

## Exam Questions

19. You are managing a software project when one of your stakeholders needs to make a change that will affect the budget. You follow the procedures to implement the change. Which of the following must get updated to reflect the change?

- A. Project Management plan
- B. Project cost baseline
- C. Cost change control system
- D. Project performance reviews

20. You are managing a project with a BAC of \$93,000, EV (BCWP) of \$51,840, PV (BCWS) of \$64,800, and AC (ACWP) of \$43,200. What is the CPI?

- A. 1.5
- B. 0.8
- C. 1.2
- D. \$9,000

↑ Again, don't panic if you see these four-letter abbreviations. You'll always be given the ones you're used to on the exam!

21. You are managing a project that has a TCPI of 1.19. What is the BEST course of action?

- A. You're under budget, so you can manage costs with lenience.
- B. Manage costs aggressively.
- C. Create a new schedule.
- D. Create a new budget.

22. You are starting to write your project charter with your project sponsor when the senior managers ask for a time and cost estimate for the project. You have not yet gathered many of the project details. What kind of estimate can you give?

- A. Analogous estimate
- B. Rough order of magnitude estimate
- C. Parametric estimate
- D. Bottom-up estimate

23. You are managing a project for a defense contractor. You know that you're over budget, and you need to tell your project sponsor how much more money it's going to cost. You've already given him a forecast that represents your estimate of total cost at the end of the project, so you need to take that into account. You now need to figure out what your CPI needs to be for the rest of the project. Which of the following BEST meets your needs?

- A. BAC
- B. ETC
- C. TCPI (BAC calculation)
- D. TCPI (EAC calculation)

## Answers

~~Exam Questions~~

## 1. Answer: A

This is really a question about the order of the processes. Control Costs uses the cost baseline, so it has to be created before you get to it. Cost Baseline isn't a process at all, so you should exclude that from the choices right away. The main output of Determine Budget is the cost baseline and supporting detail, so that's the right choice here.

D. Cost Baseline ← Watch out for fake processes! This isn't a real process name.

## 2. Answer: A

This one is just testing whether or not you know the formula for schedule variance. Just plug the values into the SV formula:  $SV = EV - PV$  and you get answer A. Watch out for negative numbers, though! Answer B is a trap because it's a positive value. Also, the test will have answers like C that check if you're using the right formula. If you use the SPI formula, that's the answer you'll get! You can throw out D right away—you don't need to do any calculation to know that you have enough information to figure out SV!

2. You're working on a project that has an EV of \$7,362 and a PV (BCWS) of \$8,232. What's your SV?

Don't get thrown off by four-letter abbreviations like BCWS—some people have different abbreviations for PV, EV, and AC. The PMP exam will always give you the abbreviations you're familiar with.

## 3. Answer: D

When you're using the past performance of previous projects to help come up with an estimate, that's called analogous estimation. This is the second time you've seen this particular technique—it was also in Chapter 6. So there's a good chance that you'll get an exam question on it.

## 4. Answer: A

The formula for SPI is:  $SPI = EV \div PV$ . So you just have to fill in the numbers that you know, which gets you  $1.2 = EV \div \$56,733$ . Now flip it around. You end up with  $EV = 1.2 \times \$56,733$ , which multiplies out to \$68,079.60.

## 5. Answer: B

Did you notice the red herring in the question? It didn't matter what the projects were about, only how much they cost!

If you see a question asking the opportunity cost of selecting one project over another, the answer is the value of the project that was not selected! So even though the answers were all numbers, there's no math at all in this question.

# Answers

## ~~Exam Questions~~

### 6. Answer: D

This is one of those questions that gives you a definition and asks you to pick the term that's being defined. So which one is it?

Try using the process of elimination to find the right answer! It can't be benefit-cost ratio, because you aren't being asked to compare the overall cost of the project to anything to figure out what its benefit will be. Depreciation isn't right—that's about how your project loses value over time, not about its costs. And it's not net present value, because the question didn't ask you about how much value your project is delivering today. That leaves lifecycle costing.

Don't forget: Lower = Loser!

### 7. Answer: C

When you see an SPI that's lower than 1, that means your project is behind schedule. But your CPI is above 1, which means that you're ahead on your budget!

### 8. Answer: C

Use the formula:  $EV = BAC \times \text{actual \% complete}$ . When you plug the numbers into the formula, the right answer pops out!

I LOVE THESE  
CALCULATION QUESTIONS  
BECAUSE WHEN I SEE THAT THE  
ANSWER ON MY CALCULATOR  
MATCHES ONE OF THE CHOICES, I  
KNOW I GOT IT RIGHT!

### 9. Answer: B

You might not have recognized this as a TCPI problem immediately, but take another look at the question. It's asking you whether or not a project is going to come in under budget, and that's what TCPI is for. Good thing you were given all of the values you need to calculate it! The actual % complete is 57%, the BAC is \$1,500,000, and the AC is \$950,000. You can calculate the  $EV = BAC \times \text{actual \% complete} = \$1,500,000 \times 57\% = \$855,000$ . So now you have everything you need to calculate TCPI: this means he needs a TCPI of 1.17 in order to come in under budget. Since he knows that he can't get better than 1.05, he's likely to blow the budget.

$$\text{TCPI} = \frac{\text{BAC} - \text{EV}}{\text{BAC} - \text{AC}} = \frac{(\$1,500,000 - \$855,000)}{(\$1,500,000 - \$950,000)} = 1.17$$



*Answers*~~Exam Questions~~**10. Answer: D**

Some of these calculation questions can get a little complicated, but that doesn't mean they're difficult! Just relax—you can do them!

The formula you need to use is: SPI = EV ÷ PV. But what do you use for EV and PV? If you look at the question again, you'll find everything you need to calculate them. First, figure out earned value: EV = BAC × actual % complete. But wait! You weren't given these in the question!

OK, no problem—you just need to think your way through it. The project will cost \$52/meter to lay 4 km (or 4,000 meters) of cable, which means the total cost of the project will be  $\$52 \times 4,000 = \$208,000$ . And you can figure out actual % complete too! You've laid 1,800 meters so far out of the 4,000 meters you'll lay in total...so that's  $1,800 \div 4,000 = 45\%$  complete. All right! Now you know your earned value: EV =  $\$208,000 \times 45\% = \$93,600$ .

So what's next? You've got half of what you need for SPI—now you have to figure out PV. The formula for it is: PV = BAC × scheduled % complete. So how much of the project were you supposed to complete by now? You're five weeks into an eight-week project, so  $5 \div 8 = 62.5\%$ . Your PV is  $\$208,000 \times 62.5\% = \$130,000$ . Now you've got everything you need to calculate SPI!

$$EV \div PV = \$93,600 \div \$130,000 = .72$$

SO THAT QUESTION  
WAS REALLY ABOUT  
WHETHER I COULD FIGURE  
OUT HOW TO CALCULATE  
EV AND PV FROM WHAT I  
WAS GIVEN.



Did you think that this was a red herring? It wasn't—you needed all the numbers you were given.

**11. Answer: B**

You'll run into a lot of questions like this where a problem happens, a person has an issue, or the project runs into trouble. When this happens, the first thing you do is stop and gather information. And that should make sense to you, since you don't know if this change will really impact cost or not. It may seem like a huge change to the programmer, but may not actually cost the project anything. Or it may really be huge. So the first thing to do is figure out the impact of the change on the project constraints, and that's what answer B says!

## Answers

~~Exam Questions~~

## 12. Answer: B

What formula do you know that has AC and EV? Right: the CPI formula does! Take a look at it:  $CPI = EV \div AC$ . So what happens if AC is bigger than EV? Make up two numbers and plug them in. You get CPI that's below 1, and you know what that means...it means that you've blown your budget!

12. If AC (ACWP) is greater than your EV (BCWP), what does this mean?

Here are more of those four-letter abbreviations. Don't worry—you don't need to memorize these.

IF I WRITE DOWN ALL OF THE FORMULAS ON MY SCRATCH PAPER BEFORE THE TEST STARTS, QUESTIONS LIKE THIS WILL BE A LOT EASIER!



## 13. Answer: D

This question gave you a definition and is checking to see if you know what it refers to. You should take a minute to look at the four possible answers and see if you can think of the definition for each of them. It's definitely worth taking the time to understand what each of these formulas and variables represents in real life! It will make the whole exam a lot easier.

## 14. Answer: C

This is a classic red herring question! The money you've spent so far is the actual cost. It's a simple definition question, wrapped up in a whole bunch of fluff!

14. You are managing an industrial architecture project. You've spent \$26,410 so far to survey...

This is the only part of the question that matters—the rest is a red herring.

## 15. Answer: A

When you plug a bunch of values into a formula or computer program, and it generates an estimate, that's called parametric estimation. Parametric estimation often uses some historical data, but that doesn't mean it's the same as analogous estimation.

~~Exam Questions~~**16. Answer: C**

You've been given a net present value (NPV) for each project. NPV means the total value that this project is worth to your company. It's got the costs—including opportunity costs—built in already. So all you need to do is select the project with the biggest NPV.

**17. Answer: B**

The rough order of magnitude estimate is a very preliminary estimate that everyone knows is only within an order of magnitude of the actual cost (or -25 to +75%).

**18. Answer: A**

You should definitely have a pretty good idea of how change control works by now! The change control system defines the procedures that you use to carry out the changes. And Control Costs has its own set of procedures, which are part of the Perform Integrated Change Control process you learned about in Chapter 4.

**19. Answer: B**

You use the project cost baseline to measure and monitor your project's cost performance. The idea behind a baseline is that when a change is approved and implemented, the baseline gets updated.

I RECOGNIZE THIS! A CHANGE IS REQUESTED, APPROVED, AND IMPLEMENTED, AND THEN THE BASELINE IS UPDATED. SO I'M USING THE COST BASELINE JUST LIKE I USED THE SCOPE BASELINE BACK IN CHAPTER 5.

**20. Answer: C**

You should have the hang of this by now! Plug the numbers into the formula ( $CPI = EV \div AC$ ), and it spits out the answer. Sometimes the question will give you more numbers than you actually need to use—just ignore them like any other red herring and use only the ones you need!

**21. Answer: B**

If your TCPI is above 1, you need to manage costs aggressively. This means that you need to meet your goals without spending as much money as you have been for the rest of the project.

# Answers

## ~~Exam Questions~~

### 22. Answer: B

If you are just starting to work on your project charter, it means you're just starting the project and you don't have enough information yet to do analogous, parametric, or bottom-up estimates.

The only estimation technique that you can use that early in the project is the rough order of magnitude estimate. That kind of estimate is not nearly as accurate as the other kinds of estimate and is used just to give a rough idea of how much time and cost will be involved in doing a project.

### 23. Answer: D

This question may have seemed a little wordy, but it's really just a question about the definition of TCPI. You're being asked to figure out where you need to keep your project's CPI in order to meet your budget. And you know it's the EAC-based TCPI number, because the question specified that you already gave him a forecast, which means you gave him an EAC value already. So now you can calculate the EAC-based TCPI number to figure out where you need to keep your CPI for the rest of the project.

By calculating this based on the EAC,  
you show your sponsor just how much  
money he needs to kick in (or less, if  
you've got good news!) in order to come  
in under budget.





## 8 Quality management

# *Getting it right*



**It's not enough to make sure you get it done on time and under budget.** You need to be sure you make the right product to suit your stakeholders' needs. Quality means making sure that you build what you said you would, and that you do it as efficiently as you can. That means trying not to make too many mistakes and always keeping your project working toward the goal of creating the right product!

## What is quality?

Everybody “knows” what **quality** is. But the way the word is used in everyday life is a little different than how it is used in project management. You manage quality on your project by setting goals and taking measurements. That’s why you need to understand the quality levels your stakeholders believe are acceptable, and ensure that your project meets those targets...just like it needs to meet their budget and schedule goals.



How do you know if this is a high-quality product?



How can you tell a high-quality product from a low-quality one?

# You need more than just tests to figure out quality

A lot of people confuse quality with testing. When projects run into quality problems, some project managers will respond by adding more testers to the project to try to find more bugs. But testing is only one part of the story. To know your product's quality, you need to do more than test it:



The Black Box 3000™



### **Scenario 1**

Lisa presses the button, but nothing happens.

HMM. I HAVE NO IDEA WHAT THESE TESTS PROVE!



### **Scenario 2**

Lisa presses the button and a voice comes out of the box that says, "You pressed the button incorrectly."

Lisa, our tester, is testing the Black Box 3000™, but she isn't sure what she's supposed to be testing for.



### **Scenario 3**

Lisa presses the button and the box heats up to 628°F. Lisa drops the box and it shatters into hundreds of pieces.

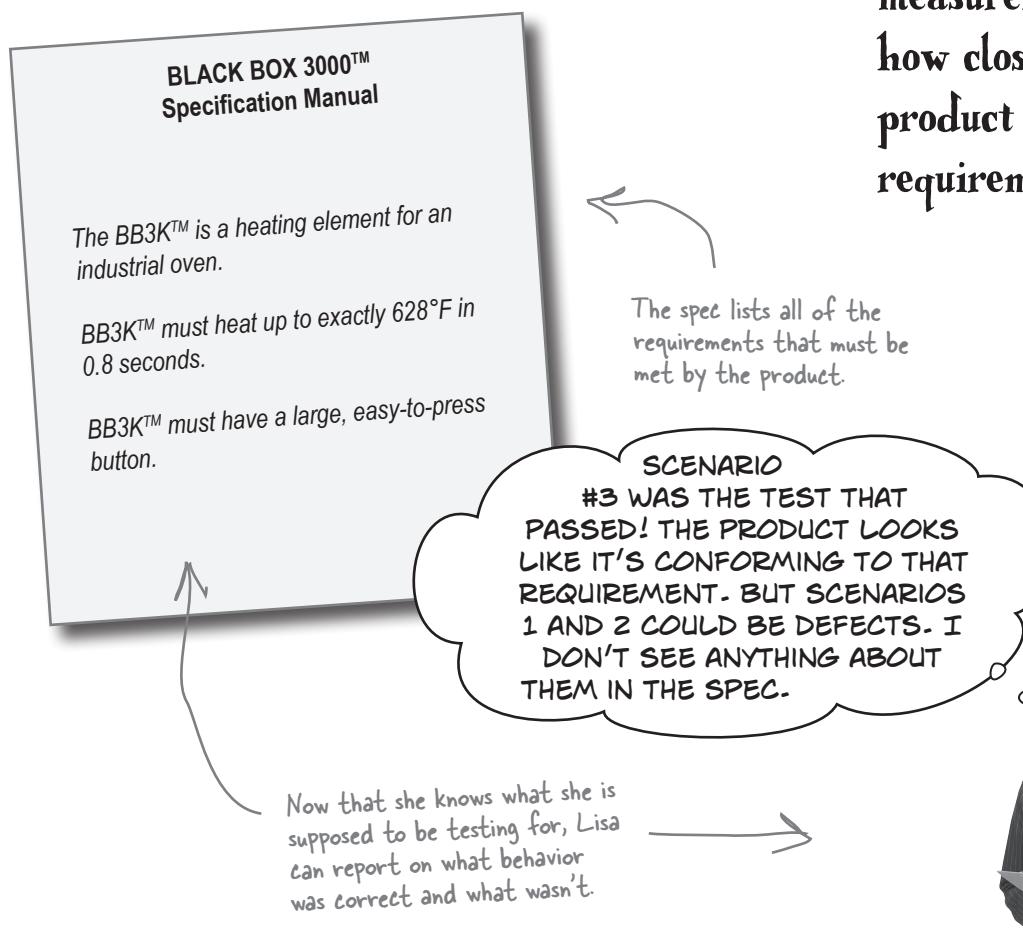
How does Lisa know which of these boxes is working, and which failed her test?



## Once you know what the product is supposed to do, it's easy to tell which tests pass and which fail

Testing is all about checking to be sure that the product does what it is supposed to do. That means that you need to have a good idea of what it is supposed to do to judge its quality. That's why the most important concept in defining quality for the PMP exam is **conformance to requirements**. That just means that your product is only as good as the requirements you have written for it. To say that something is a high-quality product means that it fulfills the requirements your team agreed to when you started the work.

That's why getting the Collect Requirements process right is so important!



**Quality is the measurement of how closely your product meets its requirements.**



## Quality up close

There are a few general ideas about quality that will help you understand a little better where the PMP exam is coming from. A lot of work has been done on quality engineering in the past 50 years or so that was originally focused on manufacturing. Those ideas have been applied to product quality over lots of different industries. Here are a few concepts that are important for the exam.

**Customer satisfaction** is about making sure that the people who are paying for the end product are happy with what they get. When the team gathers requirements for the specification, they try to write down all of the things that the customers want in the product so that you know how to make them happy.

Some requirements can be left **unstated**, too. Those are the ones that are implied by the customer's explicit needs. In the end, if you fulfill all of your requirements, your customers should be really satisfied.

**Fitness for use** is about making sure that the product you build has the best design possible to fit the customer's needs. Which would you choose: a product that's beautifully designed, well constructed, solidly built, and all around pleasant to look at but does not do what you need, or a product that does what you want despite being really ugly to look at and a pain in the butt to work with?

You'll always choose the product that fits your needs, even if it's seriously limited. That's why it's important that the product both does what it is supposed to do and does it well.

This idea came from a quality theorist named Joseph Juran.

**Conformance to requirements** is the core of both customer satisfaction and fitness for use. Above all, your product needs to do what you wrote down in your requirements specification. Your requirements should take into account both what will satisfy your customer and the best design possible for the job.

In the end, your product's quality is judged by whether you built what you said you would build.

Quality is a measure of how well your product does what you intend.

Customer needs should be written down as requirements before you start to build your product. That way, you can always plan on building the right thing.

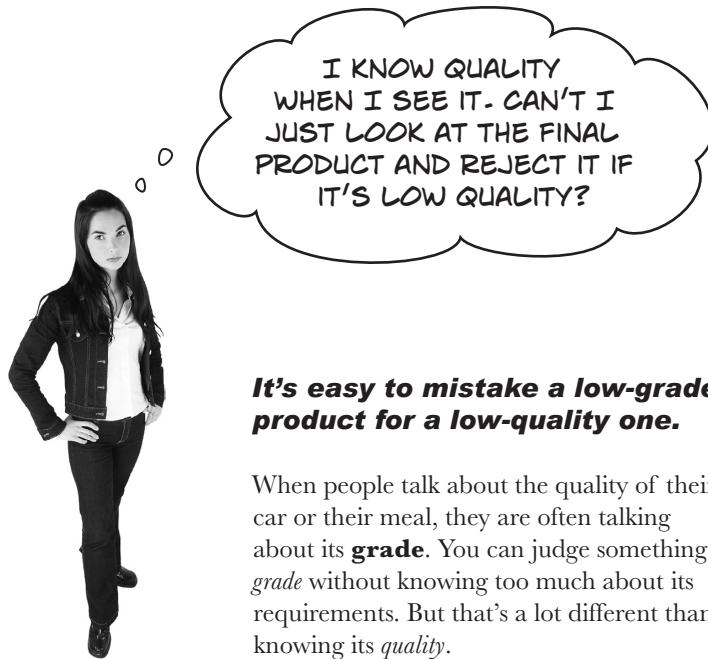
Some requirements are just common sense—like a product that people hold can't be made from toxic stuff that kills you. It might not be stated, but it's definitely a requirement.



You could pound in a nail with a screwdriver, but a hammer is more fit for the job.

Philip Crosby made this idea popular in the early 1980s. It's been really important to quality engineering ever since.

That means conforming to both stated and implied requirements.



***It's easy to mistake a low-grade product for a low-quality one.***

When people talk about the quality of their car or their meal, they are often talking about its **grade**. You can judge something's *grade* without knowing too much about its requirements. But that's a lot different than knowing its *quality*.

## Quality vs. grade

You can eat a lobster platter for dinner, or you can eat a hot dog. They are both types of food, right? But they have very different tastes, looks, feels, and most importantly, cost. If you order the lobster in a restaurant, you'll be charged a lot more than if you order a hot dog. But that doesn't mean the lobster is a higher-quality meal. If you'd ordered a salad and got lobster or a hot dog instead, you wouldn't be satisfied.

Quality means that something does what you needed it to do. Grade describes how much people value it.

Higher-grade stuff typically costs more, but just because you pay more for something doesn't mean it does what you need it to do.



The lobster is a high-grade meal; the hot dog is a low-grade one. But they're both low quality if you actually wanted a salad.



## Sharpen your pencil

Take a look at each of these situations and figure out if they're talking about quality or grade.

1. You ordered mushrooms on your pizza, but you got onions.

Quality

Grade

3. The pizza arrived, but it had canned mushrooms.

Quality

Grade

2. You called the pizza parlor to complain and the guy yelled at you.

Quality

Grade

4. The pizza was cold.

Quality

Grade

5. You just got a brand new luxury car that cost a whole lot of money.

Quality

Grade

7. Your neighbors make fun of you because your chrome hubcaps aren't very classy...

Quality

Grade

6. But it's in the shop every two weeks.

Quality

Grade

8. ...even though they do a great job of protecting the wheels from dirt, which is why you bought them in the first place.

Quality

Grade

You probably didn't tell the salesman you needed the car to work, but you expected it to. That's an unstated requirement.

→ Answers on page 466.

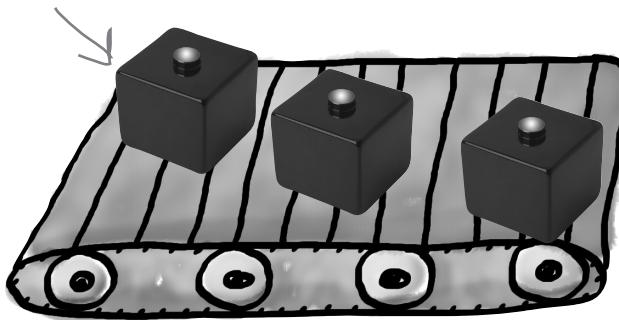


We've talked about how you can't simply test the product to figure out its quality. Can you think of ways that you can make a product's quality higher?

## "An ounce of prevention..."

It's not enough to go to the dentist to get your cavities filled. You need to brush your teeth every day. The same goes with product quality. If you focus on preventing mistakes on your project before they happen, you are more likely to get the product done on time and without spending too much money.

10% of the Black Boxes have buttons  
that stick when you press them.



We could hire a lot more inspectors to check to see if each of the products has a sticky button and send it for repair...

## And that's why you need the three Quality Management processes!

There are **three processes** in the Quality Management knowledge area, and they're all designed to make sure that you and your team deliver the highest quality product that you can.

**Plan Quality Management** is like the other planning processes you've learned about—you create a Quality Management plan to help guide you and your team through quality activities.

**Manage Quality** is where you take a step back and look at how well your project fits in with your company's overall quality standards and guidelines.



**When it comes to defects, prevention is always better than inspection!**

OR  
WE COULD CHANGE THE DESIGN TO MAKE THE BUTTON A MILLIMETER SMALLER AND ELIMINATE THE PROBLEM ALTOGETHER.



**Control Quality** is the Monitoring and Controlling process where you look at each deliverable and inspect it for defects.



Which of these activities are prevention, and which are inspection?

1. You find that 40% of the sneakers your factory makes have the left foot insole put into the right shoe and the right insole put into the left shoe. So, you print an L on the underside of the left insole so that factory workers can tell them apart more easily.

Prevention       Inspection

2. The applications being built by your programming team have lots of bugs. So you add extra test cycles and make them longer and more intensive to try to find more problems before you ship.

Prevention       Inspection

3. The applications being built by your programming team have lots of bugs. So you write up coding standards that will guide everyone in building the product with more attention to quality.

Prevention       Inspection

4. Some of the Black Boxes being built at the factory are only heating up to 500 degrees when the button is pushed. So you set up an automated button presser to press each one and measure its temperature as it comes off of the assembly line.

Prevention       Inspection

5. You set up code reviews at important milestones in your project to catch defects as early as you can.

Prevention       Inspection

6. The programmers on your team write unit tests before they write the code for the application they're writing. That helps them to think of ways that the application's design might go wrong and avoid major pitfalls.

Prevention       Inspection



## Exercise Solution

Which of these activities are prevention, and which are inspection?

1. You find that 40% of the sneakers your factory makes have the left foot insole put into the right shoe and the right insole put into the left shoe. So, you print an L on the underside of the left insole so that factory workers can tell them apart more easily.

Prevention

Inspection

The focus here is on making sure that no more defects happen, rather than on finding them.

2. The applications being built by your programming team have lots of bugs. So you add extra test cycles and make them longer and more intensive to try to find more problems before you ship.

Prevention

Inspection

Catching the bugs after they've been put in the product is not the most efficient way to deal with this problem. It will cost more money and take longer.

3. The applications being built by your programming team have lots of bugs. So, you write up coding standards that will guide everyone in building the product with more attention to quality.

Prevention

Inspection

This is a much better way of dealing with the same problem. It focuses on making sure the bugs never make it into the software rather than finding them and fixing them.

