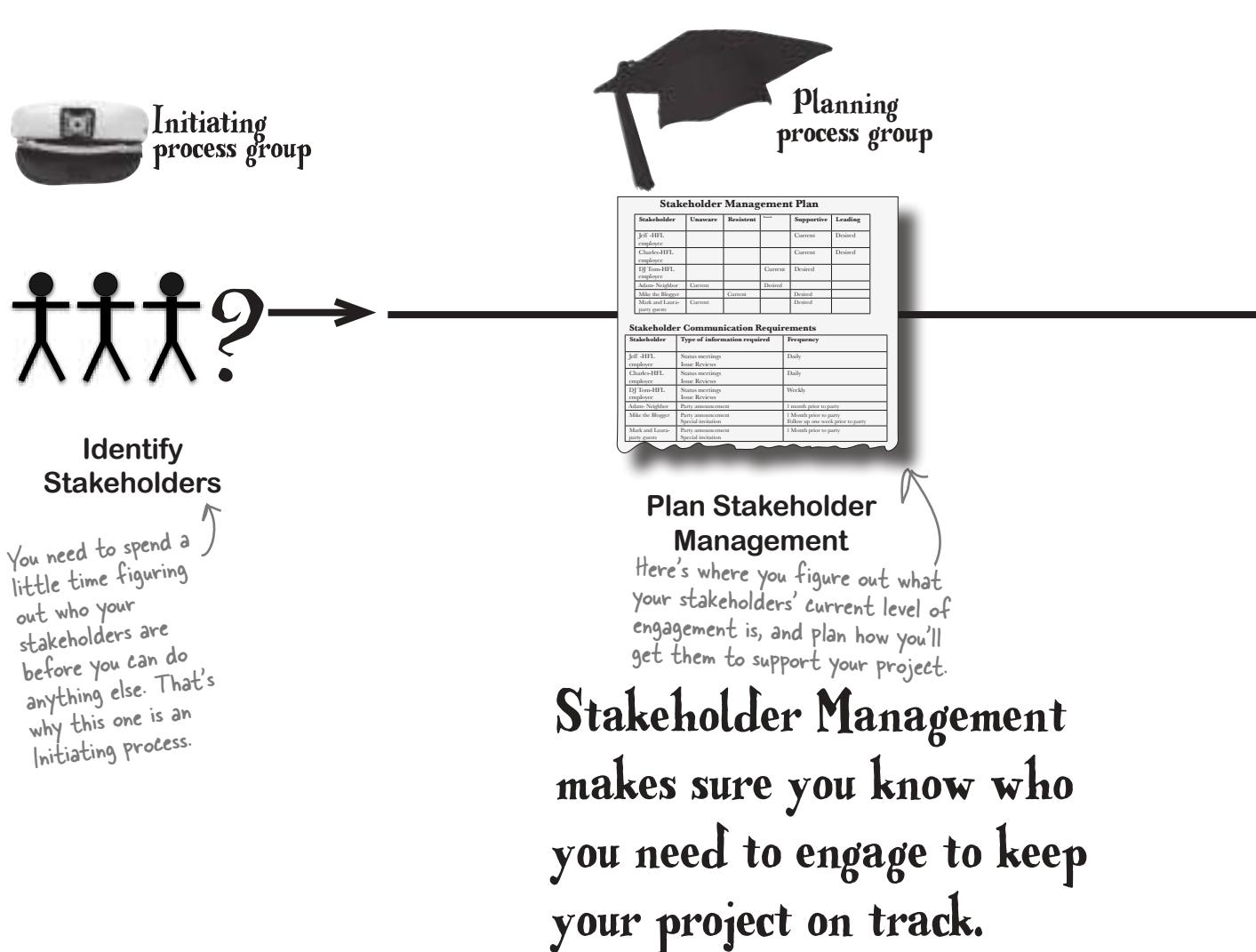
There were a few people who weren't quite as enthused about the opening party for Head First Lounge as Jeff and Charles were. Can you use the four **Stakeholder Management** processes to help them get their party on track?



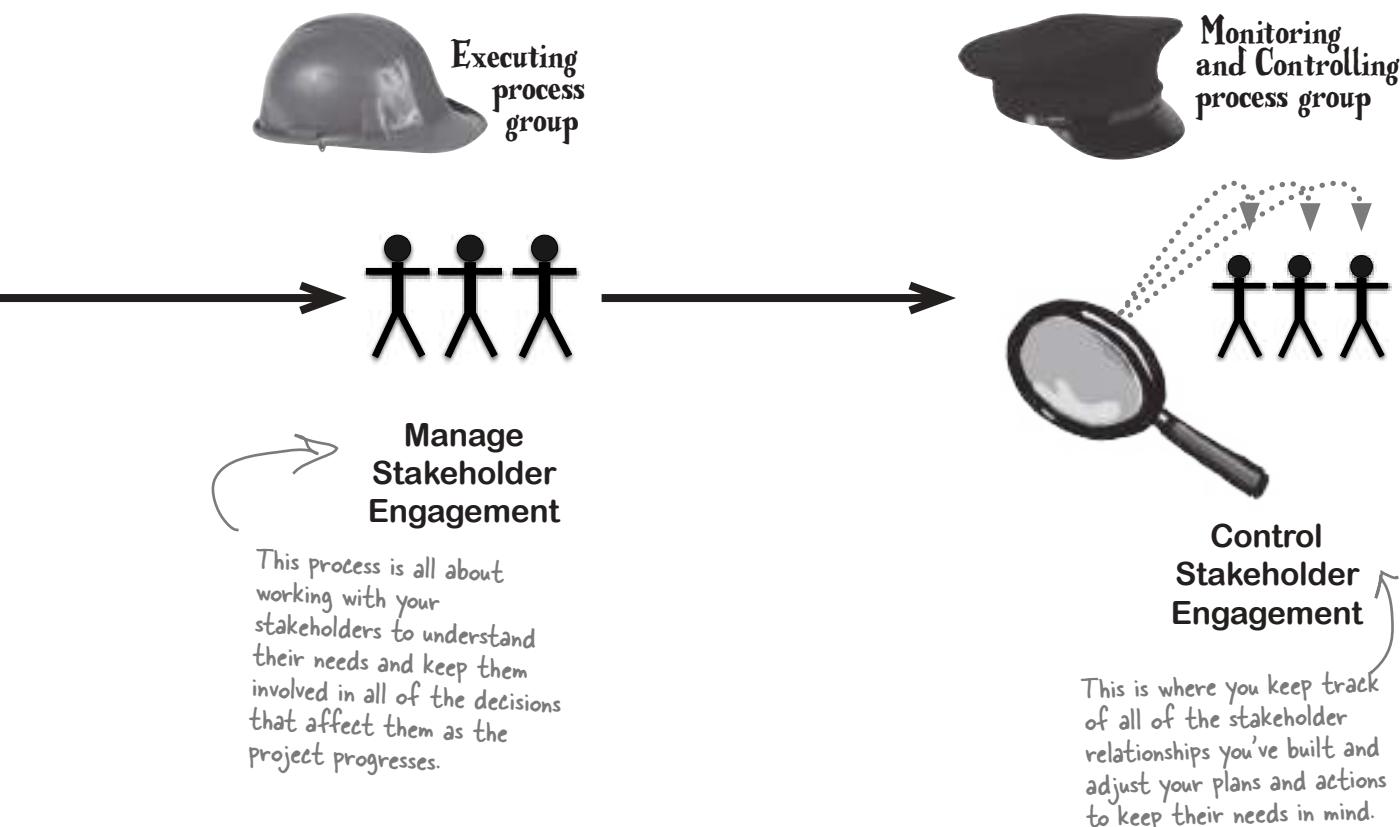
What can Jeff and Charles do to get a handle on their stakeholder problems?

