Chapter 3

3.2.3 PMI "Theory Pills"™

A number of basic assumptions and givens factor into how PMI addresses project management as opposed to how you perform it within your company. We suggest that you be familiar with the PMI "Theory Pills" listed below because they are underlying factors in how most questions are presented.

- Historical information about existing projects can contribute to the corporate knowledge base, future estimating, and organizational process assets.
- Assume that documentation exists to detail the project so that it could be recreated if necessary.
- Conduct meetings following the meeting rules listed in this book.
- Consider risk when estimating time and cost.
- Put changes through an official change control process with appropriate parties reviewing for impact and approval.
- Use the *PMBOK Guide* processes as PMI describes them in the *PMBOK Guide*, regardless of what you use in the workplace or past projects.
- Do not underemphasize the value of the WBS. Literally all planning stems from it.
- As the Project Manager, be responsible for delivering the project results in scope, on schedule, and on budget.
- If one parameter of the triple constraint is modified, the others will likely change. For example, if a schedule must be shortened, consider revising or updating the scope of the project if the sponsor decides to do so.
- The PMI approach generally calls for a great deal of planning before actual execution of work, contrary to how your industry might address projects.
- Assume that the company performing the work is fairly mature in project management regarding their methodology, processes, etc.
- The work of the project is built from the project management plan, which is what the team follows to complete the work of the project.
- The Project Manager should follow the company's project management processes.
- Fix the problem as soon as possible; do not let it linger.
- Ideally, influential stakeholders should be defined before the project starts to ensure that they have had an opportunity to provide input to the project management plan.
- Do not assume that the project or work is complete just because the team believes it is complete. Until the customer/sponsor gives formal acceptance, there may still be work to do.
- Understand the roles and responsibilities as defined in the *PMBOK Guide*, regardless of how they are defined within your company.
- "Analysis" is always a technique.
- Reality is not often addressed in the questions. Therefore, if you need time or money, time or money should be no object. Ask for it; it should be provided via the project sponsor(s). [We saved the biggest "Theory Pill" for last.]

3.2.4 Brain Dump List

The brain dump is a key piece of preparation for PMP Examination success. Let's clarify what a brain dump is. A brain dump is important information that you write down as you begin your PMP Examination. We recommend that you write down your brain dump during the tutorial of the exam. This tutorial happens in the first fifteen minutes before your four hours actually start. Ensure that you can do this cold in fifteen minutes or less before you take the test.

Some people take the approach that using a brain dump means you don't know what is needed to pass the test. The reality is that the exam has a lot of information you are expected to understand and know how to address in situational and other formats of questions. This brain dump can also help you ensure that you don't get key information twisted in your mind as you go through the test. One of our staff said that when she took the test, she knew the information, but she preferred to write it out just to ensure she could quickly reference it and not get it confused.

Every brain dump is personal and relates to key items people feel they need to have presented in the brain dump, but the following table lists items that are ideal to provide in most cases:

Content	Location
EV formulas including our table • Cost Performance Index (CPI) • Cost Variance (CV) • Schedule Performance Index (SPI) • Schedule Variance (SV) • Estimate at Completion (EAC) • Estimate to Complete (ETC) Variance at Completion (VAC) • Earned Value (EV) • Planned Value (PV) • Budget at Completion (BAC) • To Complete Performance Index (TCPI)	Cost Chapter
Percentages for 1, 2, 3, and 6 Sigma	Quality Chapter
Present and Future Value Formulas	Cost Chapter
Cost Estimate Range Table	Cost Chapter
Forward and Backward Pass Formulas	Time Chapter
Slack Formulas	Time Chapter
Organizational Structure Characteristics	Framework Chapter
Risk Response Strategies	Risk Chapter
Types of Power for the Project Manager	Human Resource Chapter
Conflict Resolution Types	Human Resource Chapter
Levels of Maslow's Hierarchy of Needs	Human Resource Chapter
Point of Total Assumption Formula and Variables	Procurement Chapter
Process Table Map -- This is the table that lists the 44 processes and the five Process Groups horizontally across the top and the nine Knowledge Areas vertically on the side.	*PMBOK Guide*