4. Some of the Black Boxes being built at the factory are only heating up to 500 degrees when the button is pushed. So you set up an automated button presser to press each one and measure its temperature as it comes off of the assembly line.

Prevention

Inspection

This one is also focused on finding the problems once they're in the product.

5. You set up code reviews at important milestones in your project to catch defects as early as you can.

Prevention

Inspection

6. The programmers on your team write unit tests before they write the code for the application they're writing. That helps them to think of ways that the application's design might go wrong and avoid major pitfalls.

Prevention

Inspection

# Plan Quality is how you prevent defects

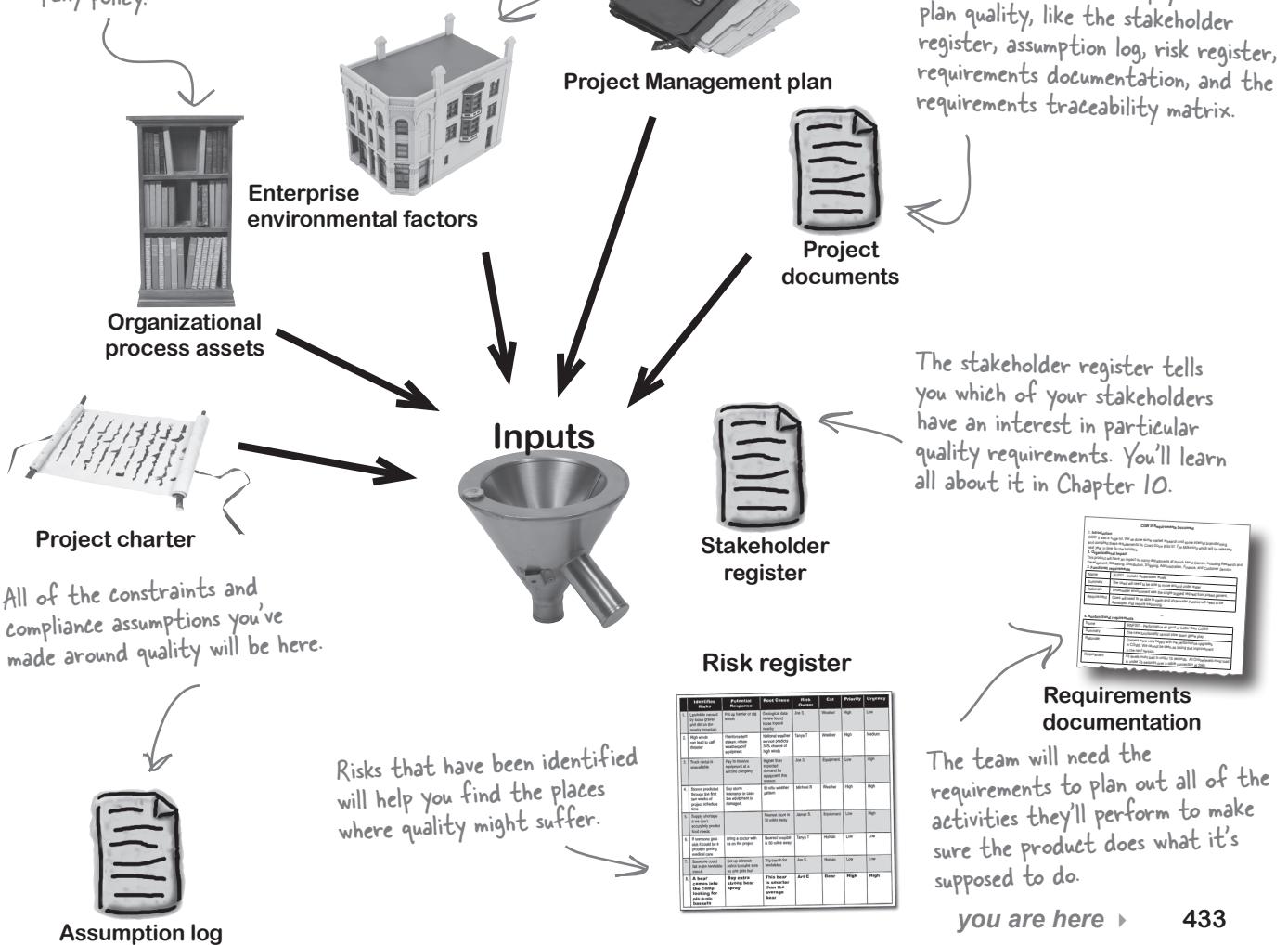
Since prevention is the best way to deal with defects, you need to do a lot of planning to make sure that your product is made with as few defects as possible. The **Plan Quality Management process** focuses on taking all of the information available to you at the beginning of your project and figuring out how you will measure your quality and prevent defects.



Your company should have a quality policy that tells how it measures quality across the organization. You should make sure your project follows the company policy.

Any company or governmental rules or regulations on how you need to plan quality for your project are considered enterprise environmental factors.

Here's where you'll find the scope baseline, the Requirements Management plan, the Risk Management plan, and the Stakeholder Engagement plan.



Identified Risk	Description	Risk Priority	Risk Exposure	Risk Owner	Est.	Priority	Targeted
1. Localized road will be closed during construction.	High priority risk due to traffic issues.	Medium	Very High	John D.	Medium	High	Low
2. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Very High	John D.	Medium	High	Medium
3. Third world is unavailable.	Very low priority risk due to availability of third world.	Low	Medium	John E.	Low	Low	Low
4. Power outages during construction.	Medium priority risk due to power issues.	Medium	Medium	John F.	Medium	High	High
5. Power outages during construction.	Medium priority risk due to power issues.	Medium	Medium	John G.	Medium	High	High
6. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John H.	Medium	Medium	Medium
7. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John I.	Medium	Medium	Medium
8. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John J.	Medium	Medium	Medium
9. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John K.	Medium	Medium	Medium
10. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John L.	Medium	Medium	Medium
11. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John M.	Medium	Medium	Medium
12. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John N.	Medium	Medium	Medium
13. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John O.	Medium	Medium	Medium
14. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John P.	Medium	Medium	Medium
15. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John Q.	Medium	Medium	Medium
16. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John R.	Medium	Medium	Medium
17. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John S.	Medium	Medium	Medium
18. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John T.	Medium	Medium	Medium
19. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John U.	Medium	Medium	Medium
20. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John V.	Medium	Medium	Medium
21. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John W.	Medium	Medium	Medium
22. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John X.	Medium	Medium	Medium
23. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John Y.	Medium	Medium	Medium
24. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John Z.	Medium	Medium	Medium
25. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John A.	Medium	Medium	Medium
26. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John B.	Medium	Medium	Medium
27. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John C.	Medium	Medium	Medium
28. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John D.	Medium	Medium	Medium
29. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John E.	Medium	Medium	Medium
30. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John F.	Medium	Medium	Medium
31. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John G.	Medium	Medium	Medium
32. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John H.	Medium	Medium	Medium
33. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John I.	Medium	Medium	Medium
34. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John J.	Medium	Medium	Medium
35. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John K.	Medium	Medium	Medium
36. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John L.	Medium	Medium	Medium
37. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John M.	Medium	Medium	Medium
38. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John N.	Medium	Medium	Medium
39. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John O.	Medium	Medium	Medium
40. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John P.	Medium	Medium	Medium
41. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John Q.	Medium	Medium	Medium
42. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John R.	Medium	Medium	Medium
43. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John S.	Medium	Medium	Medium
44. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John T.	Medium	Medium	Medium
45. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John U.	Medium	Medium	Medium
46. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John V.	Medium	Medium	Medium
47. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John W.	Medium	Medium	Medium
48. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John X.	Medium	Medium	Medium
49. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John Y.	Medium	Medium	Medium
50. Localized road will be closed during construction.	Medium priority risk due to traffic issues.	Medium	Medium	John Z.	Medium	Medium	Medium

# How to plan for quality

You need to plan out which activities you're going to use to measure the quality of the product of your project. And you need to be sure that the activities you plan are going to pay off in the end. So you'll need to think about the cost of all of the quality-related activities you want to do. Then you'll need to set some guidelines for what you're going to measure against. Finally, you'll need to design the tests you're going to run when the product is ready to be tested.



## Data gathering

**Benchmarking** means using the results of Plan Quality on other projects to set goals for your own. You might find that the last project your company did had 20% fewer defects than the one before it. You would want to learn from a project like that, and put in practice any of the ideas the company used to make such a great improvement. Benchmarks can give you some reference points for judging your own project before you even get started with the work.

**Brainstorming.** We'll learn more about this technique in Chapter 11. Teams use brainstorming to identify the best way to manage quality on the project.

**Interviews.** The people participating in the project have a lot of information from their experience that can help you plan quality management.

## Data analysis

**Cost-benefit analysis** is looking at how much your quality activities will cost versus how much you will gain from doing them. The costs are easy to measure; the effort and resources it takes to do them are just like any other task on your schedule. Since quality activities don't actually produce a product, though, it is harder for people to measure the benefits sometimes. The main benefits are less rework, higher productivity and efficiency, and more satisfaction from both the team and the customer.



That makes sense. A team that is making a high-quality product will be really proud of their work.

**Cost of quality** is what you get when you add up the cost of all of the prevention and inspection activities you are going to do on your project. It doesn't just include the testing. It includes any time spent writing standards, reviewing documents, meeting to analyze the root causes of defects, doing rework to fix the defects once the team finds them—absolutely everything you do to ensure quality on the project.



Cost of quality can be a good number to check whether your project is doing well or having trouble. If your company tracks cost of quality on all of its projects, you could tell if you were spending more or less than the others are, so you can get your project up to snuff.

quality management

**Expert judgment** means going directly to the people with expertise and getting their help.

### Decision making

**Multicriteria decision analysis** let you analyze multiple issues and prioritize so that you can work on the most important ones first.

### Test planning

This is where you apply the scientific method to create a set of tests for your project's deliverables. It's a *statistical* method, which means you use statistics to analyze the results of your experiments to determine how your deliverables best meet the requirements. A lot of quality managers use this technique to produce a list of tests that they'll run on the deliverables, so they have data to analyze later.



### Exercise

Read each of these scenarios and identify which tool or technique is being used.

1. You look through your company's asset library and find that a recent project was able to reduce defects by 20% by inserting defect prevention meetings early in the construction phase. You put the same process in your quality plan and set the target for shipped defects to be 20% lower than the company average for your project.

Tool/technique: .....

2. You add up all of the costs projected for quality activities and track that number in your Quality Management plan. You use this number to gauge the health of your project compared to other projects in your company.

Tool/technique: .....

3. You write up a list of all of the tests you are going to run on the Black Box 3000™ when it rolls off the assembly line. You determine what kinds of failures might cause you to stop testing, what it would take for you to resume test activities, and requirements that the product would need to fulfill to be considered accepted into test.

Tool/technique: .....

Answers on page 467.

# The Quality Management plan gives you what you need to manage quality

Once you have your Quality Management plan, you know your guidelines for managing quality on your project. Your strategies for monitoring your project quality should be included in the plan, as well as the reasons for all of the steps you are taking. It's important that everyone on the team understands the rationale behind the metrics being used to judge success or failure of the project.

## Outputs



The Quality Management plan is the main output of Plan Quality Management. It's a subplan of the Project Management plan.

**The Quality Management plan is the main tool for preventing defects on your project.**

A metric is just a number you use to measure your product's quality.

Even though this number is part of Cost Management, you'll often measure it in your Quality Management plan because it's part of customer satisfaction on the project.

### BLACK BOX 3000™ Quality Management Plan

#### Project Background:

The project goal is to create as many industrial heating elements as possible with no defects. Past problems included sticky buttons and difficulty testing the product. This was corrected when a specification was given to the test team.

#### Goals for Project Metrics:

Metric	Goal	Rationale	How we'll do it
Schedule variance	<5%	Because shipments of Black Boxes are planned with clients in advance, very few delays are acceptable.	Track any activities that might cause delays. Use extra resources if necessary to meet the deadline.
Defect density	0 High priority 2 Medium priority 5 Low priority (defects per thousand Black Boxes)	Defect repair is extremely costly. We need to get as many products shipped as possible on the first try.	Set up defect prevention activities early in the process. Monitor the results of inspections and adjust if necessary.

#### Defect Prevention Plan:

**Outputs****Project Management plan**

**Project Management plan updates** might need to be made because the Quality Management planning process identifies new risks or activities that add to the scope of the project. Those changes would be made in the Risk Management plan and the scope baseline.

The stakeholder register might need to be updated if you find new stakeholders in the course of planning quality activities.



Stakeholder register

**Quality metrics** are the kinds of measurements you'll take throughout your project to figure out its quality. If you're running a project to install windows in a skyscraper, and 15% of them have to be reinstalled because they were broken, that's an important metric. You'll probably want to work with your company to bring that number down.

Here's where you document how you'll be figuring out the product's quality. You need to write down the formulas you'll use, when you will do the measurements, why you are taking them, and how you will interpret them.

**Project document updates** might need to be made because you have found new information in the course of planning your quality activities that affects one of the other plans you've already made. That's why this process includes an output for making those kinds of changes.



## WHAT'S MY PURPOSE

Match each Plan Quality output to its description.

Quality Management plan

Updates to the stakeholder register, risk register, and lessons learned, to name a few.

Project Management plan updates

Helps you to plan out all of your quality activities.

Project documents updates

Describes how you'll measure a particular attribute of a deliverable during testing.

Quality metrics

Updates to the scope baseline and Risk Management plan

Answers on page 467.

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### there are no Dumb Questions

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**Q:** Why do you need to track the cost of testing?

**A:** You mean **cost of quality**, right? Cost of quality isn't just the cost of testing. It's the cost of all of your quality activities. Even preventive activities like spending time writing checklists and standards are part of it. The reason you track cost of quality is that it can tell you a lot about the health of your project as a whole.

Say you find you're spending twice as much on quality activities as you are on building your product. You need to use that number to start asking some questions about the way the work is being done.

Are people not doing enough up front to prevent defects, and adding a lot of expensive test activities at the end of the project to compensate? Is the design not clear, so your team needs to do a lot of rework trying to get what the customer needs? There are many reasons that could be causing a high cost-of-quality number, but you wouldn't even know to ask about them if *you didn't track it*.

**Q:** How do you know your benchmarks before you start building?

**A:** That's what your organizational process assets are for. Since your company keeps a record of all of the projects that have been done over the years, those projects' quality measurements can help you gauge how your project will perform too. If your company knows that all of the projects in your division had a cost of quality that was 40% of the overall cost of development, you might set 40% cost of quality as a benchmark for your project as well. Your company might have stated a goal of having a schedule variance of plus or minus 10% on all projects for this calendar year. In that case, the schedule variance is a benchmark for your project.

**Q:** I don't really have good requirements for my projects because everyone on the team starts out with just a good idea of what we're building. How do I handle quality?

**A:** You should never do that. Remember how you spent all that time collecting requirements in the Collect Requirements process? Well, this is why you needed them. And it's why it's **your** responsibility to make sure that the project starts out with good, well-defined, and correct requirements. If you don't have them, you can't measure quality—and quality is an important part of project management.

Without requirements, you have no idea what the product is supposed to do, and that means you can't judge its quality. You can learn a lot about a product by testing it, but if you don't know its requirements, a product could pass all of its tests and still not do what the customer expects it to do. So having good requirements really is the only way to know whether or not your product is high quality.

# Inspect your deliverables

It's not enough to inspect the final product. You must look at all of the things that you make throughout a project to find bugs. In fact, the earlier you find them, the easier they are to fix. The **Control Quality process** is all about inspecting work products to find defects.



## LAST WEEK

Lisa looked for defects in the parts as they were being made.

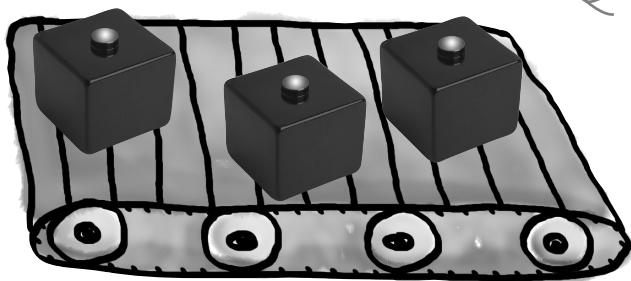


She also inspected the blueprints for the Black Box when they were designed.



## TODAY

Lisa takes a good look at a sample of all of the products that are about to be shipped to Black Box 3000™ customers.



Control Quality is in the Monitoring and Controlling process group. As in Control Scope and Control Costs, you look at the work performance information that is coming from your project and compare it to your plan. ***If there are problems, you recommend a change. That way, you can either fix the problem or make sure that it doesn't happen again.***



How would you use your checklists and metrics to inspect all of the deliverables and find defects?

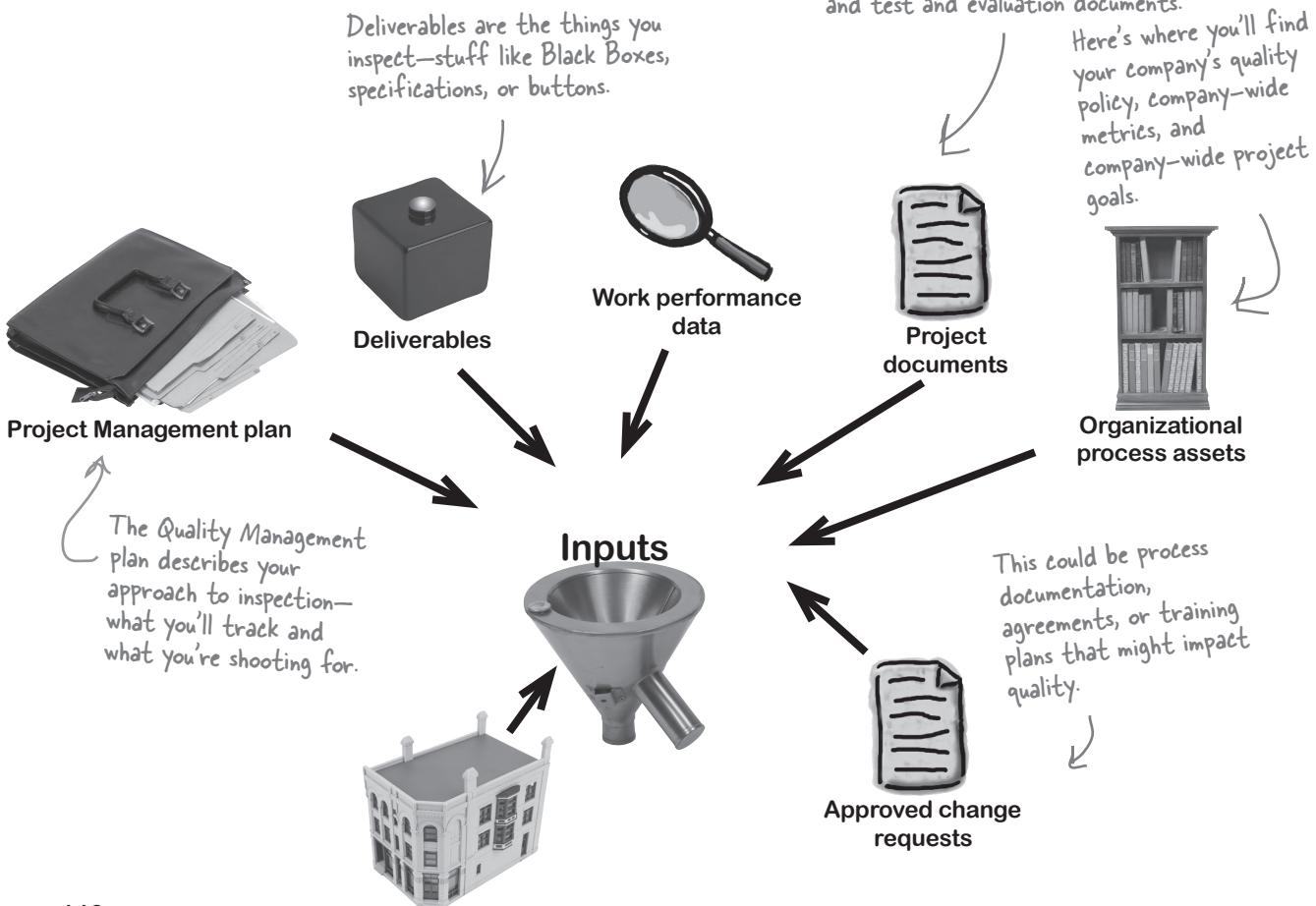
# Use the planning outputs for Control Quality

You've come up with a plan to make sure each deliverable is right. Now it's time to monitor the work that's being done to the requirements—and that's just a matter of following your plan! You'll need to look at everything that is being produced and make sure that it stands up to all of the requirements that have been gathered. And you'll need nearly everything you produced in Plan Quality Management in order to get a handle on your product's quality.

**Metrics make it easy for you to check how well your product meets expectations.**

Metrics tell what and how you are going to measure your product's quality. Other documents you might use here are lessons learned, and test and evaluation documents.

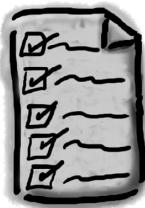
Here's where you'll find your company's quality policy, company-wide metrics, and company-wide project goals.



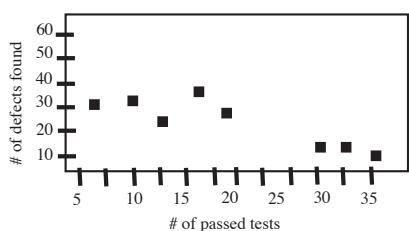


# Tools for data gathering

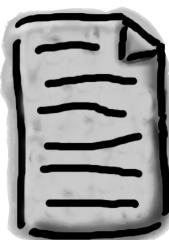
You'll need to gather data about the product or service your project is building to understand its quality. Expect a bunch of questions on these tools in the exam!



**Checksheets** allow you to collect data on the product under test. Checksheets are sometimes called *checklists* or *tally sheets*. You can use them to organize the test activities you'll be performing and track whether the product passes or fails tests. Checksheets are often used as a means of gathering the data that's displayed in trending and charting tools.



**Statistical sampling** is when you look at a representative sample of something to make decisions. For example, you might look at a selection of widgets produced in a factory to figure out which quality activities would help you prevent defects in them. Statistical sampling helps you make decisions about your product without looking at each and every thing you make. Lisa is responsible for the quality of the Black Box 3000™, but there's no way she can inspect each one as it comes off the assembly line. It makes sense for her to take a sample of the products and inspect those. From that sample she can learn enough about the project to make good judgments.



**Questionnaires and surveys** can be used to gather feedback from customers when they've had some time to use the product. Sometimes a defect is higher priority to a customer than the team anticipated, and surveys can uncover the customer's perception of a product in a way that otherwise might be difficult for the team to understand.

**Meetings** are also a tool for Control Quality. (Meetings are not part of data gathering, but a tool on their own.)



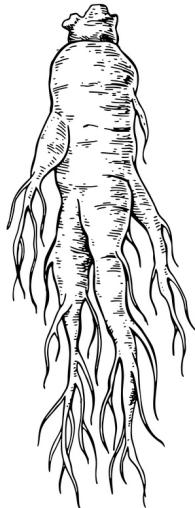
Oops! This is part of the template for the page. We forgot to change it! Too bad we didn't catch this when we were performing quality management.

## Tools for data analysis

Once you have all of the data you have gathered from quality checksheets, surveys, and statistical sampling, you need to analyze it and look for differences between what you expected when you planned the project and how it is currently performing.



**Performance reviews** are how you and your team will evaluate the current measurements of your product's quality in comparison to the measurements you expected to see. Say you set a threshold in your Quality Management Plan for a software project that it should not contain more than 10 noncritical priority defects per 10,000 lines of code. In a performance review, you would review the number of defects encountered during tests to understand if the product was meeting that quality threshold.



**Root cause analysis** is all about evaluating the product your project is creating to understand why defects are occurring. It's not enough to just find the problem, you need to trace it back to the thing that caused it. Sometimes you'll end up asking "Why?" again and again until you finally identify a cause of multiple problems, which you can then fix with more impact than if you'd just fixed the initial problem.

Taiichi Ohno, one of the first Lean thinkers, popularized the idea of root cause analysis by asking "Why?" five times to find the root of problems encountered as part of the Toyota Production System. This technique came to be called "the five whys."



Can you think of an example of a problem that appeared to be isolated on a project you've managed but was actually related to other problems you were seeing? How might root cause analysis have helped you solve those issues?