## Understanding your stakeholders

When you think about it, there are a lot of people who have an interest in your project. That obviously includes the sponsor who's paying for it, the team who's making it, and the people who will support it. But there are people who aren't so obvious who have a stake in your project as well. If you don't pay attention to all of your stakeholders, you could find that you don't meet their needs, and that can cause your project to run off the rails. The **Stakeholder Management** processes are here to help you figure out who your stakeholders are, plan how you'll keep them engaged, and manage your project to keep them satisfied.



Stakeholder requirements and expectations sometimes change over the course of the project. Control Stakeholder Engagement makes sure you stay on top of those changes and adjust your plans accordingly.

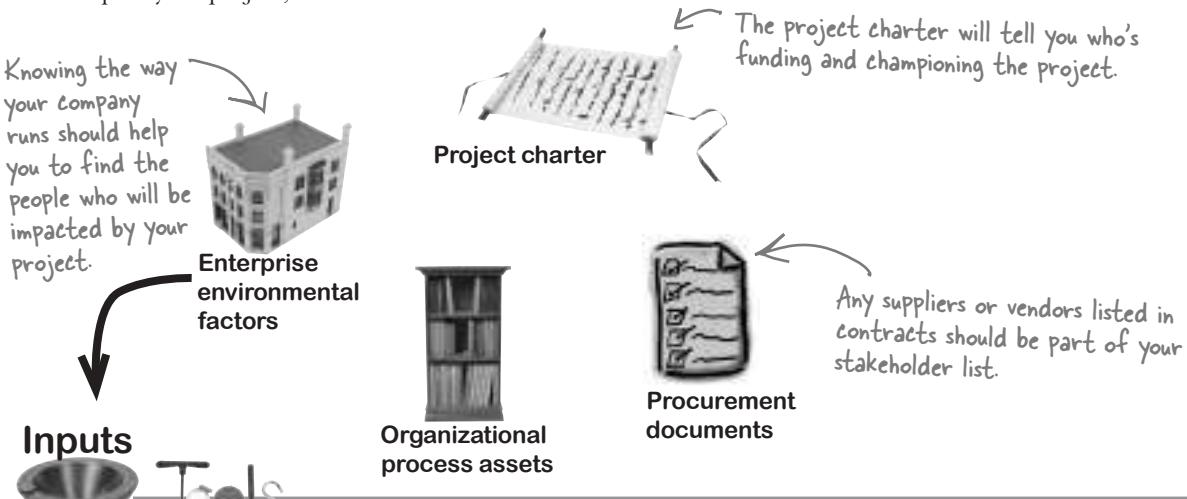


# Find out who your stakeholders are



Initiating process group

One of the first things you need to do when you start a project is to figure out who your stakeholders are and what you need to do to keep them all in the loop. The **Identify Stakeholders** process is all about writing down your stakeholders' names along with their goals, expectations, and concerns in a document called the **stakeholder register**. Most projects succeed or fail based on how well the project manager knows and manages stakeholder expectations. Writing them down up front will help you to come up with a strategy to identify the people who could impact your project, but still need to be convinced of its value.



**Stakeholder analysis** is a critical tool in this process. You need to interview all of the stakeholders you can find for your project, and find out the value the project has for them. As you sit with stakeholders, you'll identify more people to interview. During stakeholder analysis, you can divide your stakeholders into groups based on their level of involvement and need for communication. When you understand what motivates all of your stakeholders, you can come up with a strategy to make sure that they're told about the things that they find important, and that they're not bored with extraneous details.

**Expert judgment** in this process means talking to all of the experts on your project to identify more stakeholders, and learn more about the ones you've identified.

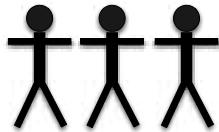


Meetings

**Meetings** are a great tool for getting everyone together to think through the stakeholders who might be impacted by your project.



What effect would a resistant stakeholder have on your project? What about a neutral one?



### **Stake-hold-er**, noun

A person who has an interest or concern about something.

*Tom was a **stakeholder** in the Little League game since his son was playing in it.*

The PMBOK Guide defines a stakeholder a little more specifically than its everyday term: "Individuals, groups, or organizations who may affect, be affected by, or perceive themselves to be affected by a decision, activity, or outcome of a project." [PMBOK Guide, 5th edition, page 394]

### Outputs



The classification tells you whether the stakeholder is internal or external, but also whether he's a supporter, resistor, or neutral participant in the project.

The register should tell you what individual stakeholder get out of the project so that you can help them to see the value in the project.

### **Stakeholder Register**

**Name:** Mike the Blogger

**Role:** Press

**Responsibilities:**

- Attend the party
- Write a blog post about it

**Requirements:**

- Compare this party with the other lounge parties in town
- Get free drinks

**Expectations:**

- Head First Lounge will have a first-rate sound system

**Classification:**

- External/Neutral

\*\*Flip the page to learn more about the stakeholder register.



## Stakeholder analysis up close

When you get started on your project, the first thing you should do is examine the charter and any contract information you have to figure out who will be impacted by it. Once you have a preliminary list of stakeholders, you should sit down with each one of them and figure out their responsibilities, goals, expectations, and concerns. These interviews will be the basis for the stakeholder profiles in your stakeholder register. As you interview people, you'll likely find more stakeholders to include in the list.

**Name:** Adam

**Group:** Neighbors

**Responsibilities:**

- None

**Requirements**

- Peacefully coexist with Head First Lounge
- Read a book on the stoop
- Drink some coffee

**Expectations:**

- Head First Lounge will not be so loud as to disrupt normal activities.

**Classification:**

**Name:** DJ Tom

**Group:** Head First Lounge Employees

**Responsibilities:**

- Play the music for the lounge party
- Keep up with the crowd's mood and make sure everybody has fun
- Play new and interesting music that the group will like

**Requirements:**

- Build a reputation as a good DJ
- Get hired back for another gig later

**Expectations:**

- Head First Lounge will have a first-rate sound system
- Head First Lounge will advertise the event and have a full house

**Name:** Mike the Blogger

**Group:** Press

**Responsibilities:**

- Attend the party
- Write a blog post about it

**Requirements:**

- Compare this party with the other lounge parties in town
- Get free drinks

**Expectations:**

- Head First Lounge will have a first-rate sound system
- Head First Lounge will be different from the rest of the downtown nightlife spots

**Classification:**

- External/Resistant

It's useful to group stakeholders together, because stakeholders in a particular group tend to have similar needs and project interests.

At first, it may sound like "requirements" and "expectations" are the same thing, but it's useful to make a distinction. Requirements are what someone needs to get out of your project, while expectations are what they think will actually happen.

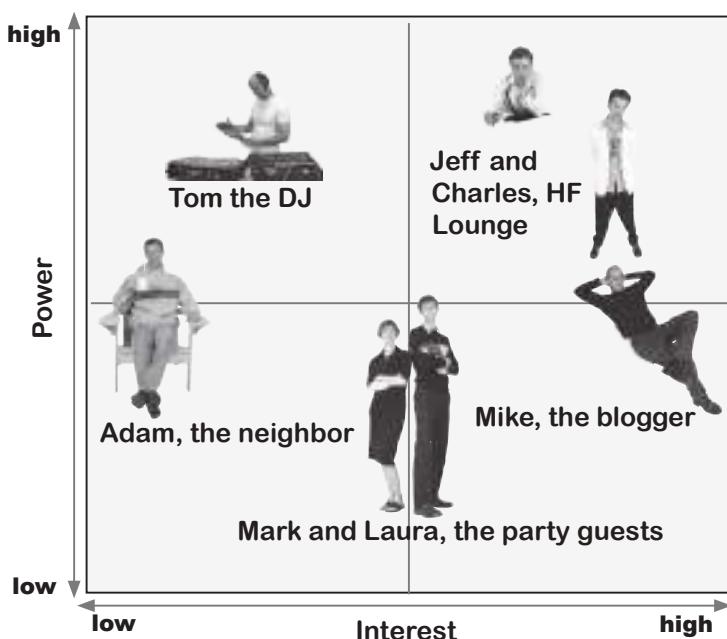
It's easy to imagine a stakeholder with high hopes but little actual expectation of seeing them realized.