Planning Diagram	*PMBOK Guide* or PMP Exam Success Series: Volume 1 Placemat
List of Management Plans and Change Control Systems	From Various Chapters

Chapter 5- Framework

5.4.3 Phase Gate

A phase gate is a review process undertaken to determine if a project is likely to succeed. At the end of a program or project phase, an authorized group (such as a steering committee or independent party) reviews the work of the phase and either approves to continue the project or makes the decision to stop future work on the initiative. As a result of this activity, projects that are not likely to succeed are "killed" early. A phase gate could also be considered a "**kill point**."

Chapter 6- Integration

Be familiar with project selection techniques and their importance.

6.3.3 Project Selection

A company can decide in a number of ways which projects to pursue. Typically, benefit and cost are examined in a variety of ways, such as by a steering committee review, project ranking and prioritization, or financial performance.

Basic needs for a project could be created from problems, opportunities, or business requirements. More specific factors that can result in the creation of a project could include a business need, market demand, technological advance, customer request, or legal requirement.

Mathematical Models	There are various mathematical models that can be used for project selection. They include the following: • Constrained Optimization • Linear • Non-linear • Dynamic • Integer • Complex calculation • Algorithms (multi-objective programming) This approach ultimately comes down to trying to forecast as many variables as possible and predict the outcome via mathematical analysis.
Benefit Measurement Model	This could also be considered a Scoring Model. This model takes the following into consideration: • Comparative approach • Scoring models • Benefit contribution • Economic model

6.9.5 Sequence for Closure

Be prepared to understand the Closing sequence of items for a project. While this sequence can be somewhat vague in the *PMBOK Guide*, it can also vary in reality from company to company, depending on the needs.

The general order is as follows:

1. Complete any Close Project activities.
2. Deliver any required reports associated with closure (Organizational Process Assets updates).
3. Close out any contracts with outside vendors.
4. Perform Lessons Learned.
5. Complete the archives of any project files (Organizational Process Assets updates).

Release resources for other projects.

Chapter 7- Scope

7.1.1 Project Scope Management Plan

The project scope management plan helps the Project Manager and team do the following:

- Establish a scope statement and requirements
- Create the WBS (Work Breakdown Structure)
- Validate that the deliverables and work (scope) of the project were built correctly

Address scope-related changes to the project

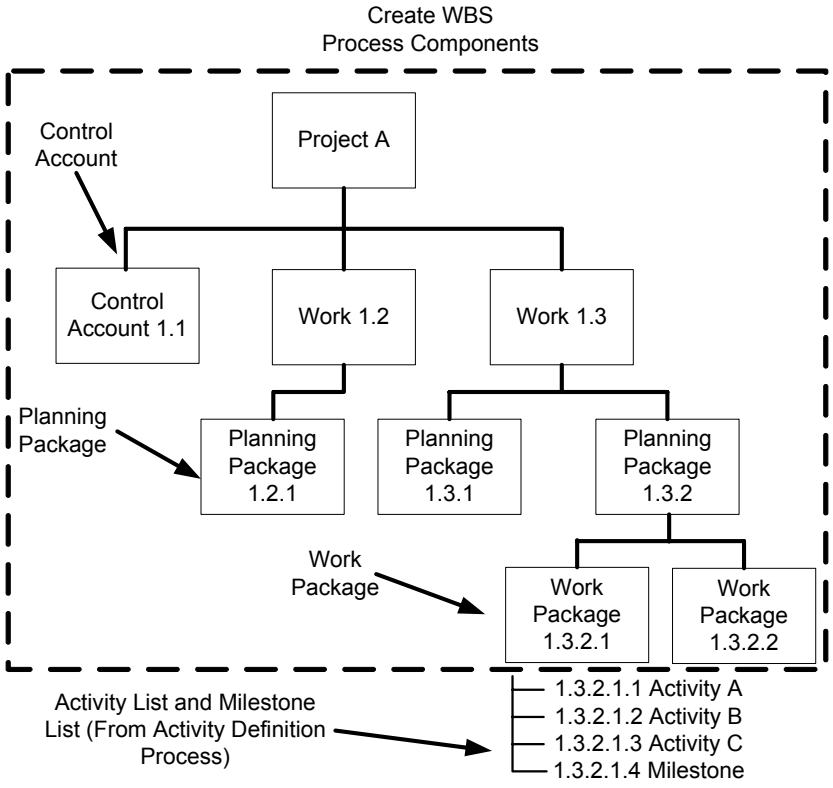


Figure Error! No text of specified style in document.**-1: WBS Process Components**