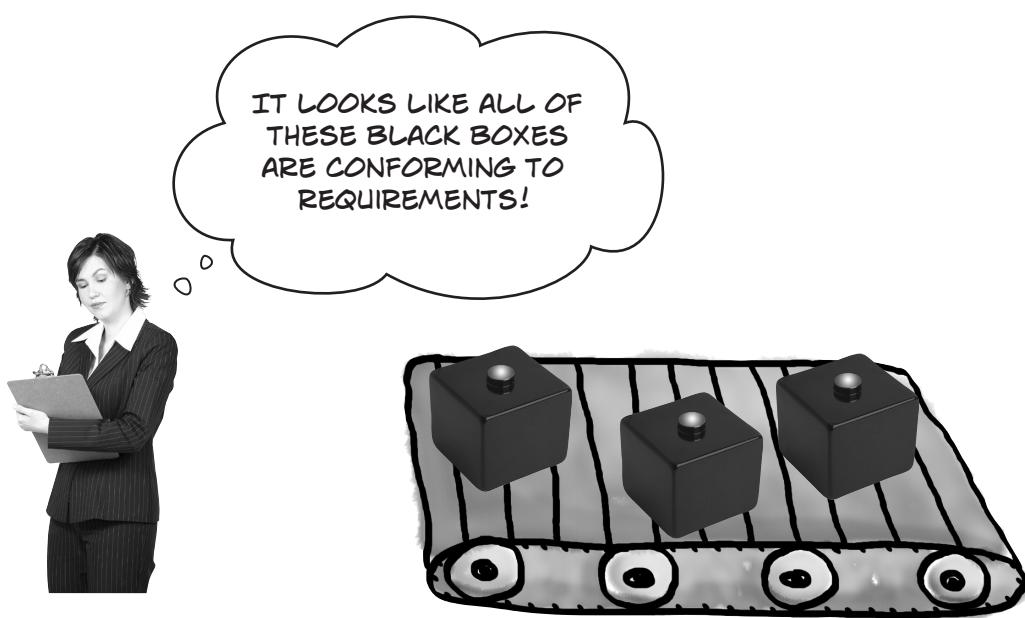


## Inspection, testing, and product evaluation

As soon as you create deliverables on your project, your team inspects, tests, and evaluates them to make sure that they are meeting the standards you set when you were planning.

**Inspection** means comparing the deliverables in your project to the standards you've created for them. If deliverables don't meet your project's standards, you've found a defect. It's not just the product of your project that gets inspected, though. You can inspect any interim deliverable as you go—and the sooner you inspect and find defects in a deliverable, the less expensive it is to fix. That's why many agile practices focus on the creator of a document or product inspecting their own work as they build and using peer reviews to inspect deliverables before calling them done.

**Testing/product evaluations** are planned as part of the Plan Quality process. As new deliverables are made available throughout your project, the team tests them to understand how much they conform to the requirements that have been defined up front. Where the product doesn't behave as specified, that's considered a defect. Usually teams will review all of the defects found during testing to determine whether or not they need to be fixed and the impact of making those fixes on other planned work.

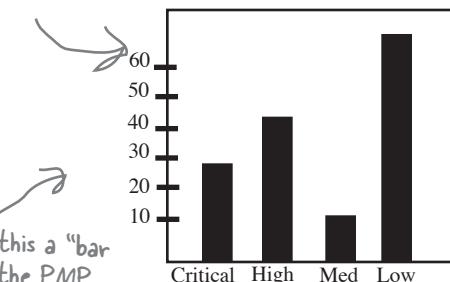


# Tools for data representation

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Once you've gathered data and analyzed it, you'll need to show the data to other people to help drive decisions. These tools for data representation help visualize your data so that everyone in your project can use it to get a handle on quality in your project.

This product probably isn't ready to ship—it still has a lot of bugs. But at least you know that the bugs aren't all critical!



Don't call this a "bar chart"! In the PMP world, a bar chart is another name for a Gantt chart, which is a kind of project schedule.

The PMBOK® Guide does refer to a histogram as a "vertical bar chart," so you might see that term where you might normally see "bar chart."

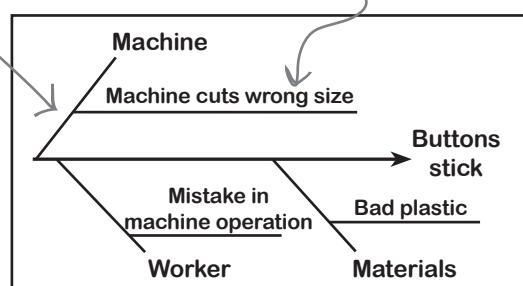
**Histograms** give you a good idea of how your data breaks down. If you heard that your product had 158 defects, you might think that they were all critical. So looking at a chart like this one would help you to get some perspective on the data. A lot of the bugs are low priority. It looks like only 28 or so are critical. Histograms are great for helping you to compare characteristics of data and make more informed decisions.

**Cause and effect diagrams** are also called **fishbone** and **Ishikawa** diagrams. They are used to figure out what caused a defect. You list all of the categories of the defects that you have identified and then write the possible causes of the defect you are analyzing from each category.

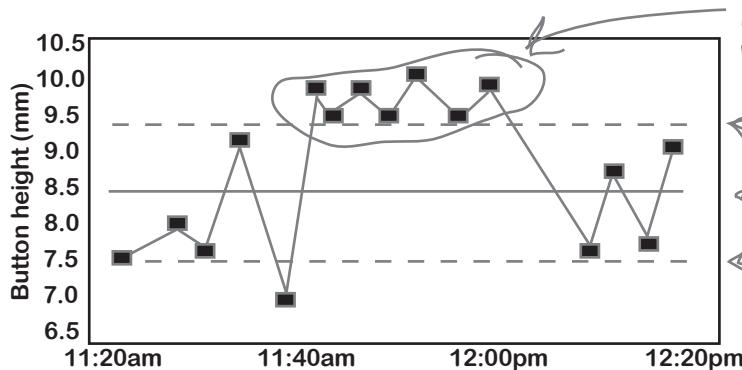
Fishbone diagrams help you **see all of the possible causes** in one place so you can think of how you might prevent the defect in the future.

The vertical "fishbone" lines are categories to help you find and organize the root causes of defects.

Horizontal lines show the root causes you've found for each category.



Fishbone or Ishikawa diagram

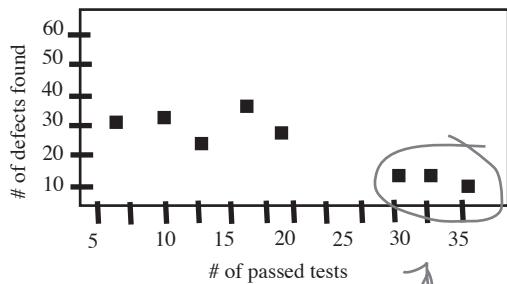


These points are showing the Rule of Seven AND that this process is out of control.

- There are three lines on a control chart. The first one is the upper control limit.
- Mean is the average height in your sample of buttons.
- The lower control limit is the last line. This one represents the shortest that you want the buttons to be.

**Control charts** are a way of visualizing how processes are doing over time. Let's say that the button on each Black Box needs to be between 7.5 and 9.5 millimeters tall, and the chart above represents sample height measurements of boxes being made. Since we want the boxes to all be between 7.5 mm and 9.5 mm, the **lower control limit** of the chart is 7.5 mm, and the **upper control limit** is 9.5 mm. The chart above shows control limits as dashed lines. The **mean** is the solid line in the middle, and it shows the average height of all of the buttons in the sample. By looking at the chart above, you can see that there are a lot of buttons that were taller than 9.5mm manufactured and only one that was shorter than 7.5mm. When a data point falls outside of the control limits, we say that data point is **out of control**, and when this happens we say that the **entire process is out of control**. It's pretty normal to have your data fluctuate from sample to sample. But when seven data points in a row fall **on one side of the mean**, that's an uncommon enough occurrence that it means your process might have a problem. So when you see this, you need to look into it and try to figure out what's going on. That's called the **rule of seven**, and *you'll definitely see questions about it on the PMP exam.*

When you're looking at the whole process, that's called Manage Quality—and it's coming up next.

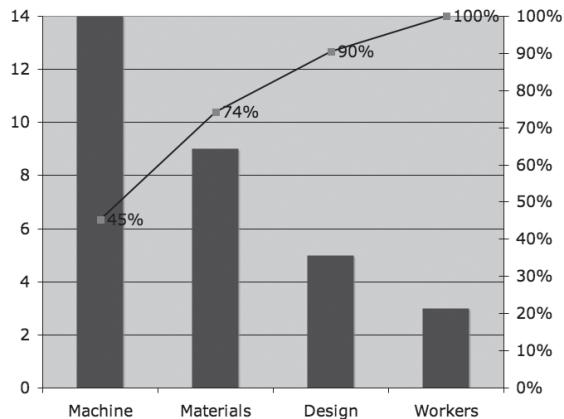


**Scatter diagrams** show how two different types of data relate to each other. If you worked with your test team to create a bunch of new tests, you might use a scatter diagram to see if the new test cases had any impact on the number of defects you found. The chart here shows that as more test cases pass, fewer defects are found.

When the number of tests passing goes up, fewer defects are found.



Answer the questions about the Black Box 3000™ using the Control Quality charts below.



Which root cause is responsible for the most defects in the project?

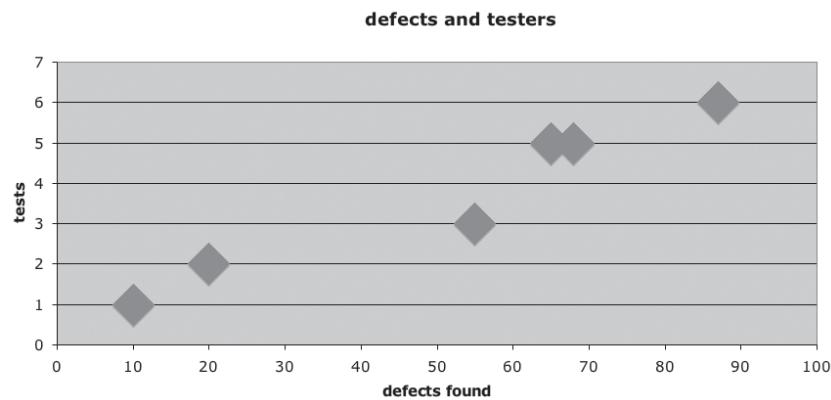
.....

What is the lowest-priority area for defect prevention?

.....

What is the cumulative percentage of machine, materials, and design defects?

.....



Did adding more tests find more bugs?

.....

Where did you see the biggest increase in defect detection?

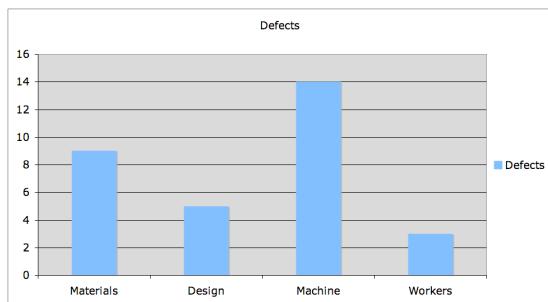
.....

Looking at this chart, should you continue to add more tests to the project?

.....

In other words, did adding extra tests help you find more defects?

Hint: Look for a gap in the chart that shows you how adding an extra test caught a lot more defects.



How many machine defects were found?

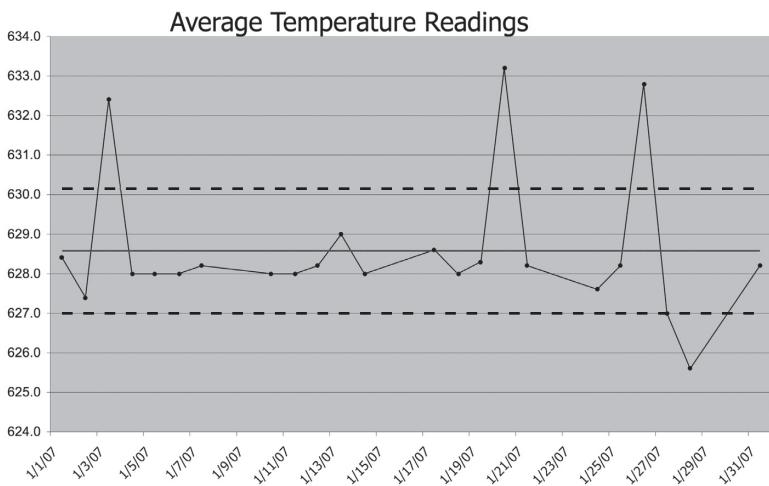
.....

How many defects were caused by workers?

.....

How many total defects are shown on this chart?

.....



Circle the data points that make up the rule of seven.

Is this process in control?

.....

What's the upper control limit?

.....

What's the mean temperature reading?

.....

What's the lower control limit?

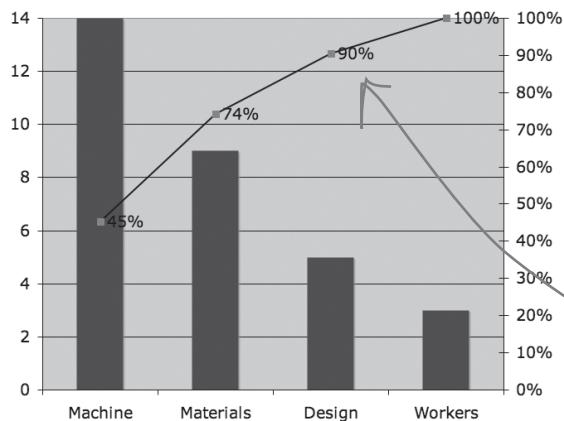
.....



## Exercise Solution

Answer the questions about the Black Box 3000™ using the Control Quality charts below.

This is a type of histogram called a Pareto chart that's used to plot out the frequency of defects and sort them in descending order.



You have the most machine defects. So, that's the root cause you should tackle first.

Which root cause is responsible for the most defects in the project?

**Machine**

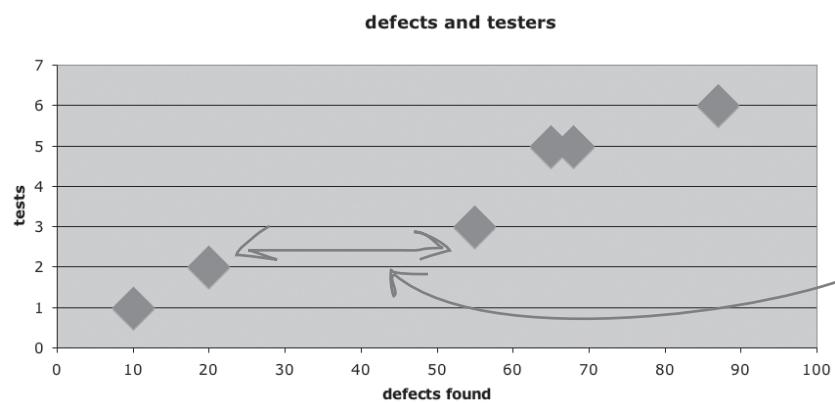
What is the lowest-priority area for defect prevention?

**Workers**

What is the cumulative percentage of machine, materials, and design defects?

**90%**

Since you don't have very many worker-related defects, they're the lowest priority for improvement tasks.



The gap between 2 and 3 was the largest, so that's where we had the biggest jump in defect detection.

Did adding more tests find more bugs?

**Yes**

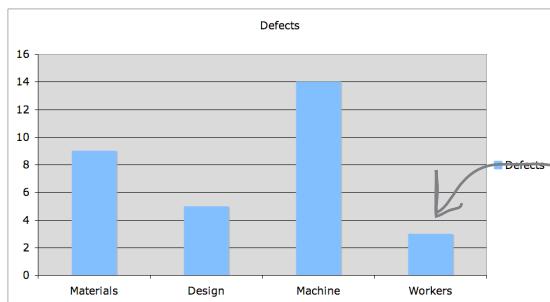
Looks like the number of defects found kept increasing as you added more tests.

Looking at this chart, should you continue to add more tests to the project?

**Yes**

Where did you see the biggest increase in defect detection?

**Three tests**



How many machine defects were found?

14

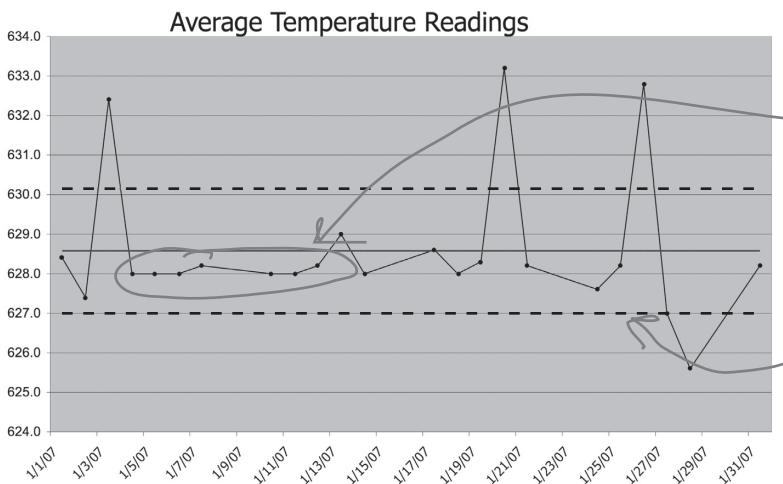
How many defects were caused by workers?

3

How many total defects are shown on this chart?

31

Adding up all of the numbers in the chart tells you how big the dataset is.



Looks like there's something worth investigating here. There are seven data points in a row that are on the lower side of the mean.

The lower limit is the bottom line and the mean is in the middle.

Circle the data points that make up the rule of seven.

Is this process in control?

No

The points both above and below the control limits tell us that the process is out of control.

What's the upper control limit?

630.2

What's the mean temperature reading?

628.6

What's the lower control limit?

627

# Question Clinic: The which-one question



YOU'LL SEE A LOT OF QUESTIONS ON THE EXAM THAT DESCRIBE A SITUATION AND ASK YOU TO IDENTIFY THE TOOL, TECHNIQUE, OR PROCESS THAT'S BEING USED OR IS MOST APPROPRIATE. LUCKILY, PROCESS OF ELIMINATION IS REALLY USEFUL WHEN YOU SEE A WHICH-ONE QUESTION.

This can't be right—it's not even a tool! It's just a rule.

The run chart just tells you trends, and that's not what you're looking for.

The histogram will show you categories of defects, but not root cause.

83. You're managing a project to install 13,000 light switches in a new strip mall. You hire a team of inspectors to help your lead electrician find any defective light switches. They check a sample of 650 light switches, and find that 15% of them are defective. You ask your lead electrician to produce a diagram that shows the root cause of defects.

- A. Rule of seven
- B. Run chart
- C. Histogram
- D. Ishikawa diagram

Aha! This is what a Ishikawa diagram is for. It shows you how a number of defects can be attributed to the same root cause.

WHEN YOU THINK ABOUT IT, ALL QUESTIONS ARE WHICH-ONE QUESTIONS...BUT WHEN THE QUESTION ASKS TO CHOOSE ONE ITEM FROM A LIST OF FOUR REALLY SIMILAR OR RELATED THINGS, THEN THAT'S WHEN YOU REALLY GET TO WORK YOUR WAY BACKWARD AND START ELIMINATING THEM ONE AT A TIME.



# HEAD LIBS



Fill in the blanks to come up with your own which-one question! Start by thinking of the correct tool and then figure out three really similar answers that sound right, but can't be because the question gives more specific details, allowing you to eliminate the wrong ones.

You're working on a \_\_\_\_\_ project, and you want to  
measure \_\_\_\_\_ . Which of the seven basic tools of  
quality is best for doing that?

- A. \_\_\_\_\_  
(an obviously wrong tool)
- B. \_\_\_\_\_  
(something that isn't a tool at all)
- C. \_\_\_\_\_  
(another incorrect tool)
- D. \_\_\_\_\_  
(the right answer)

# Control Quality means finding and correcting defects

When you look for bugs in your deliverables, you produce two kinds of things: outputs from the inspections and outputs from the repairs you've made. All of the **outputs of the Control Quality process** fall into those two categories.

## Outputs



**Quality control measurements** are all of the results of your inspections: the numbers of defects you've found, numbers of tests that passed or failed—stuff like that. You'll use them when you look at the overall process you are using in your company to see if there are trends across projects.

That's coming up next in the Quality Assurance process.



Project documents updates

You might need to update templates for quality metrics or checklists.

**Lessons learned updates** are where you keep a record of all of the major problems that you solve in the course of your project so that you can use them later.

**Test and evaluation documents** are records of quality activities that are performed through the course of the project and their results. It's a good idea to keep records of the results of reviews and quality tests.

There's just one output here, project documents updates. You'll store your lessons learned and records of your completed checklists along with all of the other documents for your project.

## Project Management plan updates

You may need to update the Quality Management plan, which is a subplan of the Project Management plan.

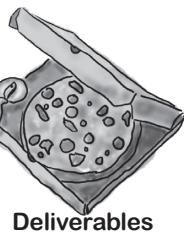


Project Management plan updates

You might need to update the PM plan because of what you find in Control Quality.

First the team inspects every deliverable to find defects that need to be fixed.

**Verified deliverables and validated changes** are two of the most important outputs of Control Quality. Every single deliverable on the project needs to be inspected to make sure it meets your quality standards. If you find defects, the team needs to fix them—and then those repairs need to be checked, to make sure the defects are now gone.



When you've finished inspecting your product, you know whether or not your fixes worked.



**Work performance information** might include all of the data your quality processes are producing. Once you've looked at the results of your quality tools, you might find places where the processes you're using to build your product need to be changed. The data you collect in the Control Quality process can help you make those kinds of changes.

## there are no Dumb Questions

**Q:** What exactly are Pareto charts for?

**A:** Pareto charts go together with the **80/20 rule**. It says that 80 percent of the problems you'll encounter in your project are caused by 20 percent of the root causes you can find. So if you find that most of your problems come from misunderstanding requirements, changing the way you gather requirements and making sure that everybody understands them earlier in the process will have a big impact on your project's quality.

To get the data for your Pareto chart, first you have to categorize all of the defects that have been found in your project by their root causes. Then you can graph them in a Pareto chart to show the frequency of bugs found with each root cause and the percentage of the cumulative defects that are caused by each root cause. The one with the highest frequency is the root cause that you should work on first.

**Q:** If I am trying to prevent quality problems, why can't I just test more?

**A:** You can find a lot of problems by testing. If you find them during testing, then you have to go back and fix them. The later you find them, the more expensive they are to fix. It's much better for everybody if you never put the bugs in the product in the first place. It's much easier to fix a problem in a specification document than it is to fix it in a finished product. That's why most of the Plan Quality Management process group is centered on setting standards and doing reviews to be sure that bugs are never put into your product and, if they are, they're caught as early as possible.

**Q:** I still don't get that thing where a control chart can show you defects that are out of control, but also show you that your process is out of control.

**A:** The reason that's a little confusing to some people is that you use the same tool to look at defects that you do when you're looking at the whole process.

A lot of the time, you'll use charts to measure processes, not just projects. They're used to look at sample data from processes and make sure that they operate within limits over time. But they are considered Control Quality tools because those data samples come from inspecting deliverables as they are produced. Yes, it's a little confusing, but if you think of control charts as the product of inspection, you'll remember that they are Control Quality tools for the test.

### BULLET POINTS: AIMING FOR THE EXAM

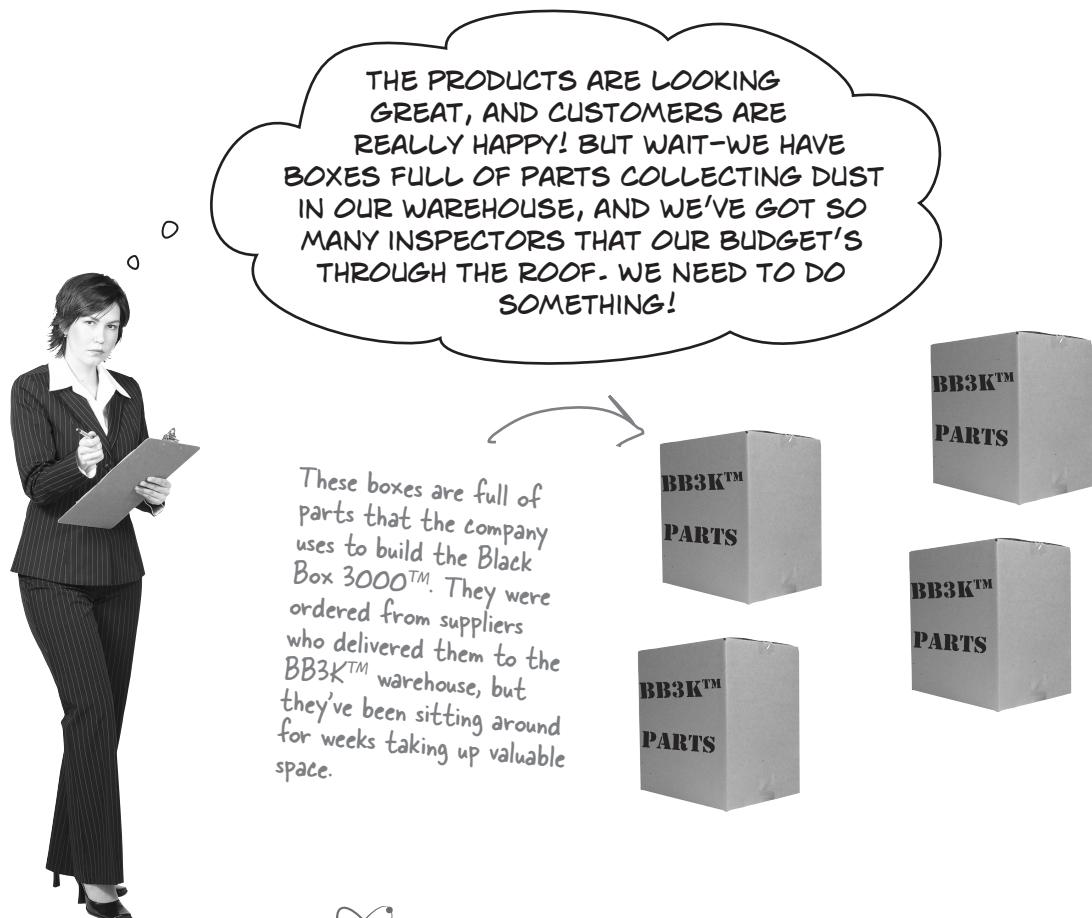
- **Inspection** means **checking each deliverable** for defects. That means checking your specs and your documentation, as well as your product, for bugs.
- The better you plan the quality activities for your project, the **less inspection** you need.
- Ishikawa diagrams help you to **pinpoint the causes** of defects.
- The **rule of seven** means that any time you have seven data points in a row that fall on the same side of the mean on a control chart, you need to figure out why.
- When data points fall above the upper limit or below the lower limit on a control chart, the process is out of control.
- For the test, using any of the seven basic quality tools is **usually** a good indication that you are in the Control Quality process.
- **Ishikawa, fishbone**, and **cause-and-effect** diagrams are all the same thing.
- **Scatter charts** help you look at the **relationship** between two different kinds of data.
- **Flowcharts** help you get a handle on how processes work by showing all of the decision points graphically.
- **Grade** refers to the **value** of a product, but not its quality. So, a product can be low-grade by design, and that's fine. But if it's a low-quality product, that's a big problem.