Once you've got a handle on your stakeholders' concerns, you can start making headway addressing them. That's how you turn a negative stakeholder into an advocate!

One way to get a handle on how to communicate with your stakeholders is to create a **power/interest grid**. When you plot your stakeholders on a power/interest grid, you can determine who has high or low power to affect your project, and who has high or low interest. People with high power need to be kept satisfied, while people with high interest need to be kept informed. When a stakeholder has both, make sure you manage her expectations very closely!

People with **high power and low interest** need to be kept in the loop. You need these people to be **kept satisfied** with the project, even if they aren't interested in it.

The people who are **high power and high interest** are the decision makers who have the biggest impact on project success, so **closely manage** their expectations.



You shouldn't have to worry too much about the people with **low interest and low power**; they require the least amount of attention here.

Folks with **high interest and low power** should be kept in the loop as the project progresses. If they're **kept informed**, your project will get good buzz.

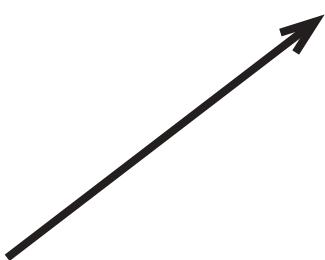


This is the Plan Stakeholder Management process. You've seen a lot of planning processes now. Can you fill in the inputs and outputs for this one?

### Inputs



This one is your company's culture and policies toward project communication.



### Tools

**Analytical techniques** means figuring out how engaged your stakeholders are today, and how engaged you want them to be as your project gets under way. The levels of engagement are:

**Unaware:** The stakeholder doesn't know that the project is happening.

**Resistant:** The stakeholder doesn't want the project or decision you're making to happen.

**Neutral:** The stakeholder is fine with the project or decision no matter how it turns out.

**Supportive:** The stakeholder wants your project or decision to succeed.

**Leading:** The stakeholder is actively helping the project to succeed.

When you're mapping out your Stakeholder Management plan, it helps to determine where all of your stakeholders are in relation to these classifications, and where you ultimately want them to be.

Here's where your company keeps all of its templates and lessons learned.

You need to know who you're going to communicate with.

Here's where you use all of the planning you've done for all of the knowledge areas in your project so far.



**Expert judgment** in this process means talking to all of the experts on your project to identify more stakeholders, and learn more about the ones you've identified.



**Meetings** are a great tool for getting everyone together to think through the stakeholders who might be impacted by your project.

Before you turn the page, take a minute and think of three examples of how you used each of these methods on your last project. That'll help you remember them for the exam!

There are only two outputs. Can you guess what this one is?

Outputs

Are you surprised at how much of this process you can fill in? Looks like you're getting the hang of this stuff!



Document updates

There are several project documents that get updated when you're planning Stakeholder Management. Can you think of one of them?



## Exercise Solution

This is the Plan Stakeholder Management process. You've seen a lot of planning processes now. Can you fill in the Inputs and Outputs for this one?

### Inputs

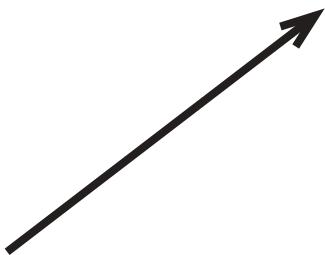


**Enterprise environmental factors**

**Organizational process assets**

**Stakeholder register**

**Project Management plan**



**Analytical Techniques** means figuring out how engaged your stakeholders are today, and how engaged you want them to be as your project gets underway. The levels of engagement are:

**Unaware:** The stakeholder doesn't know that the project is happening.

**Resistant:** The stakeholder doesn't want the project or decision you're making to happen.

**Neutral:** The stakeholder is fine with the project or decision no matter how it turns out.

**Supportive:** The stakeholder wants your project or decision to succeed.

**Leading:** The stakeholder is actively helping the project to succeed.

When you're mapping out your Stakeholder Management plan, it helps to determine where all of your stakeholders are in relation to these classifications, and where you ultimately want them to be.



**Meetings**

**Meetings** are a great tool for getting everyone together to think through the stakeholders who might be impacted by your project.

You'll usually need to update the project schedule and the stakeholder register when you plan Stakeholder Management for your project.



Expert judgment

**Expert judgment** in this process means talking to all of the experts on your project to identify more stakeholders, and learn more about the ones you've identified.

### Outputs



Document updates



Planning process group

This is the only output of the Plan Stakeholder Management process.

Think about everyone who's involved in the project, and try to come up with a plan for how to engage them.

The plan says how you will distribute the information, to whom, and how often.

### Stakeholder Management Plan

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Jeff—HFL employee				Current	Desired
Charles—HFL employee				Current	Desired
DJ Tom—HFL employee			Current	Desired	
Adam—Neighbor	Current		Desired		
Mike—Blogger		Current		Desired	
Mark and Laura—party guests	Current			Desired	

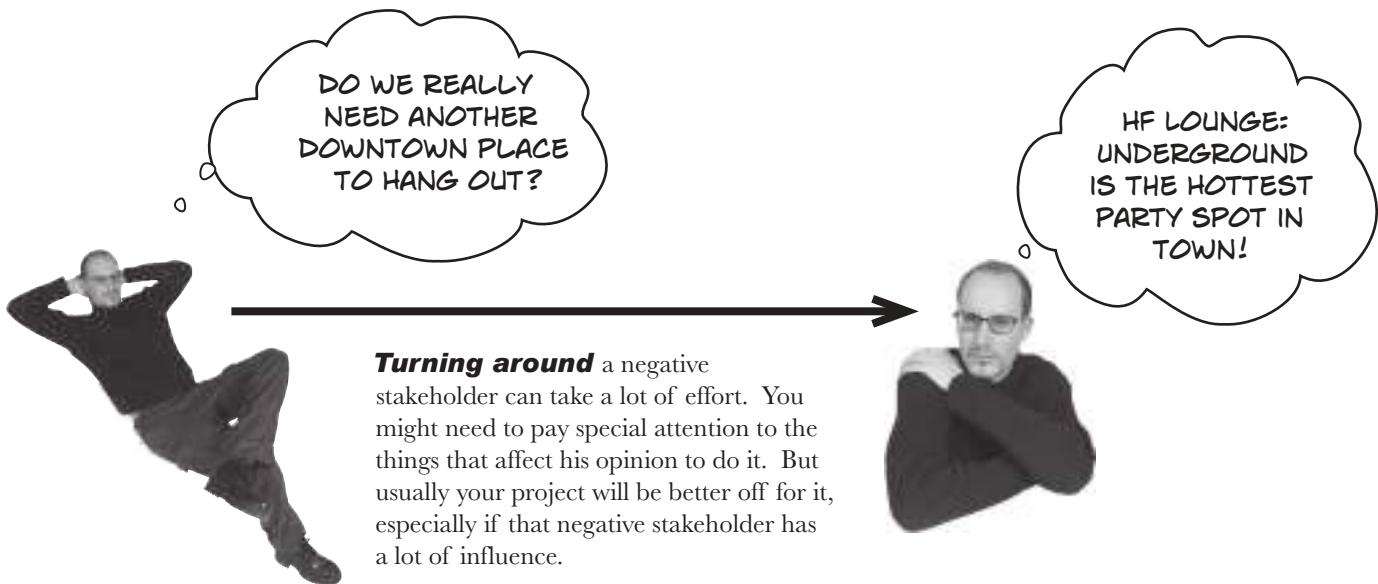
### Stakeholder Communication Requirements