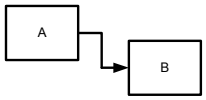
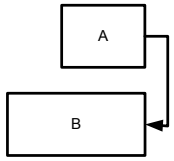
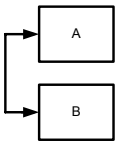
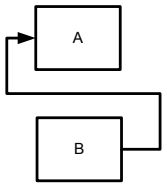
Chapter 8- Time

8.1.1 Schedule Management Plan

The schedule management plan helps the Project Manager and team do the following:

- Decompose work packages (deliverables) into activities and milestones
- Establish the network diagram
- Determine what resources are needed for the project
- Determine the durations for the activities
- Integrate all activity components into a schedule

Deal with schedule changes and updates

Finish-to-Start With the finish-to-start predecessor, Activity A must be completed before Activity B begins. This predecessor is usually the default type for most modern project scheduling software and is usable in the activity-on-arrow (AOA) and activity-on-node (AON) diagramming techniques. The other types (start-to-start, finish-to-finish, and start-to-finish) are used only on the activity-on-node (AON) diagram.	
Finish-to-Finish With the finish- to-finish predecessor, Activity B must finish by the time Activity A is finished. Use this predecessor when two or more teams are developing something, and all activity must finish at the same time to be converged into the total system.	
Start-to-Start Under the start-to-start predecessor, when Activity A starts, Activity B can start. Use this predecessor when multiple activities can start simultaneously.	
Start-to-Finish Under the start-to-finish predecessor, Activity A starts before Activity B finishes. You use the start-to-finish predecessor in situations where the new system must start before you could finish (shut down) the old system. Start-to-finish is the orphan of the predecessors. Think about it: how many of you have used this compared to any of the other predecessors when you create a schedule? One example that seems to be ideal for this type of predecessor is a project in which you create a new system to replace an existing one.	

8.4.1 Parkinson's Law

According to Parkinson's Law, work expands to consume the time scheduled for its completion. It's a comical observation of economics made by C. Northcote Parkinson, based on his experience in the British Civil Service. He noted that as the British empire shrank in both size and significance, the colonial office staff actually increased.

You could generalize Parkinson's Law as: "The demand upon a resource expands to match the supply of the resource." In computer terms, it works out to: "Data expands to fill the space available for storage." In financial terms, it reads as: "Expenses rise to meet income."

Chapter 9- Cost

9.5 Expected Present Value (EPV)

Expected present value (EPV) is a present value analysis that takes into consideration the risk of the opportunity being considered. This calculation involves considering and weighting many potential outcomes. For example, a 40% chance of making $10,000 and a 60% chance of making $2,000 would create an expected cash flow of $5,200. Although there are various ways EPV could be calculated, a common way would be to multiply dollar amount by likelihood and add the outcomes similar to expected monetary value (in the Risk chapter).

9.8 Life Cycle Costing

Life cycle costing (sometimes called TCO or Total Cost of Ownership) is the process of examining all costs associated with a project and its product once it goes into production. Without this focus, you could potentially create an environment that causes your company to incur additional cost associated with the product after it goes to production.

By taking production and the post project life into account, you can determine that your strategy to build the project might differ. Such an approach can result in an increase in project cost but a savings in operation cost, which saves the company money in the long run.

Here's an example: A vendor wants to charge your company $50,000 to create a prototype of something then charge $2,000 per item after that. The $50,000 might be higher than you prefer or had forecasted. You find another vendor that has a lower upfront cost but charges $4,000 per item. By selecting the vendor with the higher upfront cost, but lower unit cost, you can easily calculate that you would actually recognize a cost savings after the production of only 25 devices. There is even a greater cost savings when purchasing additional devices, as shown below.