# Trouble at the Black Box 3000™ factory

It's not enough to inspect your deliverables. Sometimes it's the way you work that's causing your problems. That's why you need to spend some time thinking about how you will make sure you are doing the work efficiently and with as few defects as possible. The **Manage Quality process** is about tracking the way you work and improving it all of the time.



**Executing  
process  
group**

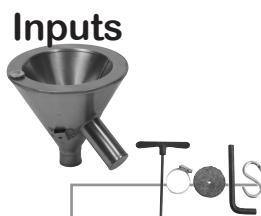


What do you do if the quality is good but you aren't satisfied with the speed or efficiency of the work?

# Introducing Manage Quality

In the **Manage Quality process**, you take all of the outputs from Plan Quality Management and Control Quality and look at them to see if you can find ways to improve your process. If you find improvements, you recommend changes to your process and your individual project plan to implement them.

This is in the Executing group because you need to make sure your project is done in a way that complies with your company's quality standards.



This includes lessons learned, quality control measurements, quality metrics, and your risk report

**Plan Quality Management tools and techniques** are all of the tools you used in Plan Quality. They come in handy when you're reviewing your process, too.

**Control Quality tools and techniques** are all of the tools from Control Quality. You can use histograms, control charts, and flowcharts—all of them can be used to help you figure out how your process is working.

**Quality improvement methods** are how you use data from performing quality practices to improve the way your project team does their work. Plan-do-check-act (which you'll learn about later in this chapter) is a common quality improvement method.

**Problem solving** is exactly what it sounds like. Fixing quality problems means actually figuring out what's causing the problems and coming up with new solutions for them.

**Quality audits** are reviews of your project by your company. They figure out whether or not you are following the company's process.

**Design for X** is when you design your product to solve a specific problem. The goal could be to improve performance or reduce operating costs as an example.

## Outputs



Project Management plan updates



Change requests



Project documents updates



Quality reports

The project documents that get updated are quality audits, training plans, and process documentation.



Test and evaluation documents

# Tools

## A closer look at some tools and techniques

Fixing the bugs in your project solves the problems that give you trouble. But fixing bugs in your **process** means that other projects can learn from the problems you've faced and avoid your project's bugs altogether. The tools that are used in quality assurance are the same as the ones in quality control, but they're used to examine the process rather than the project.

**Quality audits** are when your company reviews your project to see if you are following its processes. The point is to figure out if there are ways to help you be more effective by finding the stuff you are doing on your project that is inefficient or causes defects. When you find those problem areas, you recommend corrective actions to fix them.

Even if your company has the best process in the world, it doesn't do your project any good if you don't follow it!

A lot of companies have Quality Assurance departments whose job is to perform these audits and report findings from projects to a process group.

**Design for X** means designing your product to solve a particular problem. You might design a product to be particularly fast or to use fewer resources or to run in a distributed environment, for example. By designing to optimize a specific aspect of your product, you might be able to deliver higher value to a customer than if you had focused only on feature delivery.

**Quality management and control tools** are the same ones you already know about from earlier in this chapter. But instead of using them to look for problems with specific defects, you'll use them to look at your overall process. A good example of this is using a control chart to see if your whole process is in control. If it's not, then you'll want to make a change to the whole way you do your work in order to bring it under control.

Here's another example. If you created a Pareto chart that showed all of the defects in all of your projects, you could find the one or two categories of defects that caused problems for the whole company. Then you could get all of the PMs together to figure out an improvement that they could all make that would help the whole company.



How would **you** use these tools to manage your project?

## More ideas behind managing quality

There are a couple more things you need to know about managing quality. These are some of the most important ideas behind modern quality and process improvement.

**Kaizen** means continuous improvement. It's all about constantly looking at the way you do your work and trying to make it better. *Kaizen* is a Japanese word that means **improvement**. It focuses on making small improvements and measuring their impact. Kaizen is a philosophy that guides management, rather than a particular way of doing quality assurance.

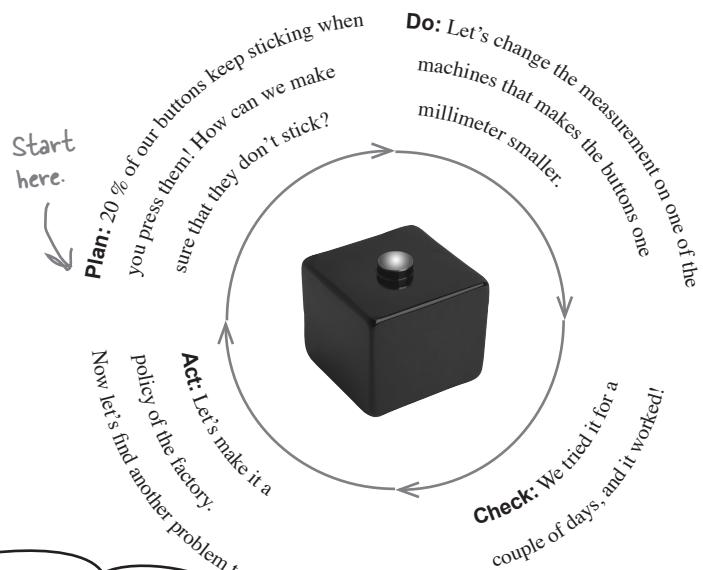
**Just-in-time** means *keeping only the inventory you need on hand when you need it*. So, instead of keeping a big inventory of parts sitting around, the Black Box company might have only the parts it needs for that day. Some companies have done away with warehouses altogether and have production lines take the parts directly off the trucks to do the work. If you're working in a just-in-time shop, quality is really important because **there isn't any extra inventory to deal with mistakes**.



WAIT A MINUTE! IN THE BEGINNING OF THE BOOK, YOU SAID THAT PROJECTS WERE TEMPORARY. THIS STUFF IS ALL ABOUT PROCESSES! WHAT GIVES?

Plan-Do-Check-Act was created by Walter Shewhart, who also created the control chart while he was working at Bell Labs in the 1920s.

**Plan-Do-Check-Act** is one way to go about improving your process, and it's used by a lot of Kaizen practitioners. It was popularized by a well-known quality theorist named W. Edwards Deming and is also known as the Deming Cycle. Plan-Do-Check-Act is about *making small improvements*, and *measuring how much benefit they make before you change your process* to include them. Here's how it works:



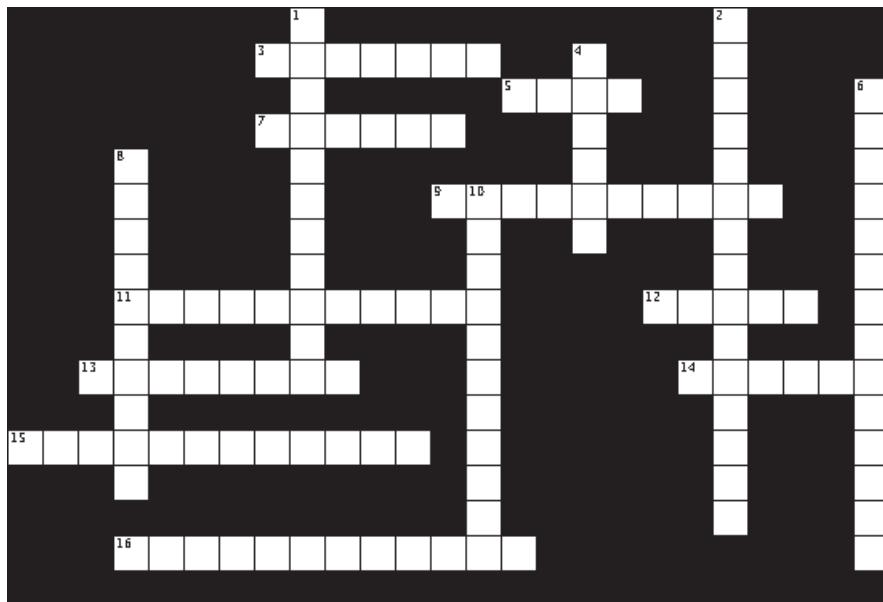
**You're right. The Manage Quality process is all about improving the process**,

and that isn't what most of project management is about. But your project is really affected by the process you are working in, so you should fully understand it and help to make it better wherever you can. The bottom line is that your project has a better chance of succeeding if you stay involved with process improvement and keep your eye on how your project stacks up to your company's expectations of quality and process.



## Qualitycross

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

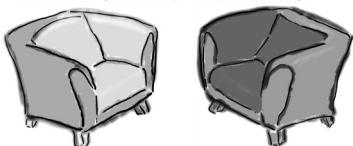
3. When a process has data points above the upper limit or below the lower limit, those data points are out of \_\_\_\_\_.
5. The middle line on a control chart.
7. The quality theorist who popularized Plan-Do-Check-Act.
9. \_\_\_\_\_ is more important than inspection in Quality Management.
11. An important definition of quality is \_\_\_\_\_ to requirements.
12. Tool used to make sure your project is following the company's process.
13. What you compare your work performance information to.
14. Tool for finding the 20% of root causes responsible for 80% of defects.
15. Tool for comparing two kinds of data to see if they are related.
16. Tool used in Plan Quality Management to set numeric goals for your project.

### Down

1. Quality theorist who came up with the idea of fitness for use.
2. Tool for finding the root cause of a defect.
4. Synonym for continuous improvement.
6. Process where you inspect deliverables to look for defects.
8. Tools that help you visualize processes and all of their decision points.
10. Heuristic that says that seven data points on one side of the mean requires investigation.

→ Answers on page 468.

## Fireside Chats



Tonight's talk: **Two quality processes discuss the best ways to correct problems on your project.**

### Control Quality:

I'd like to go first, because I'm what most people think of as quality. Whenever you see one of those "Inspected by #8" stickers on the inside of your sneaker, that's me!

Whoa, there, buddy. That's a strong statement!

That's right. And don't forget, I'm everywhere. Any time you call for customer service, I'm there to tell you that your call will be recorded for quality purposes. I'm always warning you to make sure package contents haven't shifted, and to check your car's emissions once a year.

I guess I don't really understand exactly how you do your job, then, because I'm having a hard time figuring out how I would ever be able to take a long weekend.

Well, last week it was because the company logo came out upside-down on a bunch of the shoes. It turned out that the logo was being stitched into the leather and then put on another assembly line, and once in a while it was placed on the belt upside-down.

### Manage Quality:

You're right—most people do think that quality begins and ends with inspection. Which is funny, because we wouldn't even need you if people paid attention to me.

Now don't get me wrong. Nobody's ever felt comfortable enough with me that they've eliminated inspection entirely. You always need someone at the end of the line to look at what's been produced and make sure that we delivered what we meant to.

Right, but don't you get tired of doing all of that tedious work? An ounce of prevention is worth a pound of cure, after all.

Let's take a look at those sneakers you mentioned. What's the most common reason you throw a pair back to the factory floor to be restitched?

## **Control Quality:**

We had to throw out about 10% of our sneakers last week. Let's just say that the boss wasn't happy. You could see the little veins in his forehead throbbing. It was kind of gross.

The boss yelled at everyone, and we'll check even more carefully to make sure we don't ship it.

Wow, I never thought of that.

We'd have to pay someone else to paint that on. This is no time to be *increasing* our costs!

Huh. Um. No.

## **Manage Quality:**

That seems like an honest mistake. How much did it cost?

Wow, that sounds expensive. What's keeping it from happening again?

So next week your inspection costs will be even higher, and you'll probably still have to throw out just as many shoes, or more!

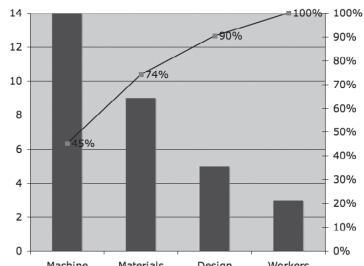
What if you painted a little arrow on the inside of the leather showing which direction the logo should be placed on the belt?

But a small increase in the cost of painting the leather will cause you to throw out a whole lot fewer sneakers.

I call that **cost of quality**. You have to pay more to put quality in at the beginning, but you can reduce the number of inspectors and scrap a lot less product. In the end, I save you far more money than I cost. Can you say the same about yourself?

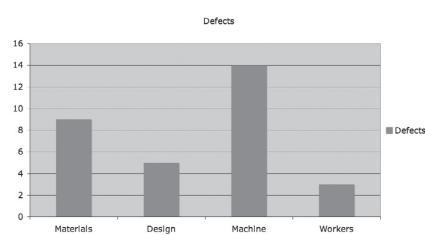


Choose whether the tools are being used in Control Quality or Manage Quality.



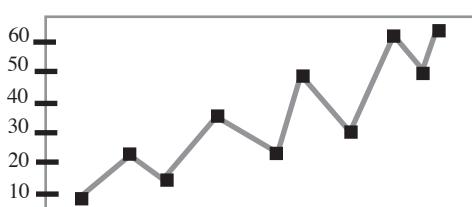
1. You use a Pareto chart to figure out which root causes are responsible for the most defects in the current batch of Black Boxes. It looks like most of them are coming from a machine calibration problem. So you run them back through the machine after recalibrating it.

Control Quality       Manage Quality



2. You use a histogram to look at the root cause category for all defects that have been found over the past year. You find that machine errors are habitually responsible for the largest number of errors across all batches of Black Boxes. You schedule machine calibration checks at the start of every shift to be sure that the machine is always set properly.

Control Quality       Manage Quality

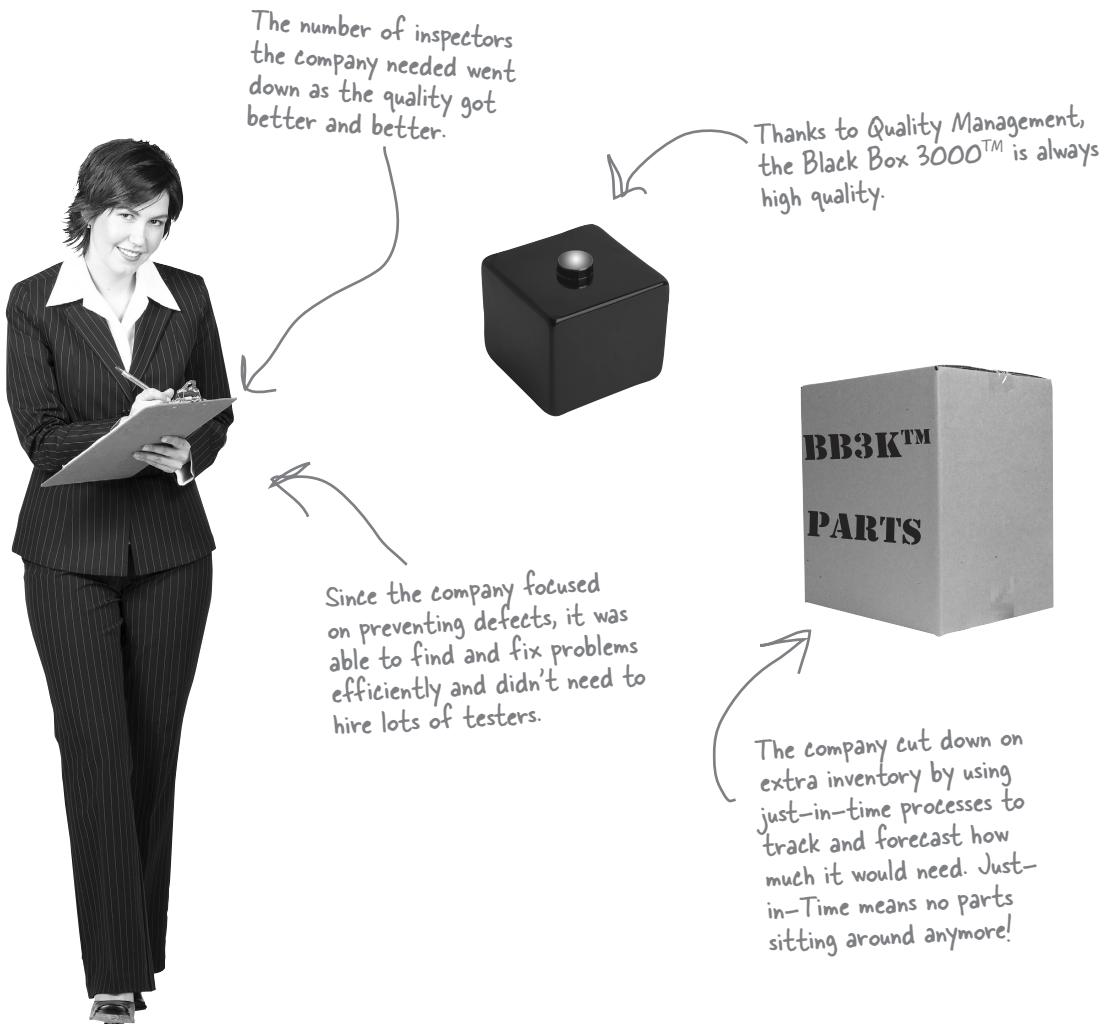


3. You look at defects in all of the inspection runs for the past year and notice that you seem to be finding more and more defects per inspection as time goes on. You create a quality task force to try to figure out what is causing these defects.

Control Quality       Manage Quality

# The Black Box 3000™ makes record profits!

People who bought the product were thrilled with it. They were happy that the Black Box company always kept its promises and the products were always high quality. The company managed to save a lot of money by implementing process improvement measures that caught defects before they cost too much money to fix. And Lisa got a big promotion—now she's in charge of quality assurance for the whole company. Great job, Lisa!





## KEY CONCEPT REVIEW

Building a high-quality product that meets the needs your project set out to solve is the goal of **Project Quality Management**. No matter what kind of project you are managing, the quality of the product or service you are producing is one of the most important aspects of your work.



### KEY CONCEPTS

We've talked about the processes you and your team will use when planning, controlling, and managing quality, but it's worth taking a minute to think about how your approach to quality management affects the overall project.

- ★ It's often tempting for teams to cut down on quality inspections and product evaluations when there's a time crunch. **Doing this can lead to missed defects** and expensive reactions to problems found late in your project that ultimately delay your project even further.
- ★ **Quality and grade** are different concepts. It's possible to intentionally build a low-grade product that is high quality and fit for specific use.
- ★ The earlier in the project that your team thinks about and addresses the overall quality of the product or service you're building, the more efficient your process will be. Thinking about quality during design is important. Building quality into the product up front and **introducing feedback loops** while you're building ensures that the product you build will have fewer defects to address as the project nears its close.
- ★ The most expensive way to find defects is to have the customer encounter them after your project has completed. The **least expensive** way to find them is to build a culture in your organization that is focused on **continuously improving** the way you work.

**QUALITY MANAGEMENT IS ABOUT MAKING SURE YOUR PROJECT PRODUCES A PRODUCT THAT DOES WHAT IT'S SUPPOSED TO DO.**



## TRENDS

Here are a few trends in Quality Management that might help you to improve and more effectively manage the quality activities for your projects.

- ★ **Continuous improvement** means constantly evaluating the processes you use to build products to see if they're building the highest-quality product as efficiently as possible. Teams focus on continuous improvement by measuring the output of their work, making small improvements, and then measuring the effects of those improvements in a plan-do-check-act cycle.
- ★ **Mutually beneficial partnerships with suppliers** are established when both the supplier and the customer share a view of quality and work to build quality in up front. That way, customers don't have to spend time looking for defects in products delivered by the supplier and slow down their own delivery.

## TAILORING



When you make changes to the processes your team will use during the course of your project, there are a few considerations that might influence your decisions:

- ★ Are there specific requirements your process needs to meet to be compliant with some regulation?
- ★ What's the culture of your organization around quality? Will your project fit into a larger continuous improvement culture in your organization? Are there metrics all teams work to produce to get a sense for how your project is working?
- ★ How much will other teams or upper management act as active stakeholders in your project? Will you need to get feedback from many sources to understand how your project is doing from a quality perspective?

## AGILE CONSIDERATIONS

Agile teams focus on implementing feedback loops in very short iterations, or sprints. You can think of a sprint in Scrum as a two-week Plan-Do-Check-Act Cycle with the retrospective at the end as a means of evaluating how well the process is working for the team. You can even think of the daily Scrum meeting as an inspection of the sprint's plan, where team members think about how likely the team is to reach their sprint goal and how to make adjustments to help each other deliver.



## Sharpen your pencil Solution

Take a look at each of these situations and figure out if they're talking about quality or grade.

1. You ordered mushrooms on your pizza, but you got onions.

Quality

Grade

3. The pizza arrived, but it had canned mushrooms.

Quality

Grade

2. You called the pizza parlor to complain and the guy yelled at you.

Quality

Grade

4. The pizza was cold.

Quality

Grade

- 
5. You just got a brand new luxury car that cost a whole lot of money.

Quality

Grade

7. Your neighbors make fun of you because your chrome hubcaps aren't very classy...

Quality

Grade

6. But it's in the shop every two weeks.

Quality

Grade

8. ...even though they do a great job of protecting the wheels from dirt, which is why you bought them in the first place.

Quality

Grade



## Exercise Solution

Read each of these scenarios and identify which tool or technique is being used.

1. You look through your company's asset library and find that a recent project was able to reduce defects by 20% by inserting defect prevention meetings early in the construction phase. You put the same process in your quality plan and set the target for shipped defects to be 20% lower than the company average for your project.

Tool/technique: **Benchmarking**

2. You add up all of the costs projected for quality activities and track that number in your Quality Management plan. You use this number to gauge the health of your project compared to other projects in your company.

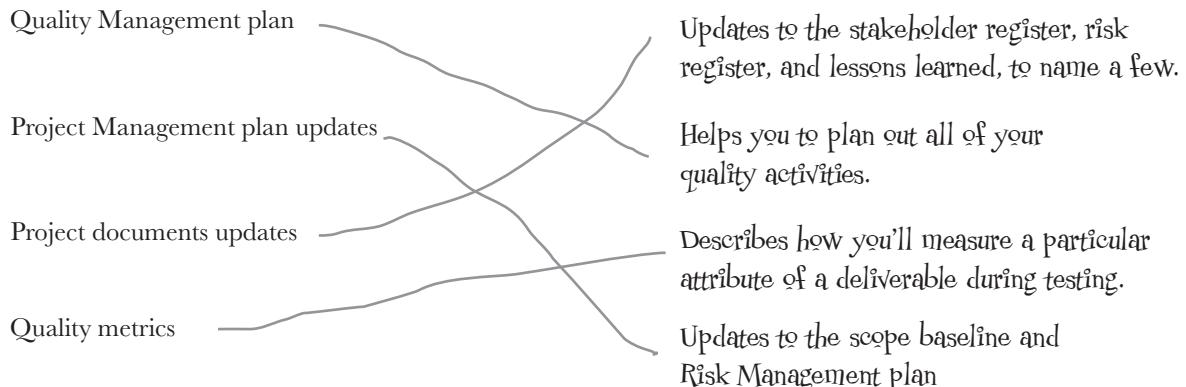
Tool/technique: **Cost of quality**

3. You write up a list of all of the tests you are going to run on the Black Box 3000™ when it rolls off the assembly line. You determine what kinds of failures might cause you to stop testing, what it would take for you to resume test activities, and requirements that the product would need to fulfill to be considered accepted into test.