Stakeholder	Type of information required	Frequency
Jeff—HFL employee	Status meetings Issue reviews	Daily
Charles—HFL employee	Status meetings Issue reviews	Daily
DJ Tom—HFL employee	Status meetings Issue reviews	Weekly
Adam—Neighbor	Party announcement	One month prior to party
Mike—Blogger	Party announcement Special invitation	One month prior to party Follow up one week prior to party
Mark and Laura—party guests	Party announcement Special invitation	One month prior to party

## How engaged are your stakeholders?

It's not enough to know who your stakeholders are—you need to understand what motivates them, and what it will take to make the project a success for each of them. That's where the **Stakeholder Engagement Assessment matrix** comes in. Jeff and Charles sat down and worked to come up with one for their upcoming party. Here's what it looked like:

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Jeff—HFL employee				Current	Desired
Charles—HFL employee				Current	Desired
DJ Tom—HFL employee			Current	Desired	
Adam—Neighbor	Current		Desired		
Mike—Blogger		Current		Desired	
Mark and Laura—party guests	Current			Desired	



**Turning around** a negative stakeholder can take a lot of effort. You might need to pay special attention to the things that affect his opinion to do it. But usually your project will be better off for it, especially if that negative stakeholder has a lot of influence.



Choose which engagement level applies in each situation.

### Exercise

1. Jeff and Charles haven't reached out to the caterer yet, but they hope to get his help at a discount.

Unaware    Resistant    Neutral

Supportive    Leading

2. The sound engineers are already booked for that night. They're going to charge an extra fee if you want them to come help out.

Unaware    Resistant    Neutral

Supportive    Leading

3. The liquor distributor usually has no trouble accommodating double and triple orders.

Unaware    Resistant    Neutral

Supportive    Leading

4. The neighborhood business association is looking for a place to celebrate the past year's successful programs, and a Head First Lounge party sounds like just the thing for them.

Unaware    Resistant    Neutral

Supportive    Leading

5. A local event magazine was so happy with the last Head First Lounge party that they've offered to partially sponsor this one.

Unaware    Resistant    Neutral

Supportive    Leading

6. The neighbors haven't been told that HFL is planning another party. We probably ought to let them know way in advance.

Unaware    Resistant    Neutral

Supportive    Leading

→ Answers on page 676.



Think about a major project you've worked on where there were a large number of stakeholders. Where was their engagement level at the beginning of the project? Where did it end up?

## *there are no Dumb Questions*

**Q:** How do I figure out who all of my stakeholders are?

**A:** The short answer is: *look around*. You probably can name the majority of the stakeholders on your project right off the top of your head. You'll surely know who the sponsor is; you can point to her name right on the charter. Then there's the team that's doing the work; you'll know who they are because you work with them every day. From there, it gets a little harder. Any business partners (like trainers or support people for software packages) that your company has contracted to help out with the project are also stakeholders. Consultants or other vendors you might've contracted to help you deliver your product will also be stakeholders. Then you'll have to think about how the product of your project will affect the rest of your company. Will it change the way people work when it's complete? How will those people who need to change their work feel about the project if you asked them today? They're stakeholders, too. If you're thorough, the list might get pretty long, but it's much better to think about your stakeholders up front than it is to ignore them. A stakeholder you don't plan for today could cause a lot of turbulence in your project later.

**Q:** Explain the point of that power/interest grid again.

**A:** Different people have different perspectives on your project. Some of them will put a lot of time and effort into making your project succeed, while others will not have the spare cycles to give. And some people might even actively work against your project if they don't understand it. The power/interest grid is there to help you understand how you should approach the stakeholders for your project. If someone without a lot of power to influence your project doesn't have the time or the will to help you with it, that's less of a problem than when someone with a lot of power to affect your project is resistant to it. It's a tool to help you figure out the best approach to managing all of the stakeholders on your project. It will help you choose the right way to influence the people who can help you succeed.

**Q:** How do I turn around resistant stakeholders?

**A:** Many times they're resistant for a good reason. The best approach is really to try to understand why they're resistant and help them to see the benefits of your project. Many times, stakeholders who are resistant to change have good suggestions that can make the project better in the long run.

**Q:** What does it mean to have a stakeholder in a leading role?

**A:** When a stakeholder takes on a leading role, he is actively involved in making sure your project is a success. He may go to meetings and convince others to support the project, and help you to clear any obstacles that might jeopardize your project's goals. When a stakeholder has a leading role in the project, he has a stake in seeing it succeed. Leading stakeholders are willing to put time and energy into making sure that others support the project.

**There are five engagement levels for stakeholders; unaware, resistant, neutral, supportive, and leading.**

# Managing stakeholder engagement means clearing up misunderstandings

As your project progresses, you'll need to check in with your stakeholders regularly so that misunderstandings don't develop. Your job is to help them to take part in the decisions the team is making, so that they can be supportive. When a stakeholder is resistant to change, you'll need to negotiate with her and understand her resistance so that you can take her perspective into account.

Sometimes a stakeholder you don't always talk to might have a good suggestion for improvement that can help the whole team. It's also possible that there are some facts about the project that the stakeholder hasn't considered, and you can help him to be better informed. The key to success in Stakeholder Management is being inclusive, and sharing information with everyone who's impacted by the project's outcome.



Jeff and Charles didn't realize that they scheduled their party on the same day as another music event that was happening in the city. The sound engineers needed to bring in extra help to handle both events, and that's why they were charging a bigger fee. Once you found out what the issue was and communicated it back to the Head First Lounge team, they understood the cost and approved it.

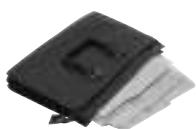


The **Manage Stakeholder Engagement** process is a typical Executing process. You already know the inputs, tools and techniques, and outputs! See if you can figure out what they do just from their names. Write down a description for each of them, and then flip the page to see if you're right.

## Inputs



Communications Management plan



Stakeholder Management plan



Organizational assets



Change log

This is a log of changes that happen on your project. You need to make sure your stakeholders are aware of them, because they really don't like being blindsided by changes.

We just covered these in Chapter 10.

## Tools



### Communications methods

.....  
.....  
.....  
.....  
.....

### Interpersonal skills

.....  
.....  
.....  
.....  
.....

**Issue log**

Since the Manage Stakeholder Engagement process is all about resolving issues that the stakeholders experience, the tools are focused on communicating with the stakeholders about those issues.

**Management skills****Outputs**

How will the outputs be used to communicate with stakeholders?  
Don't forget that every team member is a stakeholder!

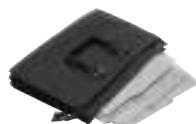
**Change requests****Project document updates****Organizational process asset updates****Project Management Plan updates**



## Exercise Solution

The **Manage Stakeholder Engagement** process is a typical Executing process. You already know the input, tools and techniques, and outputs! See if you can figure out what the outputs and tools and techniques do from their names, and write down a description for each of them.

### Inputs



Communications Management plan



Stakeholder Management plan



Change log

### Tools

#### Communications methods

This is where you decide how you'll keep people in the loop using push methods, interactive methods, or pull methods.

#### Interpersonal skills

This is where you use your "soft skills" to keep everybody on track and working toward the same goal.

**Issue log**

These are any issues that come up during the project that need to be shared with the stakeholders.

**Change requests**

These are any changes to the project plan or other documents that involve stakeholder communication.

**Management skills**

This is where you gather important information about your project and use it to make decisions about how to keep the team on track.