	25 Devices	30 Devices
Vendor A	25*($2,000) + $50,000 = $100,000	30*($2,000) + $50,000 = $110,000
Vendor B	25*($4,000) = $100,000	30*($4,000) = $120,000

9.11 Cost Estimating (Planning Process Group)

The Cost Estimating process is key because the accuracy of cost estimates directly impacts the likelihood that a project comes in on budget. In Cost Estimating, you focus on establishing the costs of either the work packages or the activities to help establish a total project cost.

9.11.1 Cost Management Plan

The cost management plan helps the Project Manager and team do the following:

- Establish the cost of activities and work packages on the project
- Establish the cost accounts and chart of accounts with the WBS and Schedule
- Establish policies associated with updating the budget and distribution of the budget through the work of the project
- Update actual costs and adjust the cost baseline

- Deal with cost changes

9.13 Cost Budgeting (Planning Process Group)

In Cost Budgeting, the primary activity is rolling up the cost estimates for the activities and work packages to create a total project budget amount that will serve as the cost baseline. At this point, you have a detailed estimate of what the project will cost, as well as its individual pieces. The cost baseline created at this point should include a time-based approach to help determine project cost needs as time passes. It establishes the basis for measuring, monitoring, and controlling project cost.

Indices

Schedule Performance Index (SPI):	Measures progress at a percent of the rate originally planned. The formula is EV/PV. Be able to calculate EV or PV if given SPI and EV or PV.
Cost Performance Index (CPI):	Measures how many cents of return on each dollar spent based on a single point in time. The formula is EV/AC. Be able to calculate EV or AC if given CPI and EV or AC.
To Complete Performance Index (TCPI):	Represents the efficiency needed from the remaining resources to meet the cost goals of the project. The formula is (BAC-EV)/(BAC-AC) and can be demonstrated as follows: $TCPI = \frac{(Remaining\ Work)}{(Remaining\ Budget)}$ The graphic below shows similarities with the CPI (Cost Performance Index) formula. $TCPI = \frac{(BAC - EV)}{(BAC - AC)}$

Variances

Cost Variance (CV):	The difference in dollars between work completed (earned value) and what was spent to complete it (actual cost) The formula is EV-AC. Be able to calculate EV or AC if given CV and EV or AC.
Schedule Variance (SV):	The difference in dollars between work completed (earned value) and what should have been (planned value) The formula is EV-PV. Be able to calculate EV or PV if given SV and EV or PV.
Variance at Completion (VAC):	The difference (or variance) in dollars between the original or revised budget (BAC) and the anticipated completion cost based on the projected completion amount of the project (estimate at completion or EAC) The estimate at completion or EAC is discussed in more detail later in the chapter. The formula is BAC-EAC.

Activity Name	Planned Day	Actual Cost($)	Earned Value($)†	% Complete	Planned Value($)
		(AC)	(EV)		(PV)
Activity A	Day 1	$300	$300	100%	$300
Activity B	Day 2	$200	$150	100%	$150
Activity C	Day 2	$150	$100	100%	$100
Activity D	Day 3	$225	$200	100%	$200
Activity E	Day 3	$100	$100	100%	$100
Activity F	Day 3	$300	$150	60%	$250
Activity G	Day 4	$140*	$130*	65%	$200
Activity H	Day 4	$100*	$80*	20%	$400
Activity I	Day 5	$0	$0	0%	$300
Activity J	Day 5	$0	$0	0%	$200

(The line between Activities F and G represents the measuring point for the analysis.)

† PV x % complete

* These activities started ahead of schedule, and the progress must be included.

We can use the example above to perform earned value analysis. The table shows that the project just completed day 3 with the horizontal line.