Tool/technique: **Test planning**

## \* WHAT'S MY PURPOSE \*

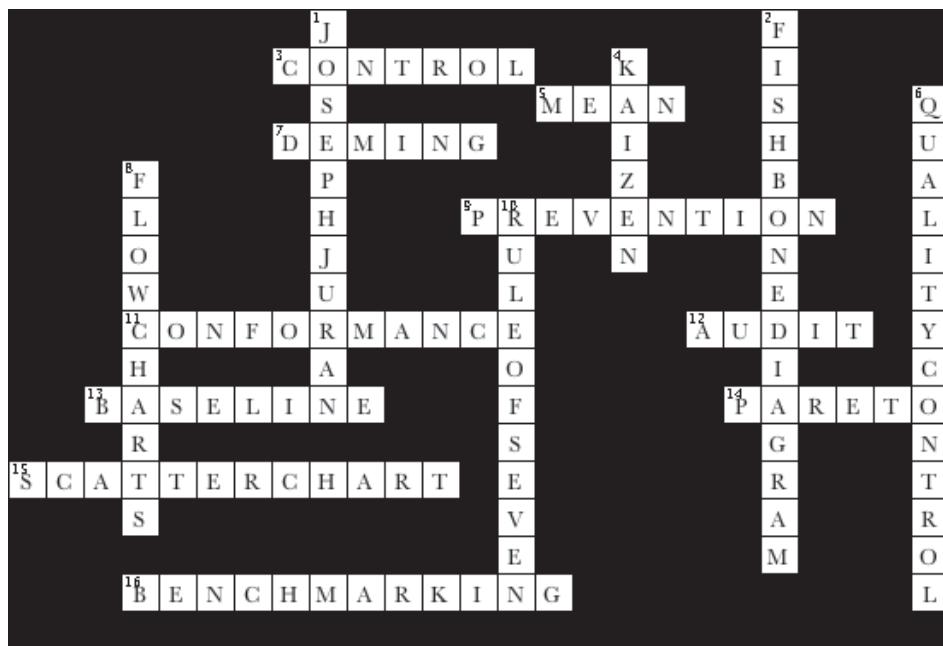
Match each Plan Quality output to its description.





# Qualitycross

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

3. When a process has data points above the upper limit or below the lower limit, those data points are out of \_\_\_\_\_.
5. The middle line on a control chart.
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16. Tool used in Plan Quality to set numeric goals for your project.

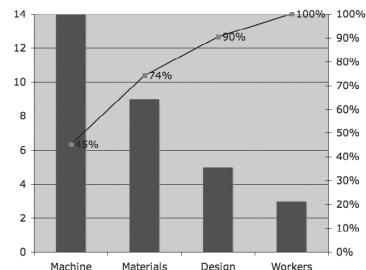
## Down

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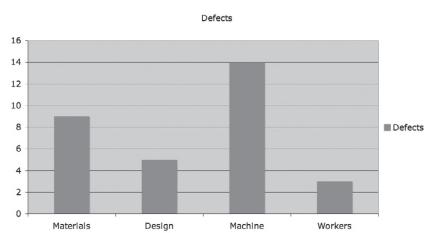
## Exercise Solution

Choose whether the tools are being used in Control Quality or Manage Quality.



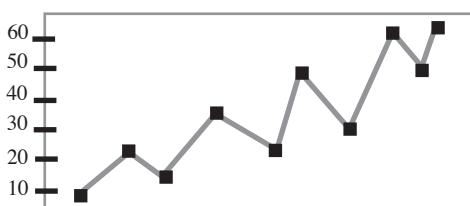
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Control Quality       Manage Quality



2. You use a histogram to look at the root cause category for all defects that have been found over the past year. You find that machine errors are habitually responsible for the largest number of errors across all batches of Black Boxes. You schedule machine calibration checks at the start of every shift to be sure that the machine is always set properly.

Control Quality       Manage Quality



3. You look at defects in all of the inspection runs for the past year and notice that you seem to be finding more and more defects per inspection as time goes on. You create a quality task force to try to figure out what is causing these defects.

Control Quality       Manage Quality

## Exam Questions

**1. Which of the following is NOT a part of quality?**

- A. Fitness for use
- B. Conformance to requirements
- C. Value to the sponsor
- D. Customer satisfaction

**2. A project manager is using a histogram to analyze defects found by the team during inspection activities. What process is being performed?**

- A. Plan Quality Management
- B. Control Quality
- C. Manage Quality
- D. Verify Scope

**3. Which of the following is NOT an example of cost of quality?**

- A. Having team members spend extra time reviewing requirements with the stakeholders
- B. Paying extra programmers to help meet a deadline
- C. Hiring extra inspectors to look for defects
- D. Sending a crew to repair a defective product that was delivered to the client

**4. You're working with an audit team to check that your company's projects all meet the same quality standards. What process is being performed?**

- A. Plan Quality Management
- B. Control Quality
- C. Manage Quality
- D. Perform Quality Management

**5. You're managing a project to deliver 10,000 units of custom parts to a manufacturer that uses just-in-time management. Which of the following constraints is most important to your client?**

- A. The parts must be delivered on time.
- B. The parts must be delivered in a specific order.
- C. The parts must conform to ISO specifications.
- D. The parts must be packaged separately.

## Exam Questions

6. Which of the following is NOT part of the Quality Management plan?

- A. Strategies for handling defects and other quality problems
- B. Guidance on how the project team will implement the company's quality policy
- C. Metrics for measuring your project's quality
- D. A description of which deliverables don't have to be inspected

7. Which of the following tools and techniques is used to show which categories of defects are most common?

- A. Control charts
- B. Pareto charts
- C. Checksheets
- D. Flowcharts

8. You're managing a highway construction project. The foreman of your building team alerts you to a problem that the inspection team found with one of the pylons, so you use an Ishikawa diagram to try to figure out the root cause of the defect. What process is being performed?

- A. Quality Management
- B. Plan Quality Management
- C. Control Quality
- D. Manage Quality

9. Which tool or technique is used to break data into categories for analysis?

- A. Scatter chart
- B. Histogram
- C. Checklist
- D. Flowchart

10. When is inspection performed?

- A. At the beginning of the project
- B. Any time a project deliverable is produced
- C. Just before the final product is delivered
- D. At the end of the project

## Exam Questions

- 11. What's the difference between Control Quality and Validate Scope?**
- A. Control Quality is done at the end of the project, while Validate Scope is done throughout the project.
  - B. Control Quality is performed by the project manager, while Validate Scope is done by the sponsor.
  - C. Control Quality is performed by the sponsor, while Validate Scope is done by the project manager.
  - D. Control Quality means looking for defects in deliverables, while Validate Scope means validating that the product is acceptable to the stakeholders.
- 12. You're a project manager at a wedding planning company. You're working on a large wedding for a wealthy client, and your company has done several weddings in the past that were very similar to the one you're working on. You want to use the results of those weddings as a guideline to make sure that your current project's quality is up to your company's standards. Which tool or technique are you using?**
- A. Checklists
  - B. Benchmarking
  - C. Design of experiments
  - D. Cost-benefit analysis
- 13. You are using a control chart to analyze defects when something on the chart causes you to realize that you have a serious quality problem. What is the MOST likely reason for this?**
- A. The rule of seven
  - B. Upper control limits
  - C. Lower control limits
  - D. Plan-Do-Check-Act
- 14. Which of the following BEST describes defect repair review?**
- A. Reviewing the repaired defect with the stakeholder to make sure it's acceptable
  - B. Reviewing the repaired defect with the team to make sure they document lessons learned
  - C. Reviewing the repaired defect to make sure it was fixed properly
  - D. Reviewing the repaired defect to make sure it's within the control limits
- 15. The project team working on a project printing 3,500 technical manuals for a hardware manufacturer can't inspect every single manual, so they take a random sample and verify that the manuals have been printed correctly. This is an example of:**
- A. Root cause analysis
  - B. Cost-benefit analysis
  - C. Benchmarking
  - D. Statistical sampling

## Exam Questions

16. What's the difference between Control Quality and Manage Quality?

- A. Control Quality involves charts like histograms and control charts, while Manage Quality doesn't use those charts.
- B. Control Quality and Manage Quality mean the same thing.
- C. Control Quality means inspecting for defects in deliverables, while Manage Quality means auditing a project to check the overall process.
- D. Manage Quality means looking for defects in deliverables, while Control Quality means auditing a project to check the overall process.

17. Which Control Quality tool is used to analyze processes by visualizing them graphically?

- A. Checklists
- B. Flowcharts
- C. Pareto charts
- D. Histograms

18. You are looking at a control chart to figure out if the way you are doing your project fits into your company's standards. Which process are you using?

- A. Plan Quality Management
- B. Manage Quality
- C. Control Quality
- D. Quality Management

19. Which of the following is associated with the 80/20 rule?

- A. Scatter chart
- B. Histogram
- C. Control chart
- D. Pareto chart

20. Validated defect repair is an output of which process?

- A. Integrated change control
- B. Plan Quality Management
- C. Control Quality
- D. Manage Quality

## Answers

~~Exam Questions~~**1. Answer: C**

It's important for projects to produce a valuable product, but value isn't really a part of quality. That's why earned value is part of Cost Management, not Quality Management.

**2. Answer: B**

In the Control Quality process, the team inspects the product for defects and uses the seven basic tools to analyze them. Since the defects came from inspection, you know it's Control Quality.

**3. Answer: B**

Cost of quality is the time and money that you spend to prevent, find, or repair defects.

**4. Answer: C**

The Manage Quality process is all about how well your company meets its overall quality goals.

Keep an eye out for fake process names like Perform Quality Management.

**5. Answer: A**

A manufacturer that uses just-in-time management is relying on its suppliers to deliver parts exactly when they're needed. This saves costs, because it doesn't have to warehouse a lot of spare parts.

But those parts had better not have a lot of defects, because there aren't a lot of spare parts lying around to do repairs!

**6. Answer: D**

Your project team needs to inspect ALL of the deliverables! That means every single thing that gets produced needs to be reviewed by team members, so they can find and repair defects.

**7. Answer: B**

A Pareto chart divides your defects into categories, and shows you the percentage of the total defects each of those categories represents. It's really useful when you have a limited budget for Plan Quality Management and want to spend it where it's most effective!

Don't forget that ALL deliverables need to be inspected, including the stuff you create—like the schedule, WBS, and Project Management plan. So you'll get defects for them, too!

# Answers

## ~~Exam Questions~~

**8. Answer: C**

Keep your eye out for questions asking you about Ishikawa or fishbone diagrams. When you use those tools to analyze defects, you're in the Control Quality process.



**Watch it!**

**Don't assume that just because you're using a fishbone diagram, you're always doing quality control!**

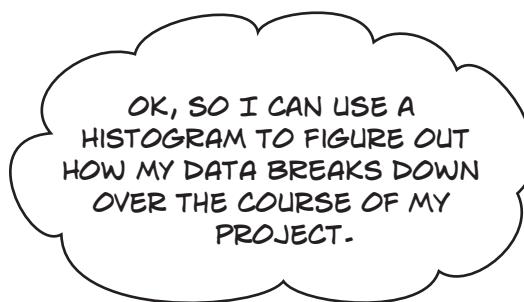
It's also used in Risk Management; you'll see that in Chapter 11. The key thing to watch for here is that the fishbone diagram is being used to find the root cause of a DEFECT, not a risk or something else.

**9. Answer: B**

A histogram is one of the seven basic tools of quality. It's a bar chart that can be used to show how your data breaks down.

**10. Answer: B**

Inspection is when your team examines something that they produced for defects...and every single deliverable needs to be inspected! That's what "prevention over inspection" means: if you produce a deliverable that's needed later in the project today, it's a lot cheaper to fix defects in it now than it will be when that deliverable is used later on in the project.

**11. Answer: D**

A lot of people get Control Quality and Validate Scope confused because they seem really similar. Both of them involve looking closely at deliverables to make sure that they meet requirements. But they serve really different purposes! You use Control Quality to find defects that you're going to repair. Validate Scope happens at the very end of the Executing phase; it's when you work with the stakeholder to get formal acceptance for the deliverables.

You'd better have found all the defects before you take the product to the customer!

**12. Answer: B**

Benchmarking is when you use previous projects to set quality guidelines for your current project. You can always find the results of the past projects in the organizational process assets.

~~Exam Questions~~**13. Answer: A**

The rule of seven tells you that when seven consecutive data points on your control chart come out on the same side of the mean, you've got a process problem. That sounds a little complicated, but it's actually pretty straightforward. Defects tend to be scattered around pretty randomly; in any project that makes a lot of parts, even if they're all within the specification, you'll get a couple of parts that are a little bigger, and a couple that are a little smaller. But if you have a bunch of them in a row that all run a little big, that's a good indication that something's gone wrong on your assembly line!

**14. Answer: C**

Going back and repairing defects can be a pretty risky activity, because it's really easy to introduce new defects or not fully understand why the defect happened in the first place. Answer C says exactly that: you go back and review the defects to make sure they're fixed.

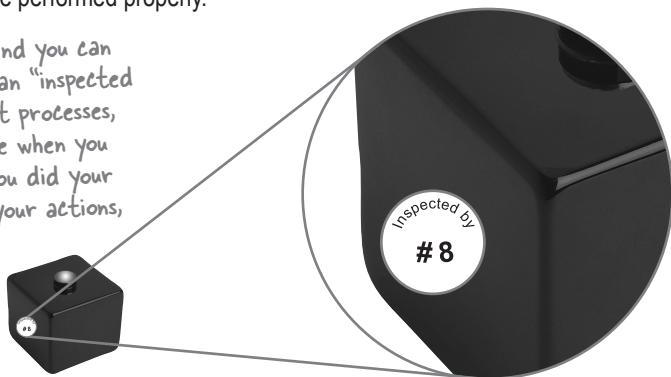
**15. Answer: D**

A lot of times it's impractical to check every single product that rolls off of your assembly line. Statistical sampling is a great tool for that; that's when you pull out a small, random sample of the products and inspect each of them. If they're all correct, then there's a very good chance that your whole product is acceptable!

**16. Answer: C**

A lot of people get confused about the difference between Control Quality and Manage Quality. Control Quality is where you inspect deliverables for defects, while Manage Quality is where you audit the project to make sure the quality activities were performed properly.

You inspect products for defects, and you can remember that because you'll find an "inspected by #8" tag in a product. You audit processes, and you can remember that because when you get audited, they're making sure you did your taxes correctly—they're auditing your actions, not a product.



# Answers

## ~~Exam Questions~~

### 17. Answer: B

A flowchart is one of the seven basic tools of quality. You use it to analyze processes that are part of your project in order to look for quality problems and inefficiencies.

### 18. Answer: B

You're analyzing the process, so you are using Manage Quality.



Just because you see a Control Quality tool, that doesn't mean you're in the Perform Control Quality process...because they're also tools used in Manage Quality! You always need to figure out what you're using them for.

### 19. Answer: D

Pareto charts are based on the 80/20 rule. They sort your defects in descending order by root cause. So you always know which 20% of root causes are responsible for 80% of defects on your project.

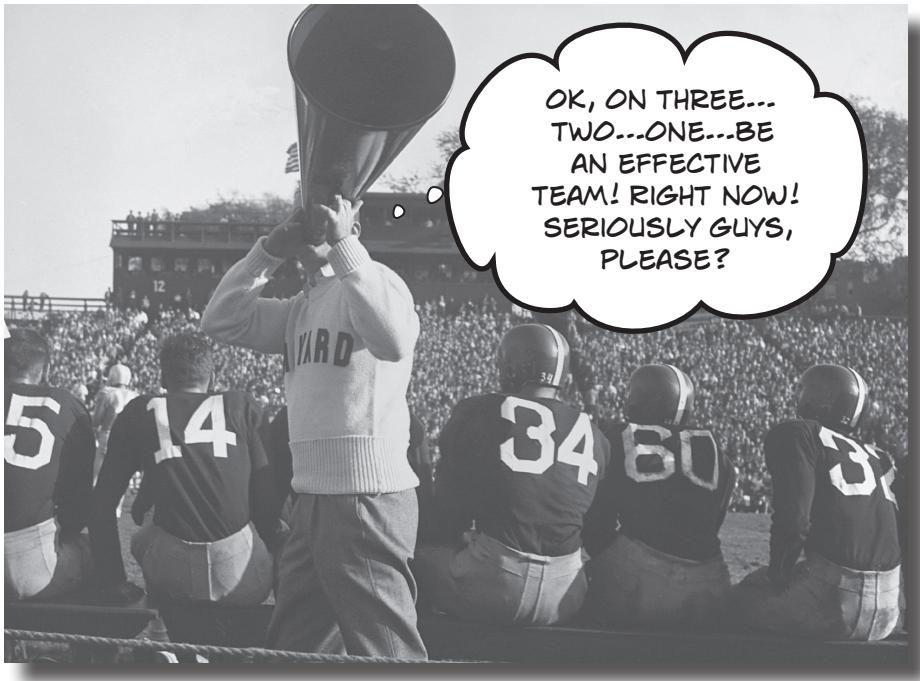
### 20. Answer: C

Control Quality is where you inspect your work, including your repairs!



## 9 Project resource management

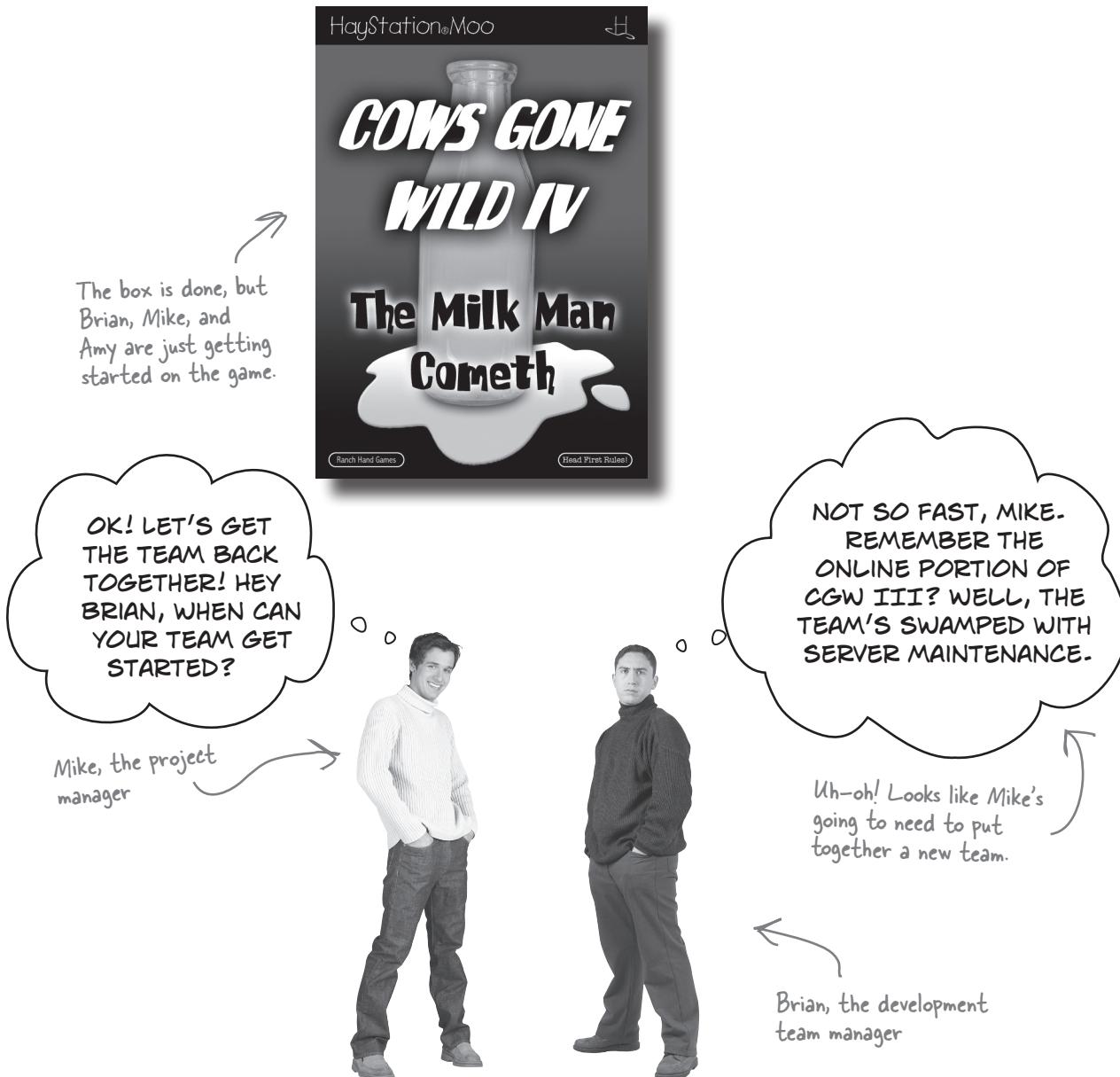
# *Getting the team together*



**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. **Project 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



**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

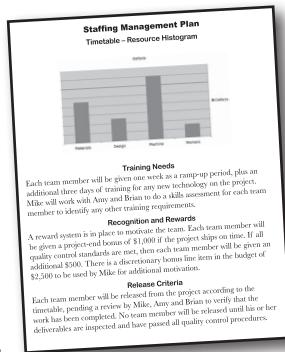
You want to stay in control of your project team, right? But when you work in a matrix organization, your team members don't directly report to you. So how do you make sure you get the best people, and keep them motivated and productive? That's what the processes in **Resource Management** are for: guiding 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 Resource Management is no exception.



In the Plan 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 Resource Management

This is where you generate the estimates for the activities being performed.



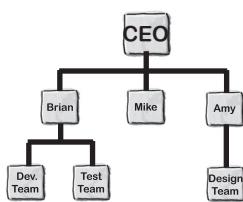
This is where you plan out the resource needs for your project, and how you'll manage and reward the team.



It makes sense that Acquire Project Team and Develop Team are in the Executing group—you only put the team together AFTER the project has started.



**Executing process group**



**Acquire Resources**

Once the project gets started, you need to put together your team. This means you may need to negotiate for some of the resources.



**Develop Team**

All three of these processes are part of the Executing process group, because they happen while your team's executing the project!



**Manage Team**



**Control Resources**



**Monitoring & Controlling process group**



**Executing process group**



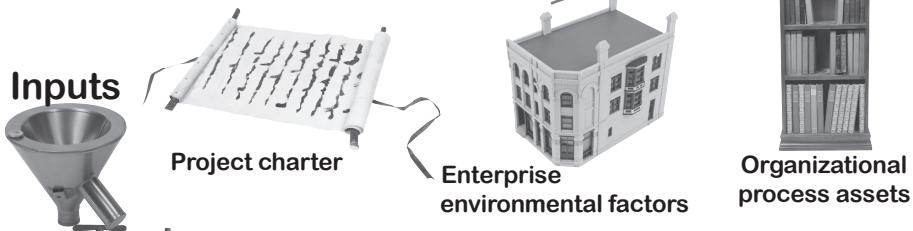
What can you do to make sure that you get the right people for your team exactly when you need them? What can you do before the project starts to make sure they stay motivated?

# 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 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!



Project Management plan



Project documents

**Data representation** tells everyone how your team is structured with hierarchical charts, responsibility assignment matrixes, and text-based displays of your organization's make-up.

**Organizational theory** is where you use proven principles to guide your decisions.

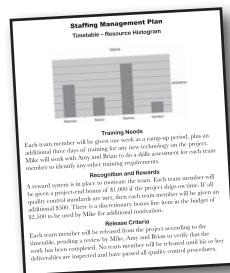
**Expert judgment** is used to figure out resource requirements and position descriptions.

**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.



Here's where the team writes their agreements, values, and guidelines for how to work together.



Resource Management plan



Project documents updates

The Resource Management plan tells everyone on the project who you'll need on your team, when you need them, and what skills they'll need.

The Resource Management plan includes your project organization charts, roles and responsibilities, and training and team development approaches.



## Sharpen your pencil

The inputs, tools and techniques, and outputs of **Plan 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

Data representation

There are a couple  
of other tools and  
techniques—this isn't  
the only one!



### OUTPUTS

- Resource Management plan
- Team charter
- Project documents updates

Think about which documents might  
need to be updated with your Resource  
Management plan information.



## 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

### TOOLS AND TECHNIQUES

Data representations

Shows the relationships between managers, team members, and other people inside and outside the company who will work on the project

### OUTPUTS

- Resource Management plan

Describes how you'll manage and control your resources

- Team charter

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.

- Project documents updates

Updates to the assumption log and risk register

The inputs, tools and techniques, and outputs of **Plan 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.

Your company's culture—stuff like common languages, technical disciplines, and how people normally relate to one another—is really important.

You've already seen lots of ways we use templates and checklists. They're just as important in Plan 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!

Your Resource 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.

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.

# A closer look at the Plan Resource Management outputs

The two main outputs of the Plan Resource Management process are the Resource Management plan and the team charter. Together they lay the groundwork for a successful team management approach.