**Project document updates**

These are any updates to previously written project documents that come from the Manage Stakeholder Engagement process.

**Organizational process asset updates**

Any lessons you learn from talking to stakeholders are added to the organizational process assets.

**Project Management plan updates**

Approved changes actually need to be made to the project plan.

## Control your stakeholders' engagement

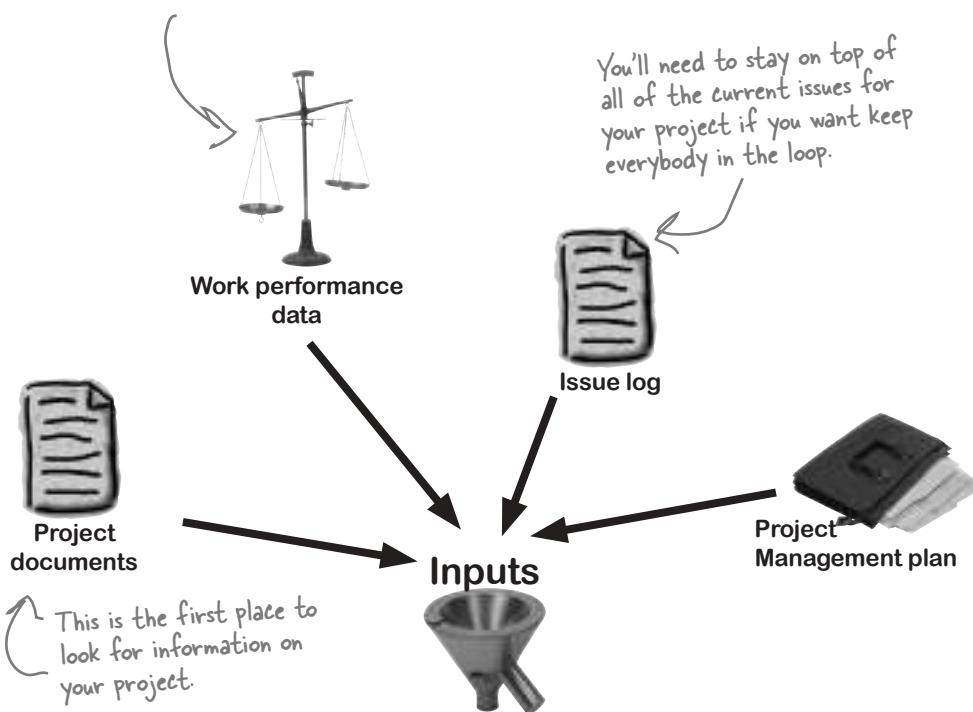
Now that you've got a great framework set up for managing the way your stakeholders interact with your project, you need to monitor those interactions to make sure that everybody stays in the loop. When you run into a problem or find a place where you might be able to bring the project closer to meeting a stakeholder's goal, you can make course corrections and changes to keep as many of your stakeholders satisfied as possible—and that's what the **Control Stakeholder Engagement** process is all about.



Monitoring  
and Controlling  
process group

Once you know what your stakeholders' requirements are, you can monitor how close or far away your project is from meeting them.

This is all of the data about how your project is progressing. You can use it to make forecasts and tell how close you are to meeting your stakeholders' goals.





# Tools

**Information management systems**

Can you figure out what each of the **Control Stakeholder Engagement** tools and techniques is for, just from the name?

**Expert judgment**

**Meetings**



Can you figure out what each of the **Control Stakeholder Engagement** tools and techniques is for, just from the name?

# Tools

## Information management systems

**Stores reports on project performance, like cost, schedule, and scope reports.**

Not everybody has a predefined information management system. Some teams provide the same information in spreadsheets or even emails.



## Expert judgment

**Getting all of your current stakeholders together to determine if there might be other stakeholders who haven't yet been identified.**

## Meetings

**Status meetings keep all of the the stakeholders in the loop about project progress, and provide a place for everyone to share their opinions on how to keep the project on track.**



Meetings are a great way to encourage an open exchange of ideas about how the project is going.

# Now you can tell when you need to change the way you deal with stakeholders

Now that you've taken a look at all of the data coming from your project, you're in a better position to tell if you need to make changes to the way you're managing stakeholder engagement. The **outputs from Control Stakeholder Engagement** are all about making changes to the documents you've been using to keep them engaged all along.



**Work performance information** is the analyzed work performance data, changed from raw data into reports that are understood in context and can be used to make project decisions. Where work performance data was the raw outputs of the various controlling processes, the work performance information is consolidated. Think of work performance data as your raw budget performance data (this month, we're over budget by \$1,000) and work performance information as that data in context (the project budget forecast is currently \$10,000 under budget, even though we're over by \$1,000 this month).

**Change requests** happen as part of controlling stakeholder engagement. What do you do if you find out that one of your stakeholders' requirements has been missed? You put the **change request** in as soon as possible.

**Project documents updates** happen as you work with your stakeholders to monitor and control their engagement. You might find new stakeholders along the way who make you update your **stakeholder register**. You could also run into issues that need to be added to the **issue log**.

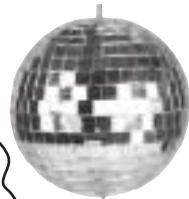
**Project Management Plan updates** might be needed as you work with your stakeholders to ensure successful delivery. Your stakeholders might request changes to your overall strategy for any of the knowledge areas you've planned as part of your Project Management plan. You'll need to go back and make updates to those plans if you want to keep everyone in the loop about the change in approach.

**Organizational process asset updates** need to be added—especially your **lessons learned**. There are always a lot of lessons to be learned when you're working with stakeholders to ensure project success.

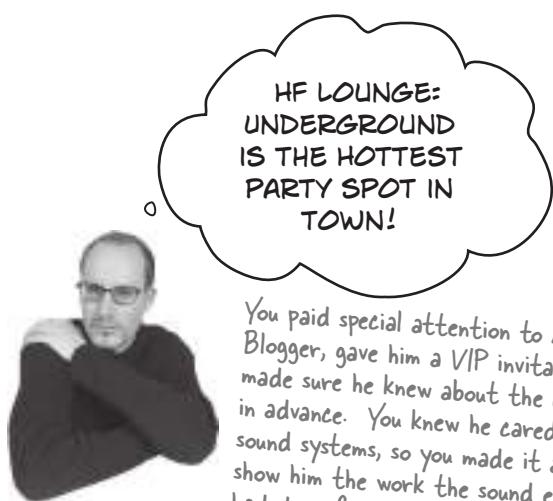
*excellent!*

## It's party time!

The Head First Lounge party is a big hit! Thanks to your Stakeholder Management skills, Jeff and Charles are the reigning kings of downtown nightlife!



Tom the DJ told you that he wanted to play different music at the next party, and you took that suggestion to Jeff and Charles. Now he's playing what he wants!



You paid special attention to Mike the Blogger, gave him a VIP invitation, and made sure he knew about the event way in advance. You knew he cared about sound systems, so you made it a point to show him the work the sound engineers had done for the event. Looks like it paid off!



By reaching out early to potential party-goers who'd missed the last event, you made sure the lounge was stocked with people who'd really appreciate the party.





### Exercise

Choose which engagement level applies in each situation

1. Jeff and Charles haven't reached out to the caterer yet, but they hope to get his help at a discount.

Unaware    Resistant    Neutral  
 Supportive    Leading

2. The sound engineers are already booked for that night. They're going to charge an extra fee if you want them to come help out.

Unaware    Resistant    Neutral  
 Supportive    Leading

3. The liquor distributor usually has no trouble accommodating double and triple orders.

Unaware    Resistant    Neutral  
 Supportive    Leading

4. The neighborhood business association is looking for a place to celebrate the past year's successful programs, and a Head First Lounge party sounds like just the thing for them.