Budget at Completion	Calculate this figure by totaling the planned values for all the activities. The total budget at completion is $2,200.
Planned Value	To calculate planned value, add up the planned value for each activity through day 3. The total is $1,100 of planned value. This value represents the work that should be complete through day 3, meaning that you should have spent $1,100 through day 3. When looking at planned value in this case, even though some work is ahead of schedule, you should look only at the work that should have been done through day 3.
Actual Cost	Total what you have actually spent to date. This total includes **any and all costs**, even if the work was started ahead of schedule. That is actual cost, and it is $1,515.
Earned Value	Earned value is the planned value of each activity (**regardless if it should have started yet or not**) multiplied by the percentage complete (%). This value provides the earned value (EV) for each activity. The next step is to add the earned value (EV) of each activity for the total earned value (EV) for the project. This value represents the budgeted cost of work performed (BCWP) or earned value (EV), and it is $1,210.
Translation	Translation means that through day 3, you should have spent $1,100, and Activities A through F should be complete. You have spent $1,515 but have an earned value (the work to show for what you have spent) of only $1,210.

Using the earned value management table previously in this chapter, notice that the project has the following metrics:

CPI:	0.8	=	$1,210/$1,515	CV:	-$305	=	$1,210-$1,515
SPI:	1.1	=	$1,210/$1,100	SV:	$110	=	$1,210-$1,100

The CPI shows that the project is getting an 80-cent value for every dollar spent, with a CV that shows it is presently $305 over budget. The SPI shows that the

project is progressing at 110% of that rate planned and has accomplished $110 more in work than was scheduled. The project is ahead of schedule but over budget.

Consider the following as a scenario to express the EVM values on a project level:

Your project is to build a sunroom on a house in five (5) days. The cost is $2,000 per day.
The project is currently 40% complete. It is now the end of day 3 and you have spent $5,000.

AC (Sum of Actual Costs)	$5,000
EV (% Complete of Project)	$4,000
PV (Value of Scheduled Work)	$6,000
BAC (Total Budget)	$10,000
CPI (EV/AC)	0.8
CV (EV-AC)	-$1,000
SPI (EV/PV)	0.667
SV (EV-PV)	-$2,000
EAC (BAC/CPI)	$12,500
ETC (EAC-AC)	$7,500
VAC (BAC-EAC)	-$2,500
TCPI (Rem. Wk./Rem. $)	1.2

Chapter 10- Quality

10.8.1 Quality Management Plan

The quality management plan helps the Project Manager and team do the following:

- Establish the definition of quality for the project and work of the project (Quality Baseline)
- Establish any checklists to ensure processes are followed
- Define any process steps
- Validate the quality processes are working
- Test the product of the project
- Format project/process data for communication to project stakeholders

Deal with changes to the quality standards and processes on the project

Chapter 11- Human Resources

11.1.1 Staffing Management Plan

The Staffing Management Plan helps the Project Manager and team do the following:

- Establish the staffing policies for the project
- Establish the organizational chart (OBS) for the project
- Define position descriptions for the project
- Get team members on the project
- Develop the group of people into a team
- Deal with team issues that arise

11.1.6 Delegation

Delegation is a key tool a Project Manager can use to assign **work** (and the respective **authority** and **responsibility**) to team members for conducting activities on the project.

When used effectively, delegation is not simply giving team members the dirty work or telling them what to do. **Effective delegation involves** giving team members the **responsibility and authority to get the work** done on time. In return, the Project Manager expects accountability and reliability from the team member who has been assigned the work. This expectation should help team members accept the project work and become more involved.

Delegation involves communication. The **Project Manager assigns the work** with a **clear definition** of what **work is to be done**, the **expected results**, and how **progress is to be evaluated**. The team members assigned the work provide feedback as acceptance of the responsibility.

Effective project managers are sensitive to delegation and know what work they can delegate to subordinates and what work they need to perform themselves.

For Consideration to Delegate	Not to be Delegated
Technical activities	Evaluating or ranking team members
Cross-training-related work	Long term (strategic) planning
Routine activities	Monitoring extremely important activities
Enjoyable activities	Rewarding team members
Work that breaks the routine of some jobs	Determining policies
Work that others do better	Personnel selection

A **traditional role** of the Project Manager has been to focus on **planning, directing, organizing**, and other project activities of that nature. Given the **evolving project environment**, these activities should be considered for delegation where applicable with the **Project Manager focusing efforts** in areas such **as coaching, motivating, evolving team performance,** and **managing expectations** of the key stakeholders.