Team charter

## ***The team charter is where the team makes their ground rules visible for everyone***

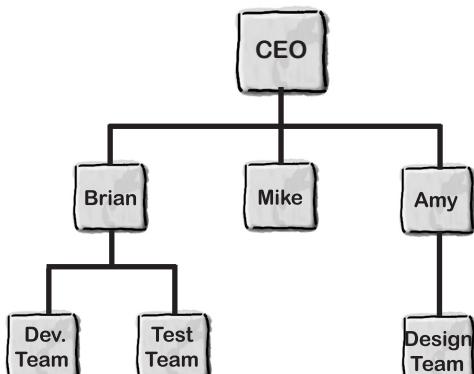
Teams can run into trouble if they don't make their policies clear to everyone they work with. By writing a charter, the team decides how they will handle conflict, run meetings, make decisions, and manage their day-to-day work. Most importantly, the team agrees to their values and goals.

## **Important components of the Resource Management plan**

The Resource Management plan contains a training plan, specifics on recognition and reward, and plans for how the team members will ramp up and roll off. But before we talk about those parts of the plan, there are a couple of sections of the plan that should be noted up front:

### ***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 an **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 Resource Management plan

An important component of the Plan Resource Management process is the **Resource 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.

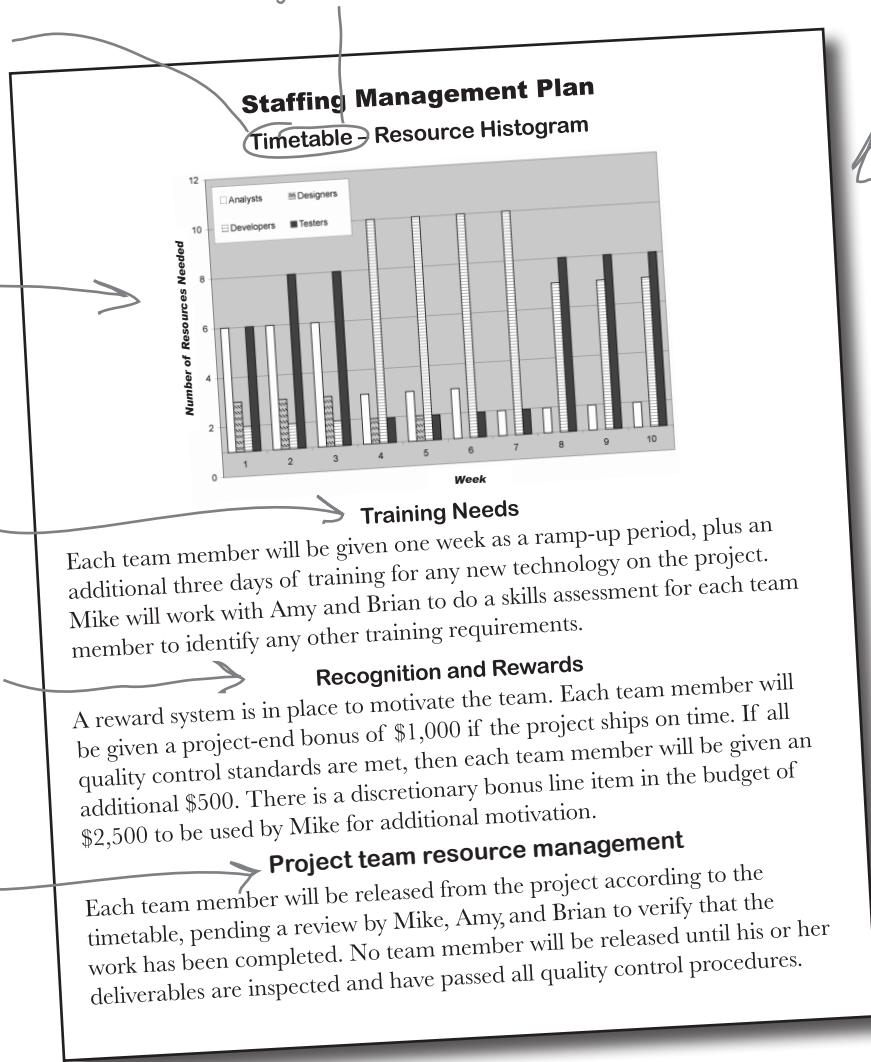
The resource histogram tells you the type and number of resources you need at any time. It's usually a vertical bar chart.

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 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 Resource Management plan.





## Exercise

Read the **Resource 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?

.....

Answers on page 522.



## *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 Resource 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 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 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.

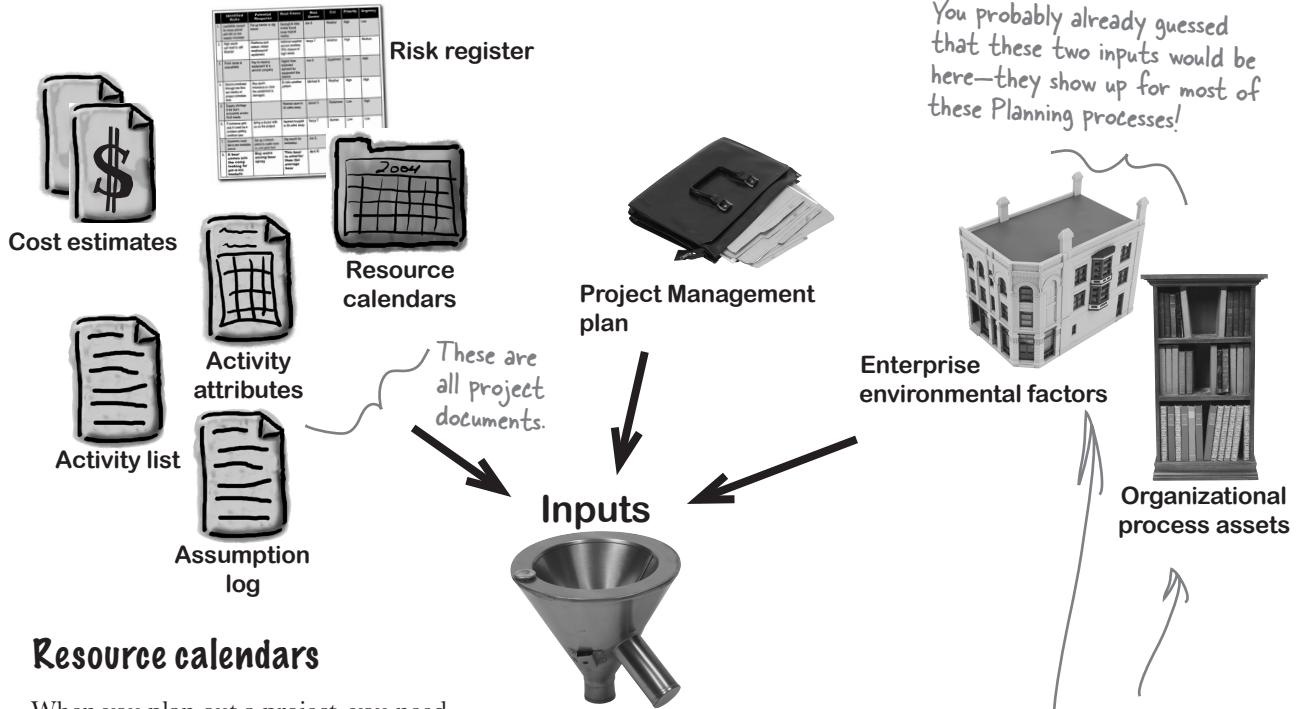
**Q:** Once I know what roles need to be filled on my project, how do I actually get the team on board?

**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.

# What you need to estimate resources

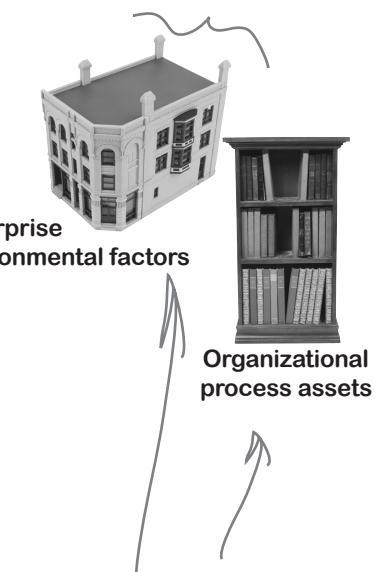
Good news: you've already seen most of the inputs to the **Estimate Activity Resources process** already! Before you can assign resources to your project, you need to know which ones you're authorized to use on your project. That's an input, and it's called **resource calendars**. You'll also need the 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.

You probably already guessed that these two inputs would be here—they show up for most of these Planning Processes!



A June wedding is harder to plan than one in December, because the wedding halls are all booked up. That's a resource constraint!

**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 estimate the resources needed for each activity in the activity list. There are **seven 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.

**Analogous estimation** is making estimates based on the number of resources and amount of effort necessary to complete a project like the one you're currently estimating.

**Parametric estimation** is when estimates are made by typing values into a mathematical model that has been created based on data from past projects.

**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 six tools and techniques.

## Project management information

**system** 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.

**Meetings** are used to get stakeholders to work collaboratively to estimate the project's resource needs.

## Outputs

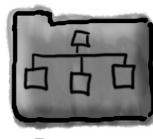


Basis of estimates

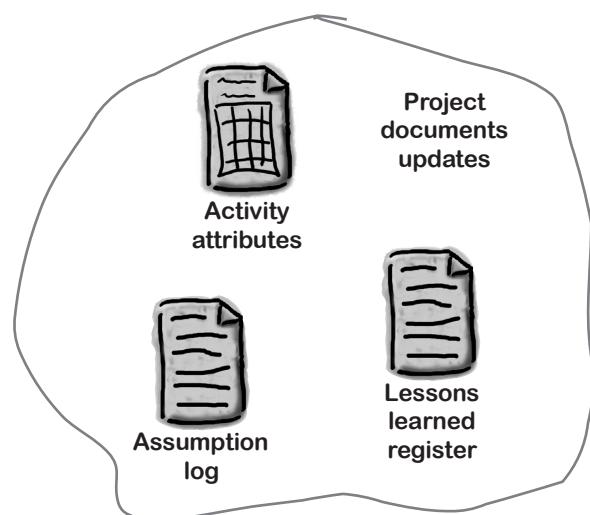


Resource requirements

The outputs of Estimate Activity Resources describe how the resources will be used, and include information about where those estimates came from.



Resource breakdown structure



## Get the team together

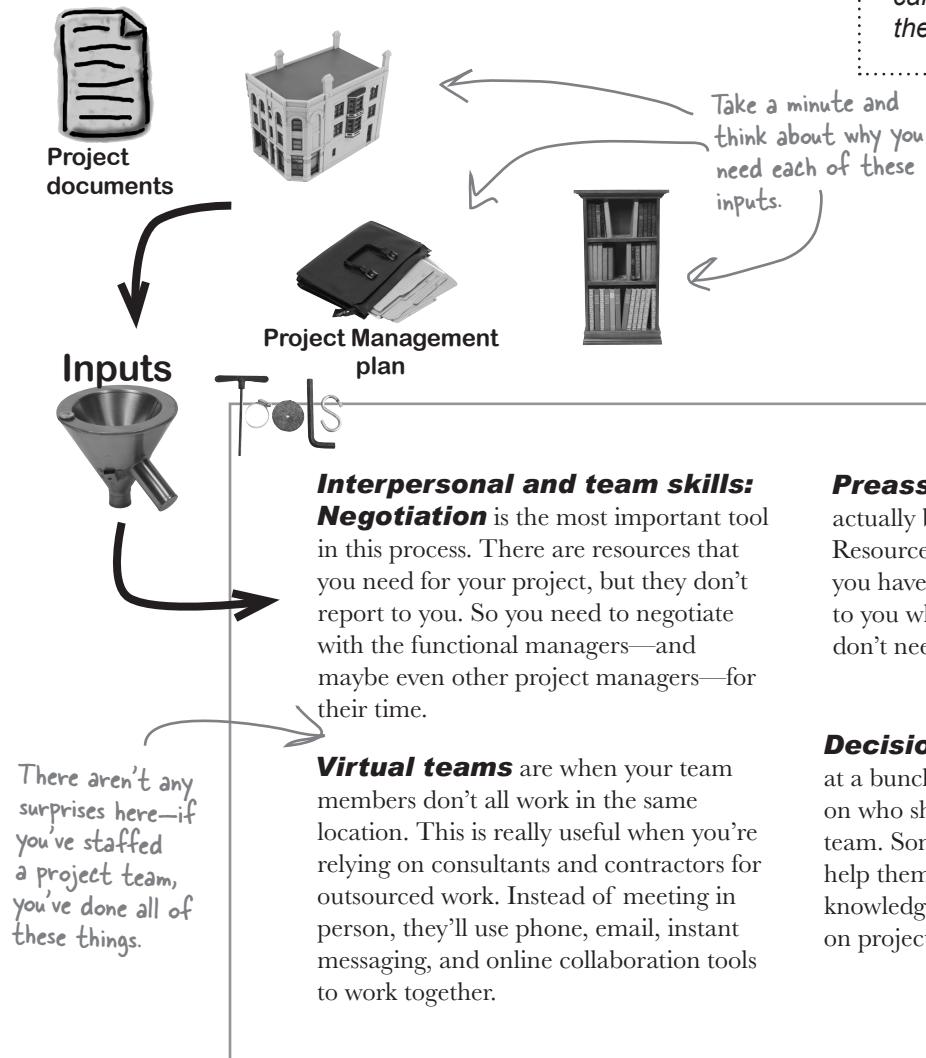
Your Resource Management plan is in place, you've estimated your project resource needs, and your project is ready to roll, so now it's time to begin the actual project work! You need your team, and the way you bring them on board is through the **Acquire Resources** process.

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!



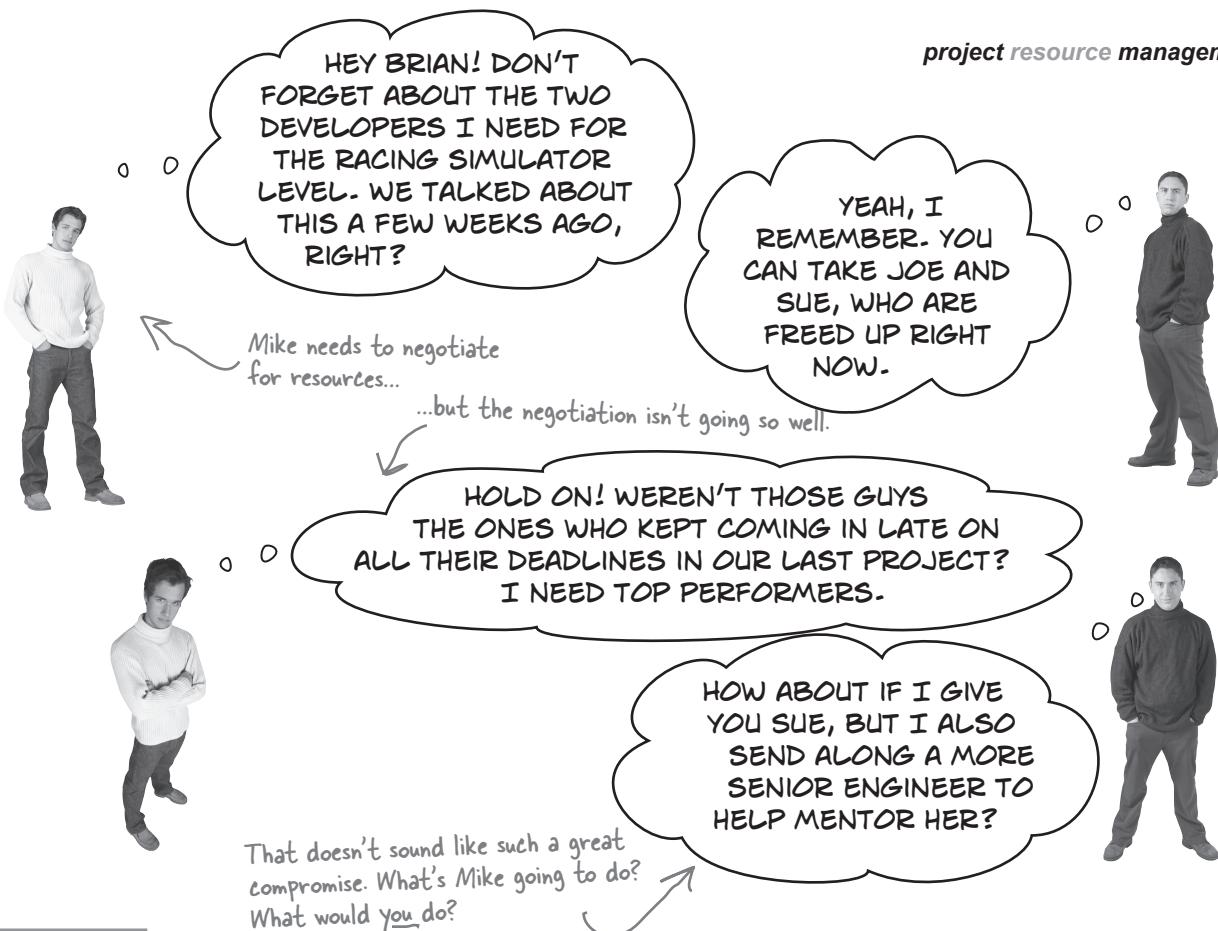
### Beware the halo effect!

*That's when you put someone in a position they can't handle, just because they're good at another job.*



**Preassignment** is when you can actually build the assignments into your Resource Management plan. Sometimes you have resources who are guaranteed to you when you start the project, so you don't need to negotiate for them.

**Decision making** means looking at a bunch of factors when deciding on who should be part of your project team. Sometimes teams will use tools that help them weigh factors like cost, skills, knowledge, and availability when deciding on project team needs.

**Outputs**

**Physical resource assignments** are all about making sure your team has the equipment they need to do the work.

**Resource calendars**

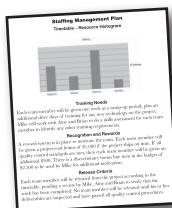
**Resource calendars** tell the company exactly when the team members will be available once they're done.

**Project documents updates****Change requests****Organizational process assets updates**

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!



**Project team 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.

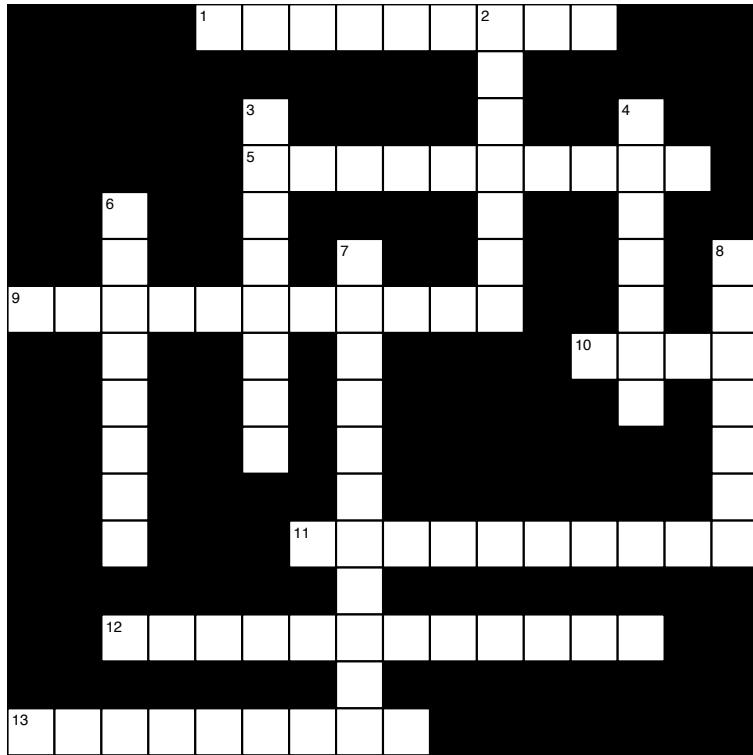
**Enterprise environmental factors updates****Project Management plan updates**

**Project Management plan updates** During Plan 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.



## 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 523.



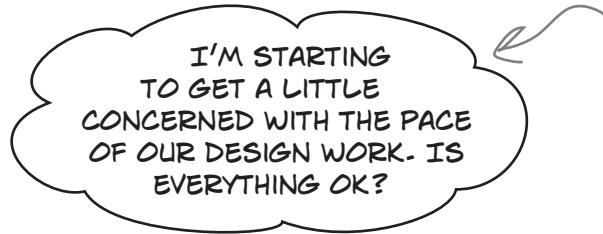
### Across

1. The resource \_\_\_\_\_ is a vertical bar chart in the Resource 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 Resource \_\_\_\_\_.
12. This kind of chart tells you how team members relate to one another in your company.
13. The Manage 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 team

The **Develop Team** process is the most important one in 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 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 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.



**Recognition and rewards** are the best way to keep your team motivated!

**Interpersonal and team skills** are all about using soft skills to help the people on your team solve problems.

**Communication technology** allows teams to share screens and send text messages and calls to keep each other up to date.

## Meetings

**Virtual teams** are teams that sit in different offices and use technology to communicate with one another.

**Individual and team assessments** 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**.

Colocation is very important for many agile teams.

# Your interpersonal and team 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.

**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.

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.



**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.



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.

**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.



**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.

## 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 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.



Match each form of power to the scenario where it's being used.

Legitimate power

A project manager sets up an "Accolade Wall" and posts awards for team members who come in ahead of schedule.

Reward power

Everyone always does what Shelly says because everyone knows that senior management loves her.

Expert power

A functional manager assigns a tester to work on the project manager's team.

Referent power

The programmers always listen to the team lead because he's a really good software architect.

Answers on page 522.

# Motivate your team

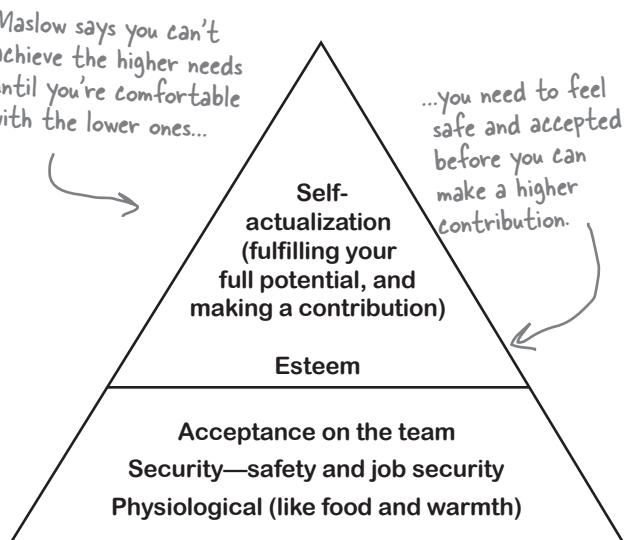
No matter how good your soft skills are, if your team has a lousy work environment, they're going to have a hard time getting the project done. Luckily, there's been research done over the years to figure out exactly what makes a good working environment. For the PMP exam, you'll be expected to be familiar 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.

Tools

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.



### Exercise Solution

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 524.

## Stages of team development

There's a process for a team to evolve 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 526.

## How's the team doing?

There's one major output of Develop Team. It 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 others are **updates to your project documents, Project Management plan, your company's enterprise environmental factors, your company's organizational process assets, and change requests**, to update your company's personnel records and keep your project documentation updated in step with new developments on your team.

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.
- 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 Motivation-Hygiene 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).
- **Referent power** is power that's based on identifying with or admiring the power holder.

## Cubicle conversation



WE'VE GOT A PROBLEM, MIKE. MY TEAM NEEDS THE 3D MODEL DESIGNS AND TEXTURE MAPS FROM THE DESIGN TEAM, BUT WE'RE NOT GETTING THEM.

**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.

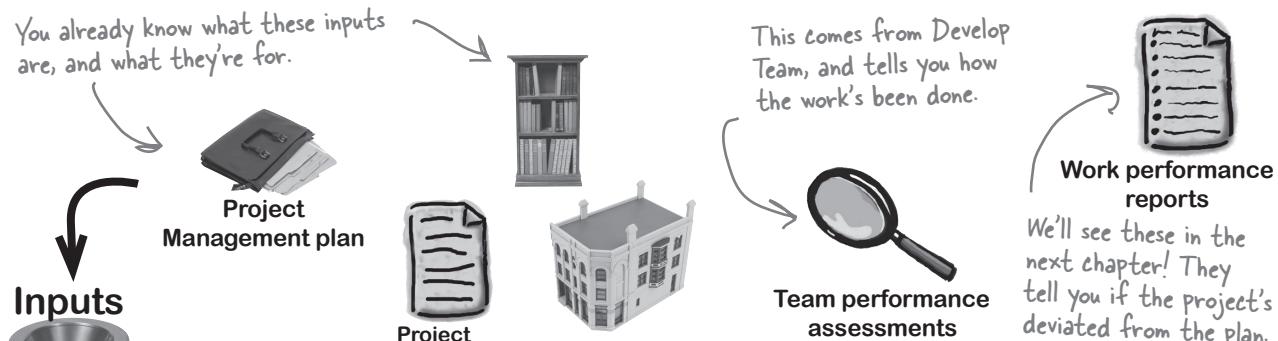
**Amy:** I don't see what there is to work out. He's being unreasonable.