Unaware    Resistant    Neutral  
 Supportive    Leading

5. A local event magazine was so happy with the last Head First Lounge party that they've offered to partially sponsor this one.

Unaware    Resistant    Neutral  
 Supportive    Leading

6. The neighbors haven't been told that HFL is planning another party. We probably ought to let them know way in advance.

Unaware    Resistant    Neutral  
 Supportive    Leading

## Exam Questions

1. Matt, the sponsor of a large publishing project, meets with all of the stakeholders on the project to ask for their support in an upcoming testing event. Which engagement level is he displaying?

- A. Unaware
- B. Resistant
- C. Supportive
- D. Leading

2. Which of the following is NOT an input to the Plan Stakeholder Management process?

- A. Enterprise environmental factors
- B. Organizational process assets
- C. Work performance data
- D. Stakeholder register

3. You take over for a project manager who has left the company, and realize that there are stakeholders in the project who haven't been included in any of the status meetings so far. Some upper managers think the project is not going to succeed, and others are actively thinking of cancelling it. Which document is the FIRST one that you should create to solve this problem?

- A. Stakeholder register
- B. Status report
- C. Budget forecast
- D. Performance report

4. In a monthly steering meeting, you ask one of the stakeholders on your project if she has reviewed the latest document updates you've made since the last meeting. She says, "I'm not working on that; I'm not even sure what it is." How would you BEST describe her level of engagement?

- A. Unaware
- B. Resistant
- C. Supportive
- D. Leading

5. You're managing a construction project. You created a stakeholder register and Stakeholder Management plan, and now the team is working on the project. You've been managing the work, and now you're looking at the work performance data to keep your stakeholders informed of the status of the project. You've discovered a change in the way your stakeholders look at the budget for your project. Which of the following BEST describes the next thing you should do?

- A. Update the risk register to include any changes to risk strategy.
- B. Compare the work performance information against the time, cost, and scope baselines and look for deviations.
- C. Create a change request and update the issue log and Cost Management plan to reflect the approved change.
- D. Hold a status meeting.

## Exam Questions

**6. Joe, a stakeholder on your project, has been plotted on the power/interest grid as high interest with low power. What's the BEST approach for managing his engagement?**

- A. Make him responsible for a deliverable on the project.
- B. Keep him informed of all of the decisions that might affect the project's outcome.
- C. Closely manage his requirements and expectations.
- D. Ignore his requirements and expectations, since he doesn't have the power to affect the project's outcome.

**7. Which Stakeholder Management process is in the Initiating process group?**

- A. Manage Stakeholder Engagement
- B. Identify Stakeholders
- C. Plan Stakeholder Management
- D. Register Stakeholders

**8. Sue, the sponsor of the industrial design project you're managing, is plotted on your power/interest grid as high power, high interest. Which is the BEST approach for managing her requirements and expectations?**

- A. Keep her informed of all project decisions.
- B. Manage her requirements and expectations closely.
- C. Keep her satisfied by inviting her to all of the team meetings.
- D. Understand her goals and expectations, but don't do anything with them.

**9. Which is NOT an input of the Identify Stakeholders process?**

- A. Procurement documents
- B. Enterprise environmental factors
- C. Project charter
- D. Project Management plan

**10. Kyle is the project manager of a project that has teams distributed in many different places. One of the stakeholders in his project has asked that all formal communications from the project be shared with all of the teams, regardless of their location. This is an example of:**

- A. A stakeholder expectation
- B. A stakeholder goal
- C. A stakeholder requirement
- D. Decoding communication

## Exam Questions

11. Which information is NOT included in the stakeholder register?

- A. Stakeholder name and group
- B. Stakeholder requirements
- C. Stakeholder expectations
- D. Stakeholder deliverables

12. Which Stakeholder Management process is in the Monitoring and Controlling process group?

- A. Distribute Information
- B. Manage Stakeholder Engagement
- C. Plan Communications
- D. Control Stakeholder Engagement

Answers

## Exam Questions

### 1. Answer: D

Since Matt is working to bring other stakeholders to support the project, he's in a leading engagement role.

### 2. Answer: C

Work performance data is an input of some Stakeholder Management processes, but not an input to Plan Stakeholder Management.

### 3. Answer: A

The stakeholder register is the first thing you need to create here. It looks like some of the upper managers who might be thinking of cancelling the project need to have their ideas taken into account. Once you've identified them as stakeholders, you can work to bring their perspective into account on your project and include them in project management decisions.

RIGHT.  
YOU NEED TO  
KNOW WHO YOUR  
STAKEHOLDERS ARE  
BEFORE YOU CAN GET  
THEM INVOLVED.



### 4. Answer: A

It sounds like this stakeholder is completely unaware of her responsibilities on the project. The next step here is to spend some time bringing her up to speed on what's expected.

### 5. Answer: C

When you look at work performance data and discover a new stakeholder requirement, you're doing the Control Stakeholder Engagement process. Some of the outputs of that process are change requests, project document updates, and Project Management plan updates.

Once you recognize the process that's being described, try to think of the outputs of the process to figure out which answer is best.

### 6. Answer: B

Stakeholders in the low power/high interest quadrant of the power/interest grid need to be kept informed of all project decisions.

# Answers

## ~~Exam Questions~~

### 7. Answer: B

Identify Stakeholders is the only process in Stakeholder Management that is part of the Initiating process group.

Flip back to chapter 4 for a quick refresher on the Initiating Process group, now that you've studied Stakeholder Management. It's a good way to review.

### 8. Answer: B

Stakeholders in the high power/high interest quadrant of the power/interest grid need to have their expectations and requirements closely managed by the project manager.

It can get confusing because Identify Stakeholders is discussed at the end of the PMBOK Guide, but it's part of the Initiating processes and done before you get to the Planning processes.

### 9. Answer: D

The Project Management plan is not an input to the Identify Stakeholders process. Since the Identify Stakeholders process is part of the Initiating process group, the stakeholders are identified as an input to the Planning processes that create the Project Management plan.

### 10. Answer: A

This is a stakeholder expectation. The stakeholder expects that the team will do as requested.

### 11. Answer: D

Not all stakeholders have deliverables on a project. Some are sponsors, vendors, or others who might be involved in the project but not actually producing deliverables. When a stakeholder does have deliverables that she's accountable for, she'll be documented in the Scope Management plan.

### 12. Answer: D

Control Stakeholder Engagement is the only Monitoring and Controlling process in Stakeholder Management.



## 14 Professional responsibility

# Making good choices



**It's not enough to just know your stuff. You need to make good choices to be good at your job.** Everyone who has the PMP credential agrees to follow the **Project Management Institute Code of Ethics and Professional Conduct**, too. The Code helps you with **ethical decisions** that aren't really covered in the body of knowledge—and it's a big part of the PMP exam. Most of what you need to know is **really straightforward**, and with a little review, you'll do well.

## Doing the right thing

You'll get some questions on the exam that give you situations that you might run into while managing your projects and then ask you what to do. Usually, there's a clear answer to these questions: **it's the one where you stick to your principles.** Questions will make the decisions tougher by offering rewards for doing the wrong thing (like money for taking a project shortcut), or they will make the infraction seem really small (like photocopying a copyrighted article out of a magazine). If you stick to the principles in the PMP Code of Professional Conduct regardless of the consequences, you'll **always** get the answers right.

The PMP exam categorizes ethics and professional conduct as part of a project manager's cross-cutting knowledge and skills. This means that there will be questions about ethics and professional conduct scattered throughout the exam alongside questions about each of the process groups. You should expect to see questions about specific ethical situations around each of the process groups. When you come across a question about ethics and professional conduct, you're likely to see it in the context of initiating, planning, executing, or monitoring and controlling a project.