Effective delegation is not without obstacles. **Obstacles can come from** the **Project Manager, the team, or the organization**. There could be situations in which the Project Manager doesn't want to involve others for various reasons. Perhaps team members are unwilling to accept the delegated work or the organization fails to support the Project Manager in the delegation of (certain) work to others.

Delegation can also be used to show what others on the project are capable of doing, thereby preparing them for promotion or new positions in the organization.

11.4.1 Sources of Conflict

Sources of conflict are an issue that is imperative in order to understand conflict. If Project Managers are aware of variables that can cause conflict, they can take a proactive approach to eliminating conflict before it occurs. They can also know that it is likely to come when the project addresses areas that simply can't be ignored, such as scheduling and resources. If conflict is managed correctly, there can be a greater output of the team and enhanced relationships among the team members.

Most people think that personality is the main reason for conflict. Studies have shown that this is rarely the case. **Traditionally, conflict occurs as Planning evolves.** Items such as scheduling priorities and resource utilization are the most likely sources of conflict. **Personality is typically the least source of conflict.** To minimize conflict, a Project Manager can utilize team ground rules, group norms, and project management practices.

Scheduling Priorities	Scarce Resources	Personal Workstyles	Technical Direction	Methodology Details	Cost	Personality
⬆ Greatest Source of Conflict						⬆ Least Source of Conflict

Chapter 12- Communication

12.3.1 Communications Management Plan

The communications management plan defines the communication needs of the stakeholders, the communications format and frequency, and who delivers them. This communication can include reports, meeting schedules, change processes, and contact information for the team. It lets team members know the communication rules and the project expectations.

The plan helps the Project Manager and team do the following:

- Determine communication requirements for the project
- Establish and utilize communication infrastructure for distributing information on the project
- Report performance on the project to the appropriate stakeholders
- Deal with communication issues that arise

Be prepared to calculate the number of communication channels on a project, as well as the number of channels added if team members are added or removed. **Also, be sensitive to questions in which you are the Project Manager with a team of a given number of people compared to a team of a given number of people. You must count yourself in the first situation.**

Know the calculations for the total number of communication channels added or removed as team members are added or removed

You must recognize if the PM is included in the situation…

PM has a team of 6 (count 7 people)	The PM is described as "outside" the team, and the total count must be adjusted to include the PM in the communications channels.
Team has 6 people (count 6 people)	The PM is described as within the team. No adjustment to the total count is necessary.

Be able to calculate the following:

Number of channels total on project	Number of channels total on project when people are added	Number of channels added when people are added
Use the standard formula.	Use the standard formula for new total number of people.	Use the standard formulas for original number of people and for new total number of people then subtract the difference.
$N^{original} * (N^{original}-1)/2$	$N^{new} * (N^{new}-1)/2$	$(N^{new} * (N^{new}-1)/2) - (N^{original} * (N^{original}-1)/2)$

Scenario: PM Already Counted	Standard Formula: N*(N-1)/2
With a team of 4, there are 6 channels	**4*(4-1)/2=6**
If 2 people are added to the team, there is now a team of 6 and a total of 15 channels.	**(4+2)*((4+2)-1)/2=15** **Or** **6*(6-1)/2=15**
The total number of channels added is 9.	**New # - Original # = # added** **15-6=9**

Scenario: PM Counted "outside" the Team	Standard Formula: N*(N-1)/2
The PM has a team of 5. There are 15 channels.	**(5+1)*((5+1)-1)/2=15** **or** **6*(6-1)/2=15**
If 3 people are added, there are now 9 people (team plus PM) and a total of 36 channels.	**(6+3)*((6+3)-1)/2=36** **Or** **9*(9-1)/2=36**
The total number of channels added is 21.	**New # - Original # = # added** **36-15=21**

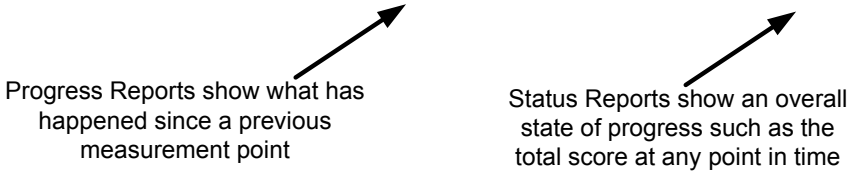
Progress Reports

Progress reports provide information on what has been done recently on the project. Ex: What have we done in the last week?