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 Team** process is about.



**Interpersonal and team skills** are all about helping the people on your team to solve problems. You'll use these skills to help team members stay focused on project goals and collaborate with one another to achieve them.

**Project management information system** is helpful in keeping track of progress toward your goals and understanding which team member is working on which work item as your team works together to deliver the project.



You've seen all of the outputs of Manage 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 523.



# 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?

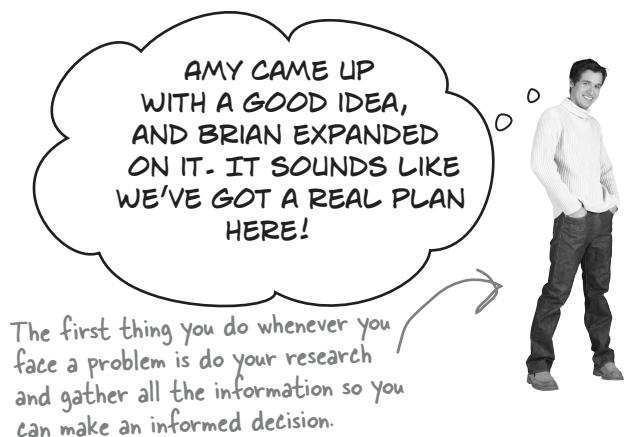
## How to resolve a conflict

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.

### **Collaborating—or problem solving—is the most effective way to resolve a conflict.**

This 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 while you get to the bottom of what's causing the issue and figure out a solution that works for everybody.

**The best way to resolve a conflict is to collaborate with others: do your research, figure out what's behind it, and fix the root cause.**



### **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 solve the problem first—you should forge a compromise only after you've tried every possible way to solve the real problem.



**Smoothing** or accommodating 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 COLLABORATING  
SOUNDS LIKE A BAD THING!  
SHOULDN'T I SOLVE  
PROBLEMS ON MY OWN?

**No! Collaboration is just another name for problem solving with other people,** because you solve a problem by hearing everybody's viewpoint, doing your research, and fixing whatever is causing it. If you always remember to:

**Collaborate with the team  
to solve the problem**

...it will really help you through a bunch of questions on the exam!

"Collaborating" is another way of saying "problem solving with a group of people." Any time two people have a conflict, you need to step back and figure out what's actually causing the problem and then get everybody to work together to solve it. If you get many different opinions, you're more likely to come up with a solution that works.





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 any more 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."

.....

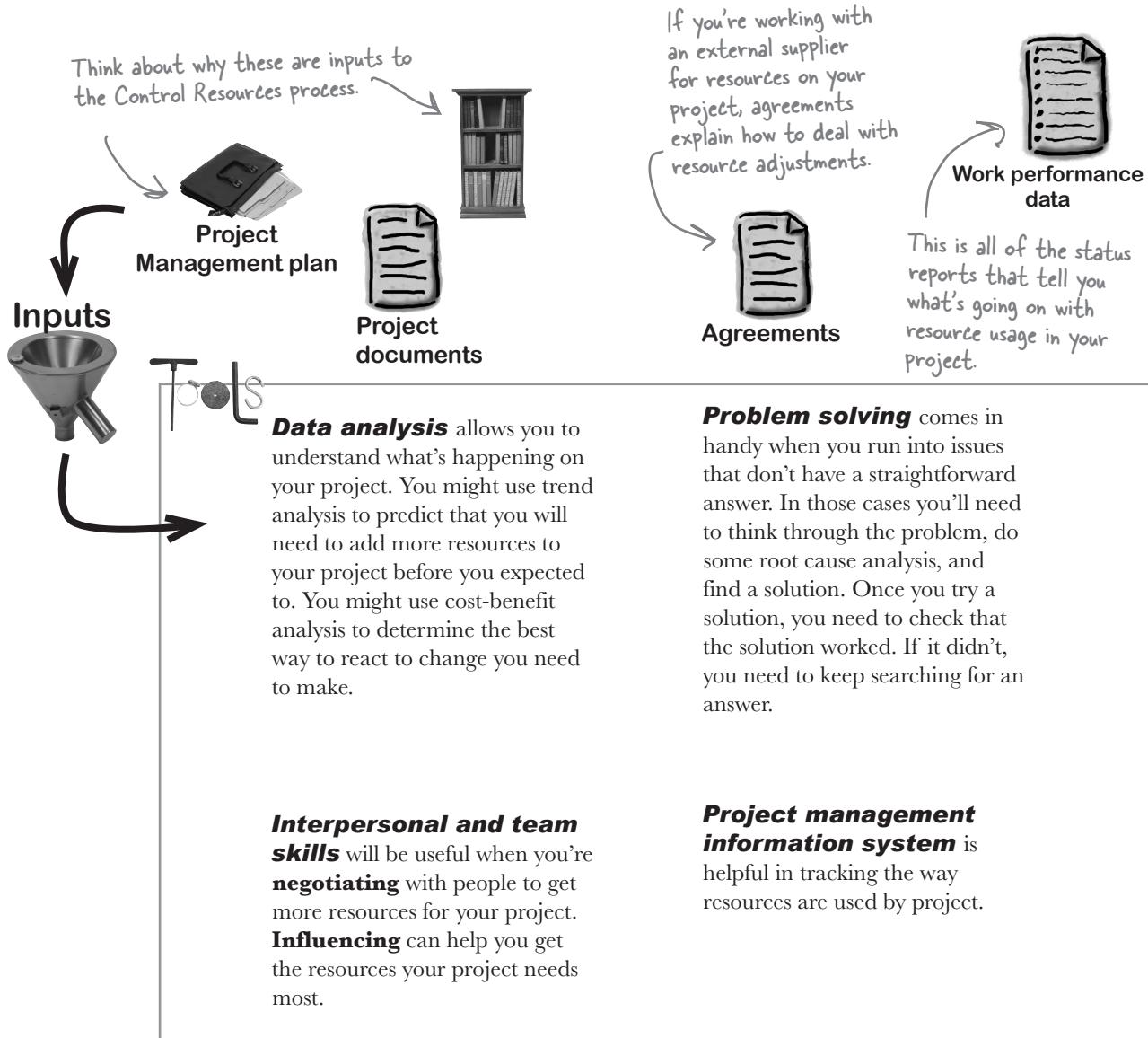
7. "I know this problem seems really big, but I'll bet if we take a long, hard look at it, we can figure out how to fix it permanently."

→ Answers on page 525.

# Make sure to control resources to keep your project on track



We all know that projects don't always happen exactly as planned and that's why you need to make sure your resources are ready when they're needed and released to other teams when they're not needed. **Control Resources** is all about comparing your actual product data to the plan and adapting as you go.



# Outputs of the Control Resources process

Once you find changes to the plan, they need to be proposed as change requests. When those change requests are approved, the Project Management plan and project documents need to be updated to include the change.

## Outputs



When you need to make changes to the Resource Management plan, you make them through a change request.



Project documents updates



Change requests



Project Management plan updates



Work performance information

This is all of the information about how your project is progressing. As you make changes to the resource make-up on your project, those changes are reflected in your work performance information.

Some of the documents that might be affected by the control resources project are: assumption log, issue log, lessons learned register, physical resource assignments, resource breakdown structure, risk register.

Some of the plans affected by this process are Resource Management plan, schedule baseline, cost baseline..

**The Control Resources process lets you adapt your plan to changes that happen during your project.**

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.

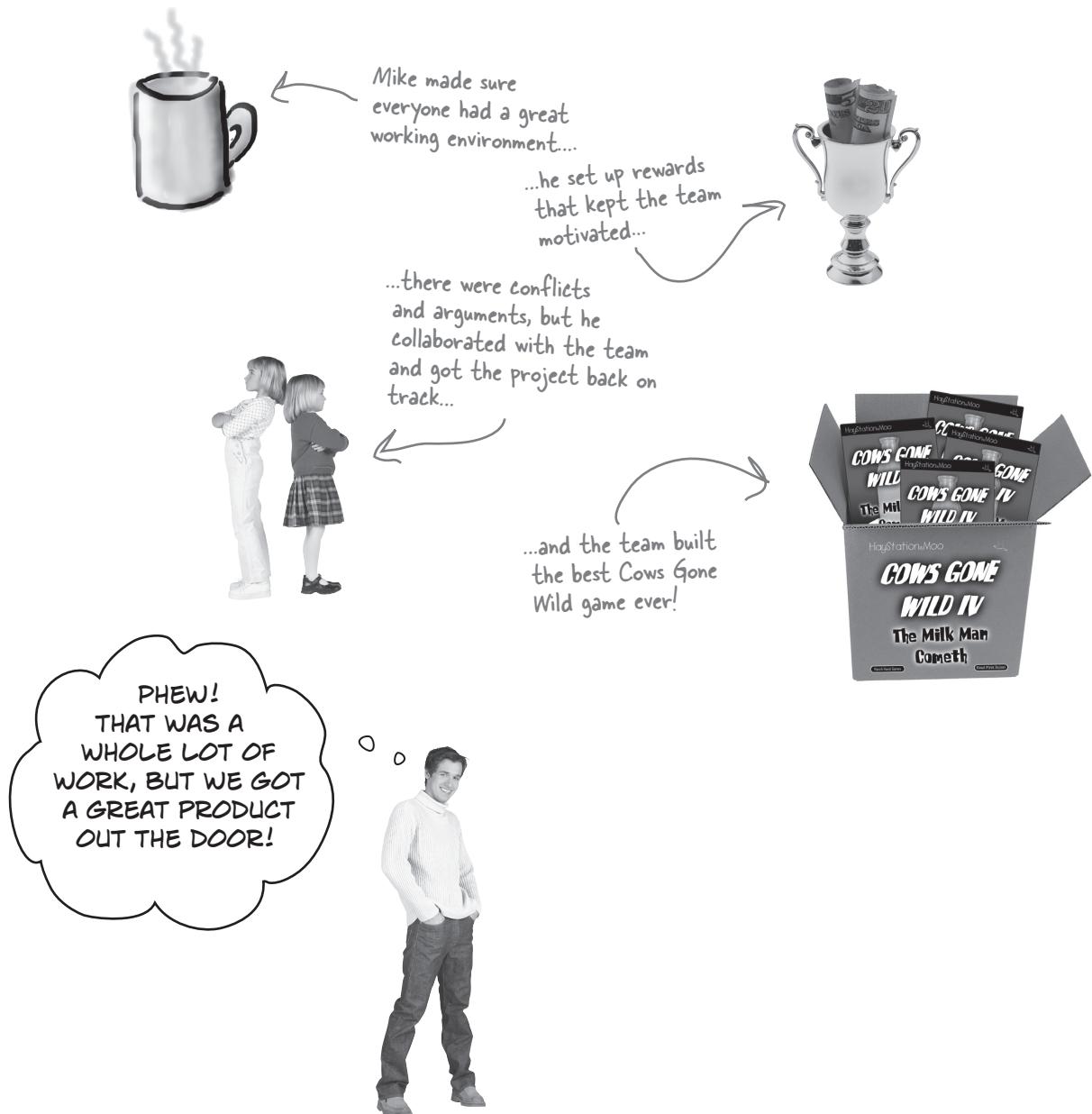
**Try to avoid using punishment. When you do have to punish someone, make sure to do it in private, and not in front of peers or other managers.**

## 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 do your research, figure out what's causing the problem, and **collaborate with your team to solve 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 "collaborating" is a bad thing. **Collaborating is just another word for problem solving with multiple perspectives**.
- **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 solve 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!





## KEY CONCEPT REVIEW

Part of any successful project is securing the resources necessary to get the job done. **Project Resource Management** means getting the team together that will be able to collaborate and solve the problems that might come along. It also means getting the tools and physical resources your team needs to produce.



### KEY CONCEPTS

We've talked about the processes you and your team will use when planning, developing, managing, and controlling resources, but it's worth taking a minute to think about how your approach to resource management affects the overall project.

- ★ Although team members have specific roles to play on a project, it's best for the **whole team to work together** on project planning and decision making.
- ★ The team's environment, distance from one another, ability to communicate with stakeholders, and **cultural and political issues within the organization** can all affect their performance.
- ★ Resource management isn't just about working with teams. It's important that a project manager spend time thinking about **necessary infrastructure, software, hardware, or other physical resources** the team will need to do their work. If you get to a critical part of the project and don't have the physical resources lined up, it could delay your project or even cause you to catch defects too late to resolve them.

**RESOURCE MANAGEMENT IS ABOUT MAKING SURE YOUR PROJECT HAS ALL OF THE PEOPLE AND PHYSICAL RESOURCES YOU NEED TO DELIVER.**



## TRENDS

Here are a few trends in Resource Management that might help you to improve and manage the resources for your projects more effectively.

- ★ **Lean thinking** means that project teams are sometimes organized so that work comes to them rather than them being organized around the work. Lean teams **organize resources just-in-time**, and try not to reserve resources for longer than they need them.
- ★ **Self-organizing teams** are able to collaborate toward a specific goal. In teams like these, roles and responsibilities are not strictly defined. Instead, the team members will do whatever is necessary to complete the work, even if that means a developer spends time testing rather than developing, for example. Self-organizing teams care most about getting the work done, and about their own roles secondarily.

## TAILORING



When you make changes to the processes your team will use during the course of your project, there are a few considerations that might influence your decisions:

- ★ Where are the resources and people who need to work on the project in relation to one another?
- ★ Is there special domain knowledge required for this project that is hard to come by?
- ★ How will you add resources to this project if you need to?
- ★ How does the organization manage people? How does it manage physical resources?

## AGILE CONSIDERATIONS

Agile teams focus on collaboration around an elevating goal. They plan as little as possible up front in order to leave themselves more open to change. Agile teams prefer to self-organize and focus on completing work rather than having many work items in progress at the same time.

## 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.

\_\_\_\_\_



### Exercise Solution

Read the **Resource 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.**



### Exercise Solution

Match each form of power to the scenario where it's being used.

Legitimate power



A project manager sets up an "Accolade Wall" and posts awards for team members who come in ahead of schedule.

Reward power



Everyone always does what Shelly says because a senior director assigned her personally.

Expert power



A functional manager assigns a tester to work on the project manager's team.

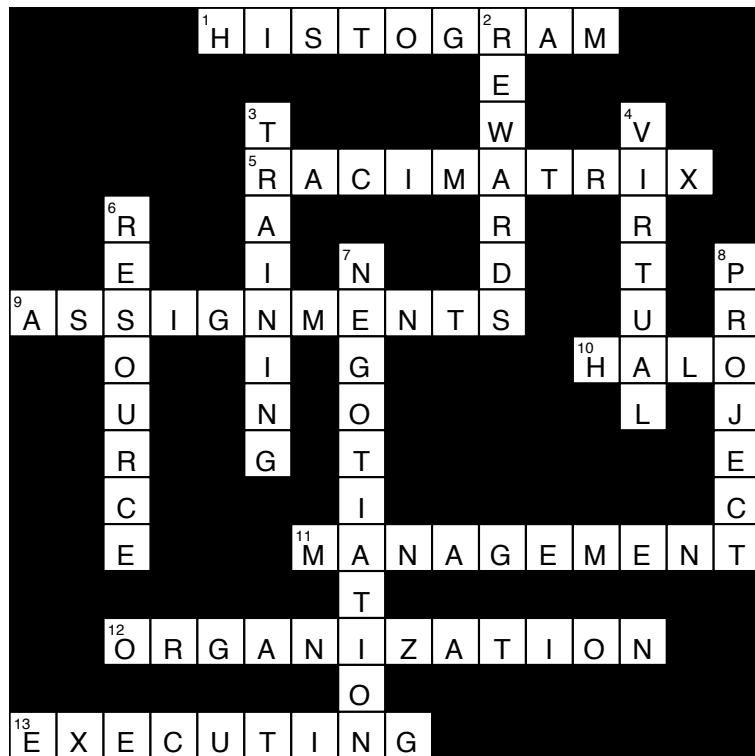
Referent power



The programmers always listen to the team lead because he's a really good software architect.



# Resourcecross Solution



The Sharpie logo, featuring the word "Sharpie" in its signature bold, italicized font, with a stylized pen nib pointing towards the left.

# Sharpen your pencil Solution

You've seen all of the outputs of Manage 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 Project

### Management plan



## Exercise Solution

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**



## Exercise Solution

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."

### Collaborating

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."

### Collaborating



### 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. Collaborating
- 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. Collaborating

## Exam Questions

- 6. You've just completed your staffing management plan. What process are you in?**
- A. Acquire Project Team
  - B. Develop Project Team
  - C. Plan 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. Collaborating
  - 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. Legitimate Power
- 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 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 Resource Management
- B. Acquire Team
- C. Develop Team
- D. Manage 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 Motivation-Hygiene Theory
- B. Maslow's Hierarchy of Needs
- C. McGregor'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. Collaborating
- 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

If you actually solve the problem by taking everybody's ideas into account, 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 staffing management plan as part of the Resource Management plan. It's the main output of the Plan 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.

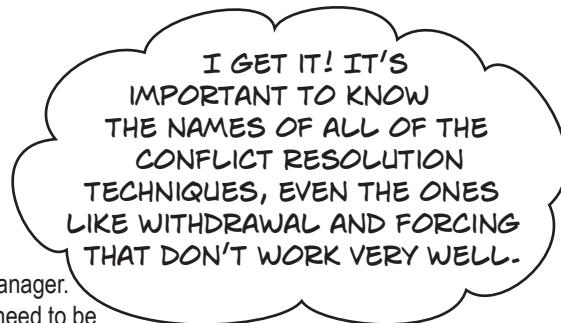
## ~~Exam Questions~~

### 8. Answer: A

Jim took his ball and went home.  
That's withdrawal.

### 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 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.

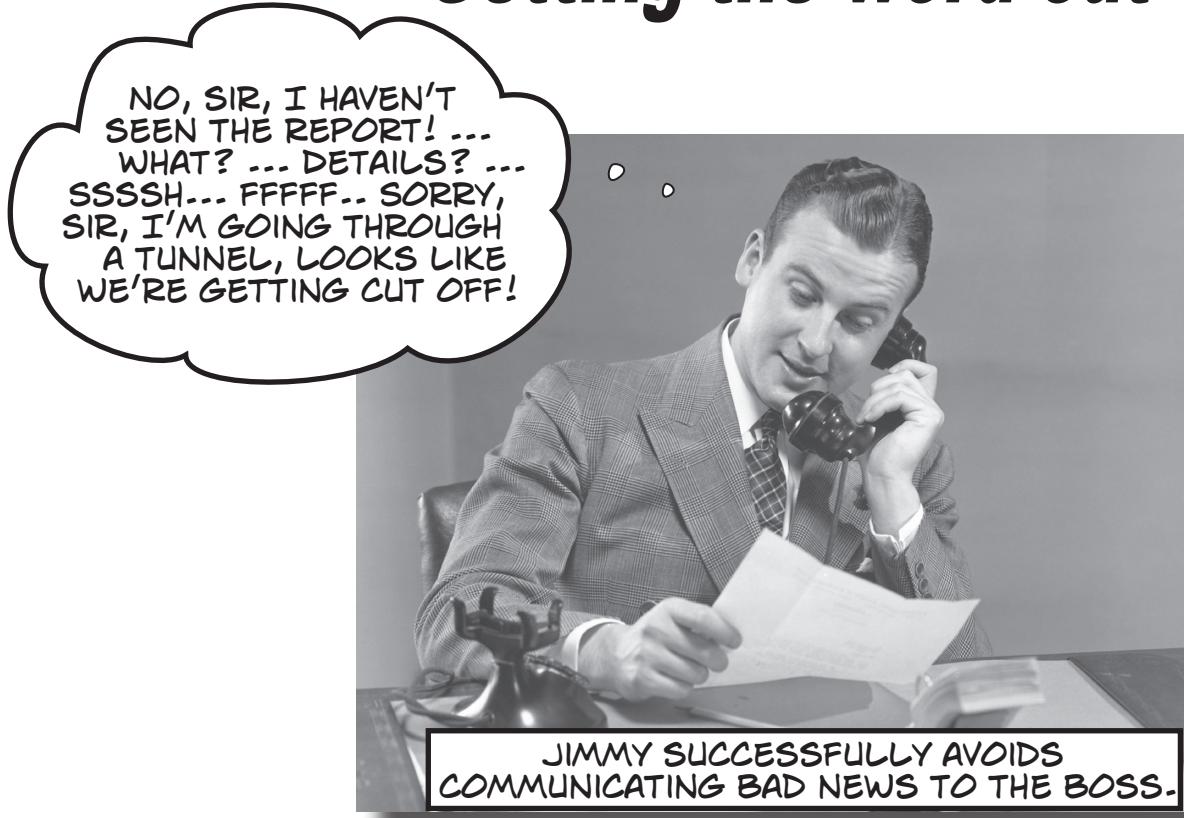
HE SHOULD  
HAVE SAT DOWN WITH  
BOTH PROGRAMMERS AND  
FIGURED OUT WHAT THE  
REAL PROBLEM WAS. EVEN  
IF THE SOLUTION ISN'T  
PERFECT, AT LEAST IT'S  
MORE FAIR.





## 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 retro 1970s-style Head First Lounge, and they're planning 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.

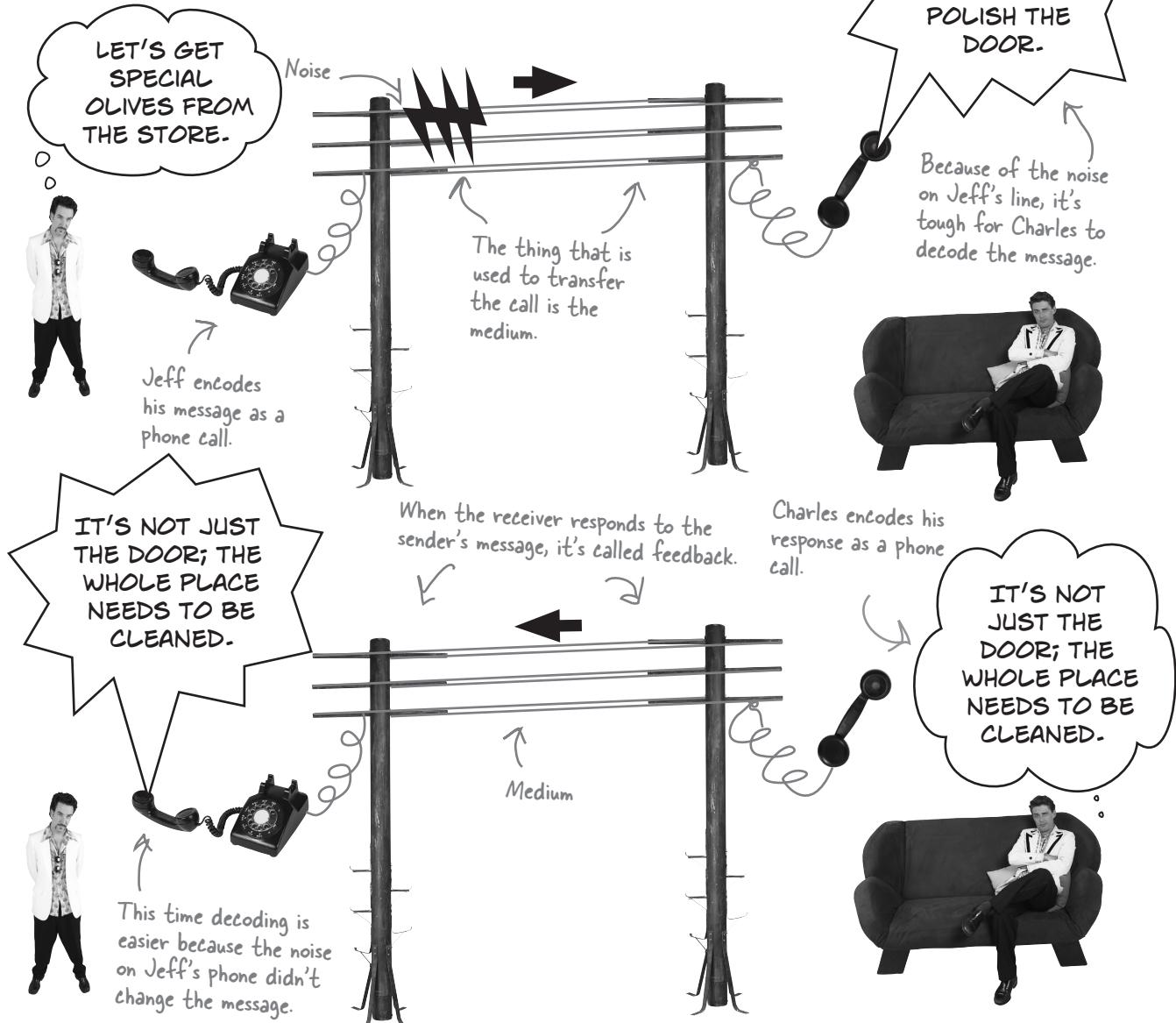


What can Jeff and Charles do to get a handle on their communication problems?