### The main ideas

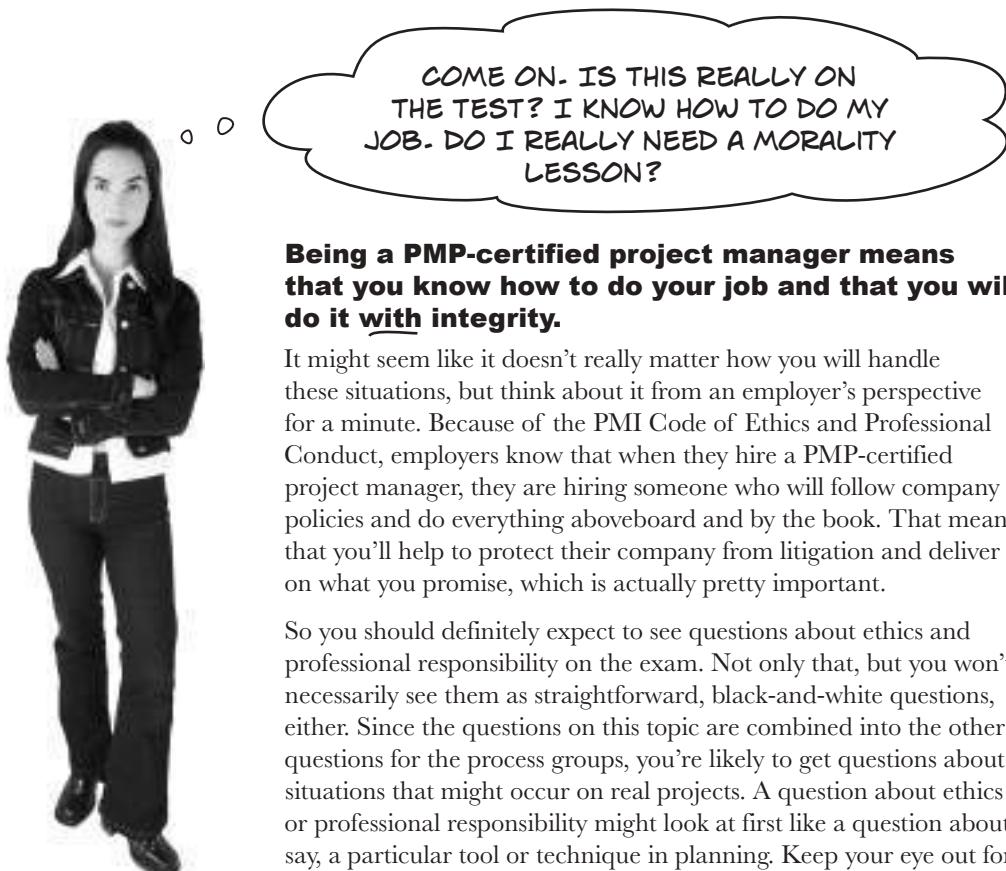
**In general, there are a few kinds of problems that the code of ethics prepares you to deal with.**

- 1. Follow all laws and company policies.**
- 2. Treat everybody fairly and respectfully.**
- 3. Have respect for the environment and the community you're working in.**
- 4. Give back to the project management community by writing, speaking, and sharing your experience with other project managers.**
- 5. Keep learning and getting better and better at your job.**
- 6. Respect other people's cultures.**
- 7. Respect copyright laws.**
- 8. Always be honest with everyone on the project.**
- 9. If you find that another person has done something to damage the PMP credential in any way, you must report it to PMI.**

Ethics and professional responsibility questions make up 10% of the exam. That's good news because these questions are really easy if you understand the ideas behind the PMP Code of Professional Conduct.



So if you find out that someone has stolen questions from the PMP exam, cheated on the PMP exam, falsely claimed to have a PMP certification, or lied about anything related to the PMP certification process, then you **MUST** report that to PMI.



**Being a PMP-certified project manager means  
that you know how to do your job and that you will  
do it with integrity.**

It might seem like it doesn't really matter how you will handle these situations, but think about it from an employer's perspective for a minute. Because of the PMI Code of Ethics and Professional Conduct, employers know that when they hire a PMP-certified project manager, they are hiring someone who will follow company policies and do everything aboveboard and by the book. That means that you'll help to protect their company from litigation and deliver on what you promise, which is actually pretty important.

So you should definitely expect to see questions about ethics and professional responsibility on the exam. Not only that, but you won't necessarily see them as straightforward, black-and-white questions, either. Since the questions on this topic are combined into the other questions for the process groups, you're likely to get questions about situations that might occur on real projects. A question about ethics or professional responsibility might look at first like a question about, say, a particular tool or technique in planning. Keep your eye out for "red herring" questions that turn out to be about ethics and social responsibility. They'll lay out a situation that sounds like a normal project management problem, but requires you to use one of the principles in the PMI Code of Ethics and Professional Conduct.

 **BRAIN  
POWER**

Can you think of some situations where you might need to make decisions using these principles in your own projects?

## Keep the cash?

A lot of ethics questions on the PMP exam concern bribery. It is never, under any circumstances, OK to accept a bribe—even if your company and customer might benefit from it somehow. And bribes aren't always cash. They can be anything from free trips to tickets to a ball game. Any time you're offered anything to change your opinion or the way you work, you must decline the offer and disclose it to your company.

In some countries, even though you may be "expected" to pay a bribe, it's not okay to do it—even if it's customary or culturally acceptable.



The easy way



I'M SORRY, I CAN'T ACCEPT THE GIFT. I REALLY APPRECIATE THE GESTURE, THOUGH.

KATE, YOU WERE SO GREAT TO WORK WITH. WE'D LIKE TO SEND YOU \$1,000 AS A TOKEN OF OUR APPRECIATION.



I WOULD NEVER ACCEPT A GIFT LIKE THAT. DOING A GOOD JOB IS ITS OWN REWARD!



The right way

## Fly business class?

Any time there's a policy in your company, you need to follow it. Even if it seems like no harm will be done if you don't follow the policy, and even if you will be able to get away with it, you should not do it. And that goes double for laws—under no circumstances are you ever allowed to break a law, no matter how much good it "seems" to do you or your project.

WE'VE GOT SOME EXTRA MONEY IN THE BUDGET AND YOU'RE REALLY DOING A GREAT JOB. I KNOW THE TRAVEL POLICY SAYS WE ALWAYS FLY COACH. BUT WE CAN AFFORD TO SPLURGE A BIT. WHY DON'T YOU BUY A BUSINESS TICKET THIS TIME?

And if you ever see someone in your company breaking the law, you need to report it to the authorities.

DID YOU KNOW THAT THOSE CHAIRS GO INTO TOTALLY FLAT BEDS? THIS IS SO COOL. I'VE WORKED SO HARD, I'VE TOTALLY EARNED IT!



THERE'S NO EXCUSE FOR NOT FOLLOWING THE RULES. THE TRAVEL POLICY SAYS FLY COACH. NO EXCEPTIONS!



WOW, BEN. THAT'S REALLY NICE OF YOU. BUT THE ECONOMY FARE WILL BE FINE.



## New software

When it comes to copyright, it's never OK to use anything without permission. Books, articles, music, software...you always need to ask before using it. For example, if you want to use some copyrighted music in a company presentation, you should write to the copyright owner and ask for permission.



## Shortcuts

You might see a question or two that asks if you really need to follow all of the processes. Or you might be asked by your boss to keep certain facts about your project hidden from stakeholders or sponsors. You have a responsibility to make sure your projects are run properly, and to never withhold information from people who need it.



## A good price or a clean river?

Being responsible to the community is even more important than running a successful project. But it's more than being environmentally aware—you should also respect the cultures of everyone else in your community, and the community where your project work will be done.