Status Reports

Status reports provide information on the present overall state of the project. Ex: What have we done total so far?

Team	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Team A	28	26	24	33	111
Team B	30	23	32	12	97



How work experience requires reports often conflicts with how PMI defines reports. To clarify progress and status, review the above example of a four-quarter game between two teams. A **progress report** shows how many points have been scored by period. A **status report** shows the overall score at any point in time. To apply these examples to a project, a **progress report shows what has been accomplished within a given time frame**. A **status report shows the overall state of the project**. **Remember: The Status Report is the sum of ALL Progress Reports.** For example, in a six-week project, with progress reporting weekly at the end of three weeks, the Status Report is the sum of information reported in Progress Reports for weeks 1, 2, and 3.

Progress = **P**oints in time
Status = **S**um of all

Chapter 13- Risk

13.2.1 Risk Management Plan

The Risk Management Plan helps the Project Manager and team do the following:

- Create the risk register or what specific version to use
- Identify risks (positive and negative) and triggers
- Define the probability and impact matrix and its thresholds
- Determine when and how to perform quantitative risk analysis, expected monetary value (EMV) and decision tree analysis
- Establish risk responses
- Establish risk owners and the responsibilities of each risk owner
- Plan how to monitor and respond to risks

13.3.1 Risk Register

The risk register is a part of the project management plan and is created during the risk planning processes. It evolves as the risk management processes and the project evolve, and it contains the following:

- Risks
- Triggers
- Probability (Likelihood) and Impact ($) from risk analysis
- Planned Responses
- Risk owners

Chapter 14- Procurement

14.1.1 Procurement Management Plan

The procurement management plan helps the Project Manager and team do the following:

- Determine make vs. buy for the various needs of the project
- Establish what procurement documents (RFP, RFI, RFQ) are needed for the project
- Create the procurement documents for the project
- Run bidders conferences
- Address single source and sole source procurement
- Select vendors to do work
- Establish contract(s) with vendors

14.1.3 Rent or Buy Calculation

You may be quizzed on the calculation area of this topic. It is a straightforward calculation. The components are typically as follows:

- Purchase cost and daily maintenance with the purchase option
- Daily (or weekly, monthly) rental fee, which usually includes maintenance fees

Typically, you should be prepared to calculate the point where it makes sense to purchase, versus rent, or visa versa. Review the following example:

> You are the Project Manager for a housing developer. The development requires a skid loader to clean out the lots where the houses will be built. You can rent the skid loader for $100 per day (including maintenance) or you can purchase one for $5,000, with a $50 per day maintenance cost. What is the maximum time you would want to rent this tool before considering purchasing it?

To determine the best decision, first take the variables and make a formula. The options have rental at $100 per day or purchase at $5,000 with $50 per day maintenance. Translate this information into a formula as follows to solve for the variable X.

The formula is ($ per day)x(number of days) = purchase price + (maintenance fee per day x number of days). An example is $100X=$5,000+$50X. Solve for X as the number of days.

Step 1. (-$50X)+$100X=$5,000 or $50X=$5,000 (Move all the pieces with the variable X to one side of the equation.)
Step 2. $5,000/$50=X (Divide to determine the value of X.)
Step 3. $5,000/$50=100
Step 4. X=100 (Here is the maximum number of days you would want to rent the tool before purchasing it.)

14.4.1 Contract Management Plan

The Contract Management Plan helps the Project Manager and team do the following:

- Define the rules for archiving contract documentation (contract file)
- Establish payments for the work of the contract
- Address changes to the contract
- Validate that the work of the contract is complete
- Close the contract when work is complete