## 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*

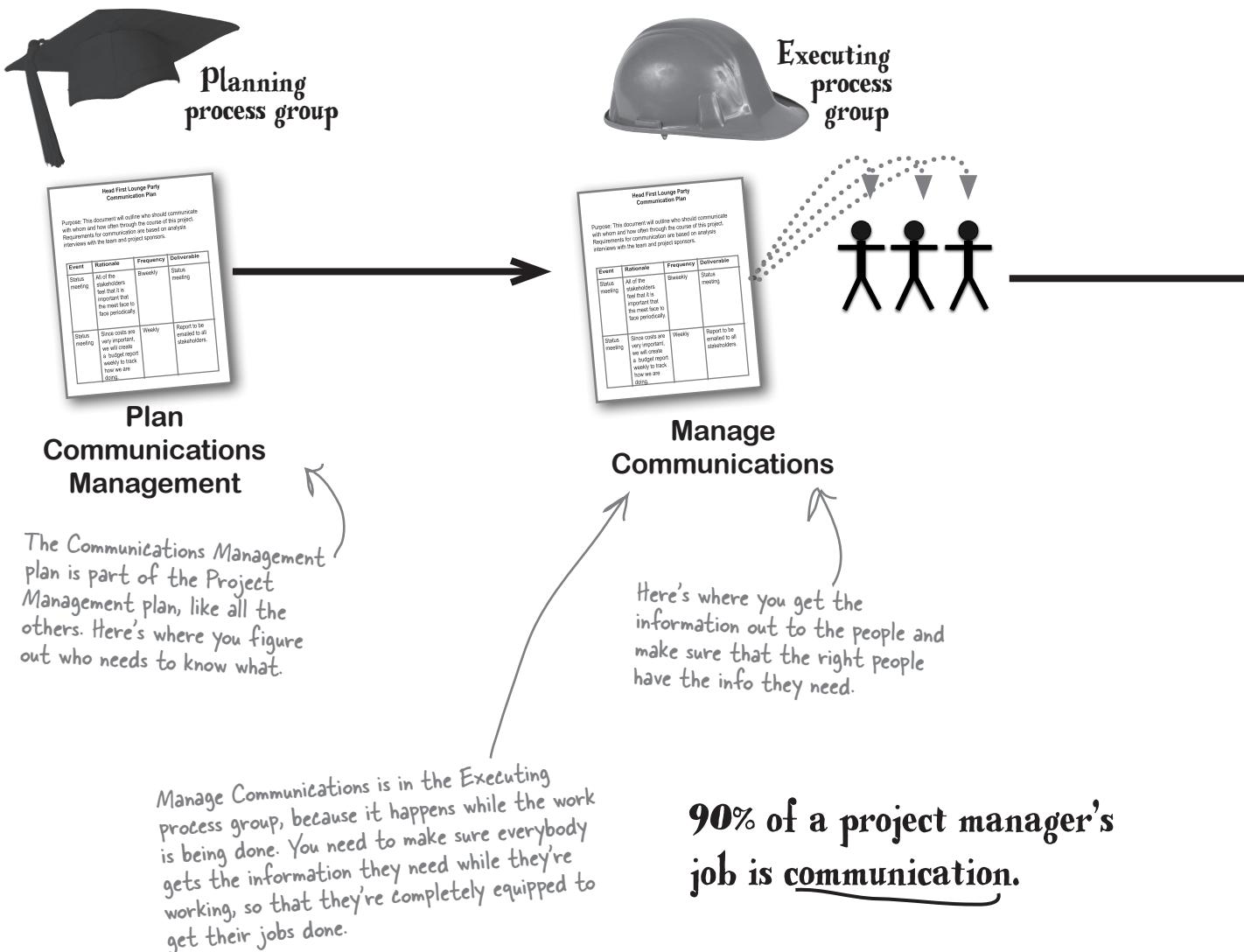
Decoding

*Modifying a message so that it can be sent*

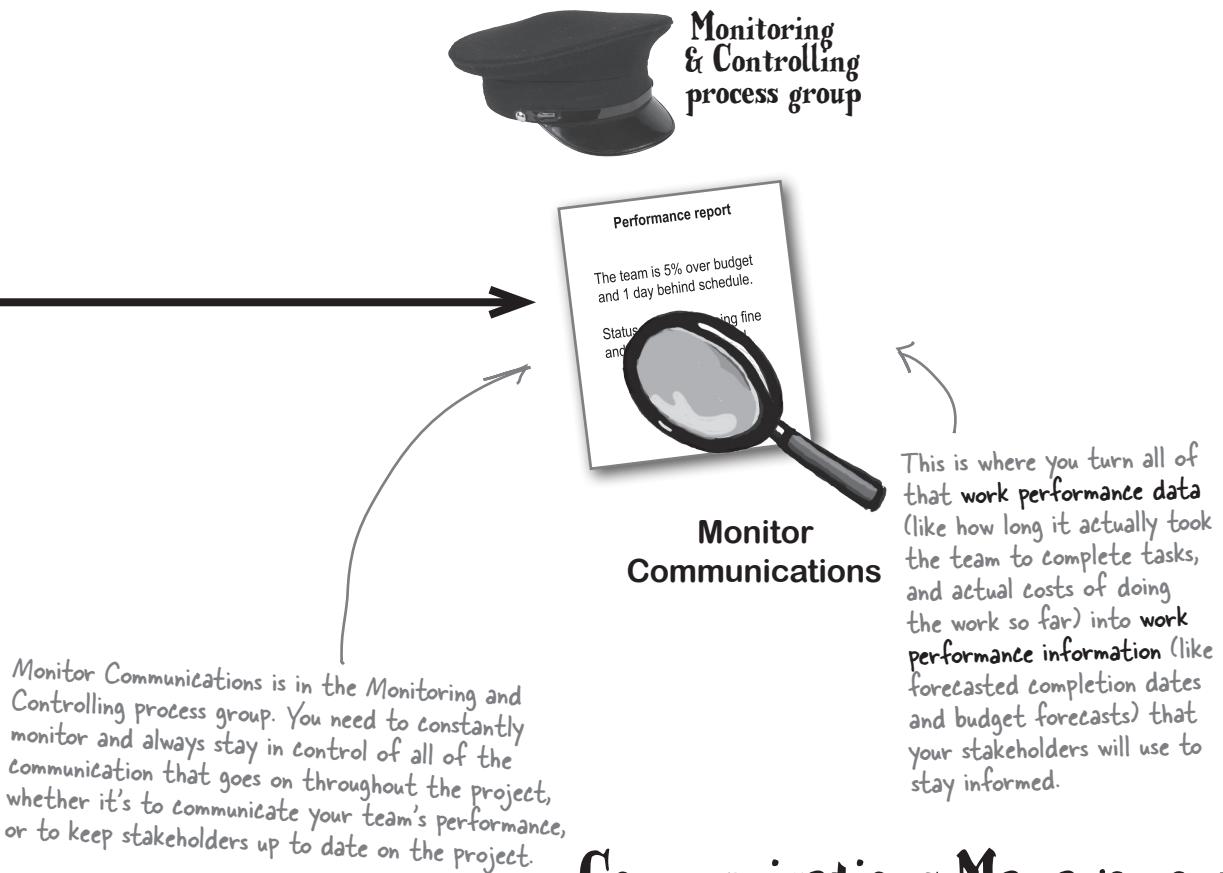
—————> Answers on page 568.

## 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, by planning and carefully tracking the 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 **Monitor 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



We'll start you off with two inputs.

### Project documents

### Project charter

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.





## 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 three outputs. Can you guess what this one is?

**Meetings** are always great for helping your team to think about communication.



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 and determine how important that the message to them looks to them personally.	Biweekly	Status meeting
Status meeting	Since costs are high, 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



Project documents

Enterprise environmental factors

Organizational process assets

Project charter

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.

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### Expert judgment

ensures that you get the perspectives and input from the experts who can help you plan.

**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.

**Data representation** shows you who your stakeholders are and how much you need to engage them.

**Interpersonal and team skills** get the message across in the most effective way.

The PM's not always responsible for every communication. The plan makes it clear who communicates what on the project.

### Outputs



It's important that everyone involved understands why you are holding these meetings and creating these reports.

You'll usually need to update the project schedule, the stakeholder register, or the Stakeholder Management plan when you plan communications for your project.



Document updates



Planning process group



Project Management plan updates

### 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

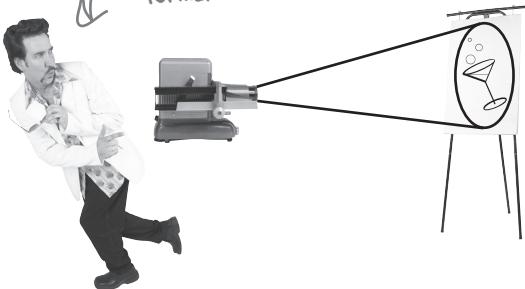
Blueprints, specifications, and all other project documents are examples of formal written communication.



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.



## Exercise

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.  | 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   |
|   |   |
| 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. | 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   |
|   |   |
| 3. You present your project's status to your company's executive committee.   | 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   |
|   |   |
| 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 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 569.



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.



SO IT'S NOT  
ENOUGH TO SAY THE  
RIGHT THING. YOU  
NEED TO SAY IT THE  
RIGHT WAY, TOO.

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 568.



## 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!

**Project management information 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 **hardcopy 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 you'll use the data they produce to make decisions about your project.

**Project 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 other than urgency that influence your decision to use a particular technology when communicating, 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.

**Communication skills** are all about how well people communicate with each other. They're skills that we can—and should!—work on throughout our careers.

**Interpersonal and team skills** are also important. They help you work with a team, and with others in your organization.

**Meetings** are among the most common communication tools found on projects.



## 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

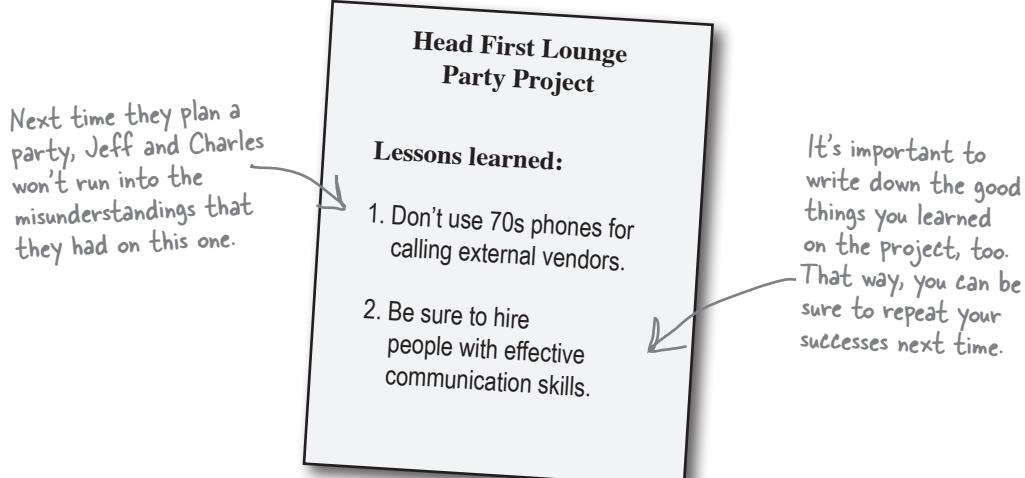
You've used lessons learned from all of the other projects your company has done as you've planned out your work. Here's where you get a chance to give your project's experience back to the company and to help future project managers learn from what's happened on your project.



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.**

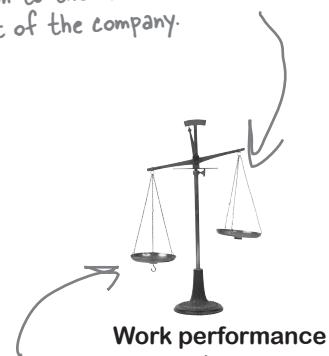
# Let everyone know how the project's going

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 **Monitor 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.



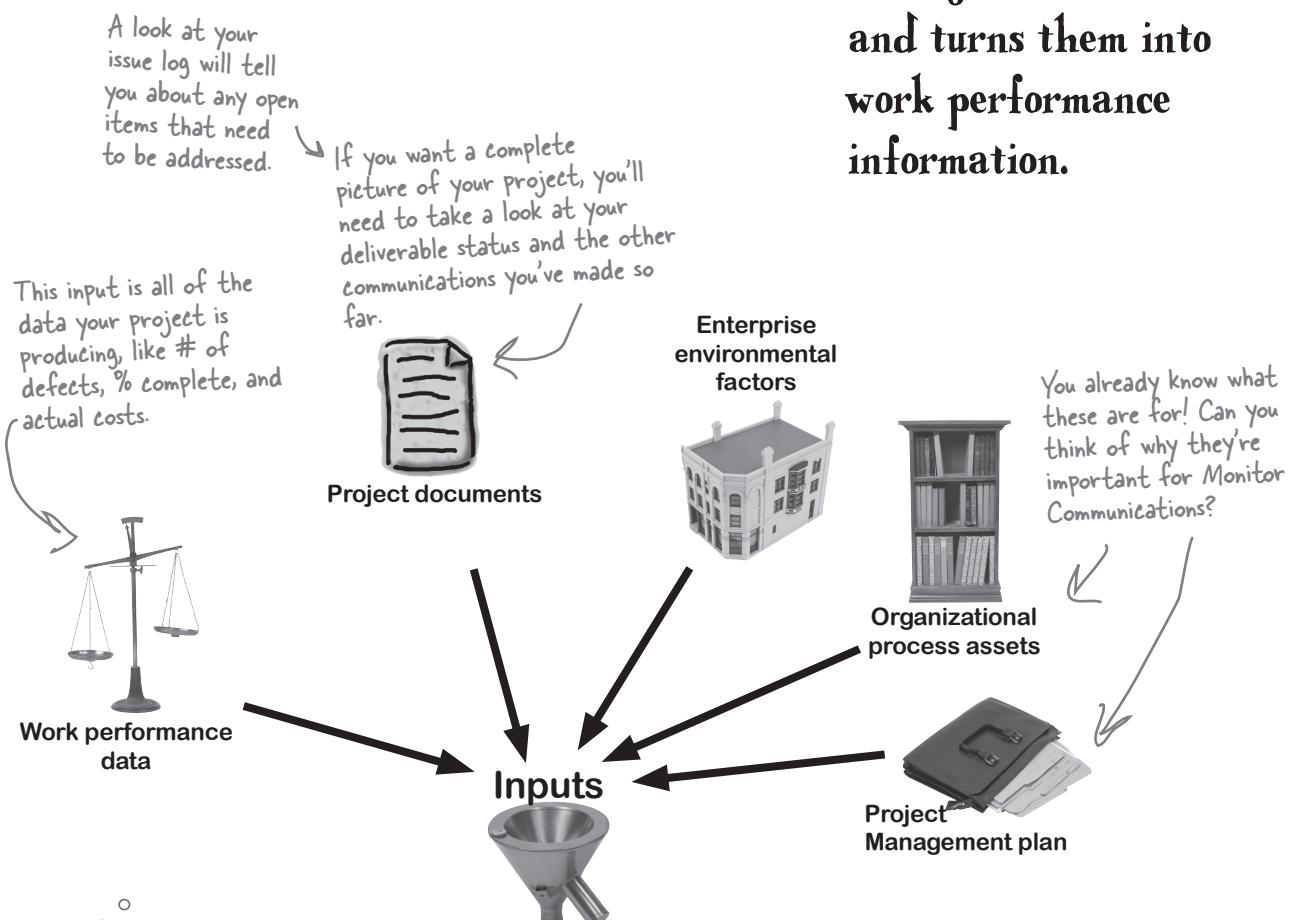
**Work performance data**

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 data 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 % 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.

**Monitor Communications** takes the outputs from the Executing process in **Manage Communications** and turns them into **work performance information**.



## Sharpen your pencil



**Project management information system**

Monitor 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**

**Data analysis**

**Interpersonal and team skills**

**Meetings**



Monitor 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?

**Project management information system**

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.

**Data analysis**

You can look at the data your project is creating to see if your communications methods are effective.

**Interpersonal and team skills**

Working with the team is the best way to know how things are going.

**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 Monitor 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:

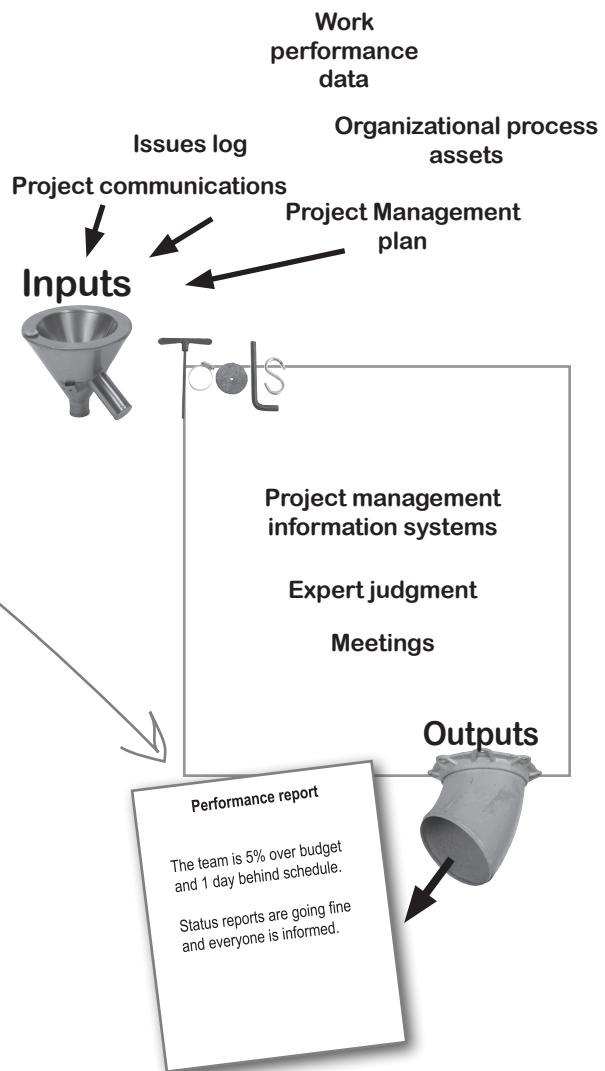
**Work performance information** is the most important output of the process—which shouldn't be a surprise, since the process is called Monitor Communications. Your performance reports tell everyone exactly how the project is doing, and how far off it is from its time, cost, and scope baselines. These 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.

**Change requests** happen when you do Monitor 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.



Monitor 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?

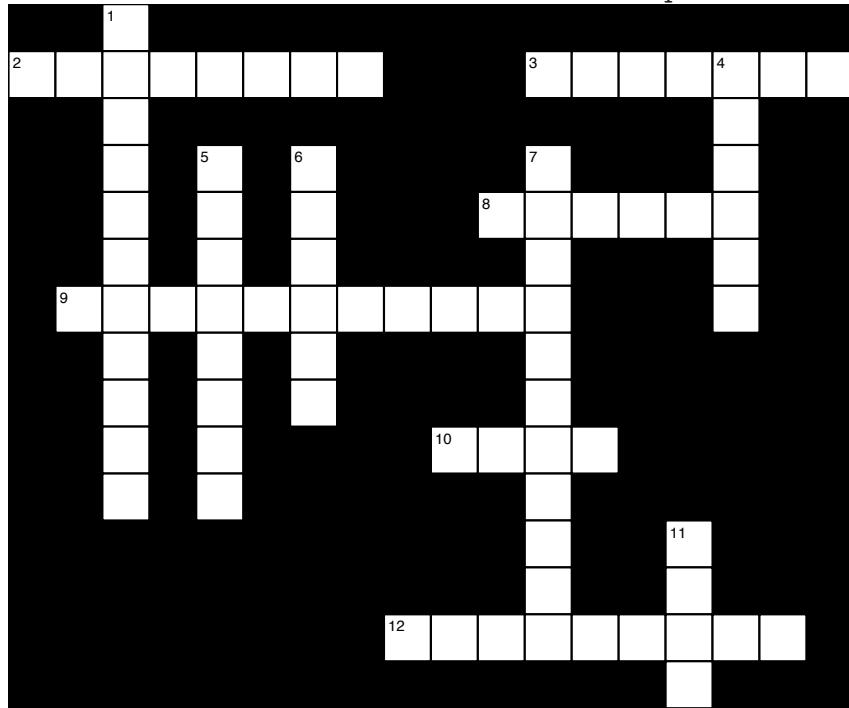


**Project documents updates** could mean updates to performance reports, issue logs, or forecasts.



## 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 Monitor 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 method you use when you send email announcements.

→ Answers on page 570.

# 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.

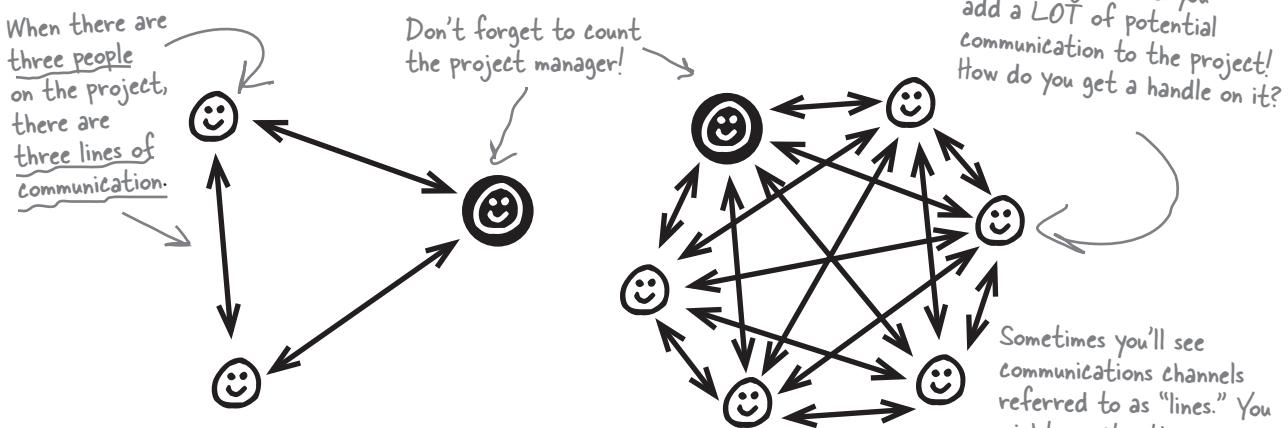
HOW ARE WE GONNA GET  
A HANDLE ON THIS?



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 six people**:

$$\# \text{ lines for 6 people} = \frac{6 \times (6 - 1)}{2} = (6 \times 5) \div 2 = 15$$

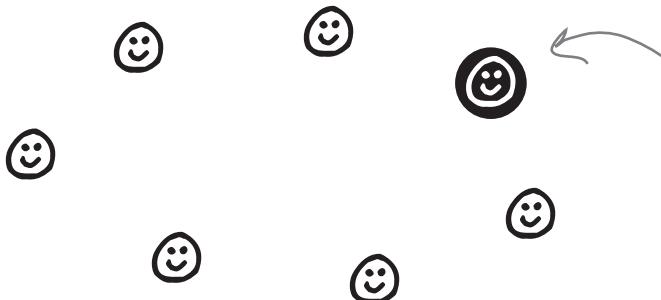
When you added three more people to the three-person project—which had three lines of communication—the new team has 15 lines. So you **added 12 channels of communication**.



## 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 571.

*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 versus 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!





## KEY CONCEPT REVIEW

If your team isn't communicating and nobody knows what's going on with your project, you'll have a hard time getting it done. **Project Communications Management** is where everybody on the team gets in sync, resolves issues that might throw the project off track, and keeps stakeholders in the loop about what's happening.



### KEY CONCEPTS

We've talked about the processes you and your team will use when planning, managing, and monitoring communications, but it's worth taking a minute to think about how your approach to Project Communications Management affects the overall project.

- ★ People can communicate in many different ways: in written form, through gestures, in conversation, or even through public media.
- ★ Communications can take a different tone based on their context. You might communicate differently to an external party about a project issue than you would with a team member. You might be more or less formal **depending on your relationship to the person** you are addressing.
- ★ For communication to be successful, you need to have an **effective strategy** that takes project stakeholders into account. Once you've thought through the stakeholders' perspective, you can plan how to communicate timely project information with them in a way that allows them to make decisions in the project's best interest.
- ★ It's not enough to clearly state your message; for a communication to be effective, you need to **actively listen** to the person you're talking to and be aware of cultural context.

**COMMUNICATION MANAGEMENT IS ABOUT FIGURING OUT THE BEST STRATEGY FOR KEEPING YOUR STAKEHOLDERS UP TO DATE AND EXECUTING IT.**