That means even though languages, customs, holidays, and vacation policies might be different from country to country, you need to treat people the way they are accustomed to being treated.

WE JUST FOUND OUT THAT ONE OF OUR SUPPLIERS DUMPS HARMFUL CHEMICALS IN THE RIVER. THEY'VE ALWAYS GIVEN US GREAT RATES, AND OUR BUDGET WILL GO THROUGH THE ROOF IF WE SWITCH SUPPLIERS NOW. THE WHOLE THING GIVES ME A HEADACHE. WHAT SHOULD WE DO?



WE CAN'T LET THE PROJECT FAIL FOR A BUNCH OF STUPID FISH.



THE EARTH IS OUR HOME AND IS SO MUCH MORE IMPORTANT THAN THIS PROJECT. WE HAVE TO DO WHAT'S RIGHT...



BEN, I KNOW IT COULD CAUSE US PROBLEMS, BUT WE'RE GONNA HAVE TO FIND ANOTHER SUPPLIER.



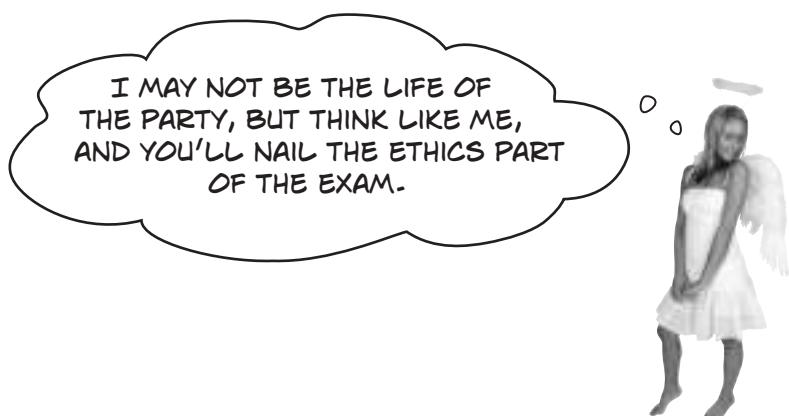
## We're not all angels

We know that the choices you make on your project are not always black and white. Remember that the questions on the exam are designed to test your knowledge of the PMP Code of Professional Conduct and how to apply it. A lot of situations you will run into in real life have a hundred circumstances around them that make these decisions a little tougher to make than the ones you see here. But if you know what the code would have you do, you're in a good position to evaluate those scenarios as well.

Seriously, it's a quick  
read—and it'll help  
you on the exam.

Now, go read the PMP Code of Professional Conduct before you take these exam questions. Go to this URL and click on the "PMI Code of Ethics and Professional Conduct" link.

<http://www.headfirstlabs.com/hfpmp>



## Exam Questions

- 1. You read a great article over the weekend, and you think your team could really benefit from it. What should you do?**
  - A. Photocopy the article and give it to the team members.
  - B. Type up parts of the article and email it to the team.
  - C. Tell everyone that you thought of the ideas in the article yourself.
  - D. Buy a copy of the magazine for everyone.
- 2. You find out that a contractor that you're working with discriminates against women. The contractor is in another country, and it's normal in that country. What should you do?**
  - A. Respect the contractor's culture and allow the discrimination to continue.
  - B. Refuse to work with the contractor, and find a new seller.
  - C. Submit a written request that the contractor no longer discriminate.
  - D. Meet with your boss and explain the situation.
- 3. You're a project manager at a construction company that's selling services to a client. You are working on a schedule and a budget when the CEO at the client demands that you do not produce those things. Instead, he wants you to begin work immediately. What the BEST thing that you can do?**
  - A. Meet with the CEO to explain why the budget and schedule are necessary.
  - B. Stop work immediately and go into claims administration.
  - C. Don't produce the schedule and budget.
  - D. Ask the buyer to find another company to work with.
- 4. You're working on a project when the client demands that you take him out to lunch every week if you want to keep his business. What's the BEST thing to do?**
  - A. Take the client out to lunch and charge it to your company.
  - B. Refuse to take the client out to lunch because it's a bribe.
  - C. Take the client out to lunch, but report him to his manager.
  - D. Report the incident to PMI.
- 5. You are working on one of the first financial projects your company has attempted, and you have learned a lot about how to manage the project along the way. Your company is targeting financial companies for new projects next year. What's the BEST thing for you to do?**
  - A. Talk to your company about setting up some training sessions so that you can teach others what you have learned on your project.
  - B. Keep the information you've learned to yourself so that you'll be more valuable to the company in the next year.
  - C. Decide to specialize in financial contracts.
  - D. Focus on your work with the project and don't worry about helping other people to learn from the experience.

## Exam Questions

**6. You find out that you could save money by contracting with a seller in a country that has lax environmental protection rules. What should you do?**

- A. Continue to pay higher rates for a environmentally safe solution.
- B. Take advantage of the cost savings.
- C. Ask your boss to make the decision for you.
- D. Demand that your current contractor match the price.

**7. You overhear someone on your team using a racial slur. This person is a critical team member and you are worried that if he leaves your company it will cause project problems. What should you do?**

- A. Pretend you didn't hear it so that you don't cause problems.
- B. Report the team member to his boss.
- C. Bring it up at the next team meeting.
- D. Meet in private with the team member and explain that racial slurs are unacceptable.

**8. You've given a presentation for your local PMI chapter meeting. This is an example of what?**

- A. A PDU
- B. Contributing to the Project Management Body of Knowledge
- C. Donating to charity
- D. Volunteering

**9. You are about to hold a bidder conference, and a potential seller offers you great tickets to a baseball game for your favorite team. What should you do?**

- A. Go to the game with the seller but avoid talking about the contract.
- B. Go to the game with seller and discuss the contract.
- C. Go to the game, but make sure not to let him buy you anything because that would be a bribe.
- D. Politely refuse the tickets.

**10. Your company has sent out an RFP, and your brother wants to bid on it. What's the BEST thing for you to do?**

- A. Give your brother inside information to make sure that he has the best chance at getting the project.
- B. Publicly disclose your relationship with him and excuse yourself from the selection process.
- C. Recommend your brother but don't inform anyone of your relationship.
- D. Don't tell anyone about your relationship, but be careful not to give your brother any advantage when evaluating all of the potential sellers.

**Answers**

**Exam Questions**

**1. Answer: D**

You should never copy anything that's copyrighted. Make sure you always respect other people's intellectual property!

**2. Answer: B**

It's never OK to discriminate against women, minorities, or others. You should avoid doing business with anyone who does.

**3. Answer: A**

This is a difficult situation for any project manager. But you can't cut corners on the project management processes, and you certainly can't tell the client that you're refusing their business. The best thing you can do is meet with the CEO to explain why you need to follow the rules.

**4. Answer: B**

The client is demanding a bribe, and paying bribes is unethical. You should not do it. If your project requires you to bribe someone, then you shouldn't do business with that person.

**5. Answer: A**

You should always try to help other people learn about managing projects.

This is called contributing to the Project Management Body of Knowledge.



**6. Answer: A**

You should never contract work to a seller who pollutes the environment. Even though it costs more to use machinery that doesn't damage the environment, it's the right thing to do.

## Answers

# ~~Exam Questions~~

### **7. Answer: D**

You should make sure that your team always respects other people.

### **8. Answer: B**

Any time you help share your knowledge with others, you are contributing to the Project Management Body of Knowledge, and that's something you should do as a certified project manager!

### **9. Answer: D**

You have to refuse the tickets even if the game sounds like a lot of fun. The tickets amount to a bribe, and you shouldn't do anything that might influence your decision in awarding your contract.

### **10. Answer: B**

You have to disclose the relationship. It's important to be up front and honest about any conflict of interest that could occur on your projects.