

PMP Exam Tips on Time Management. Fourth Edition

Jim Owens PMP

Parallels between Cost and Time estimating:



There are strong parallels between **Cost** estimating and **Time** estimating, as you will see if you compare the ITTO's (Inputs, Tools & Techniques, and Outputs) of the estimating processes.

Time Management and Professional Responsibility are two of the more difficult knowledge areas in the exam. Part of the reason is (I think) that with Professional Responsibility it is simply underestimated during study, and the fact that it is not elaborated in PMBOK means that you have to look elsewhere for information on it. And with Time questions the exam requires you to work out manually what project management software does automatically. Just a reminder here – there are **no questions on specific project management software** in the exam, so MS Project and Primavera etc won't rate a mention.

Time Management, as with the other knowledge areas, is **recursive** (looped-through and refined throughout the project). During the recursions, details are finalised and fed back into the Scope Baseline (scope plan, WBS and WBS Dictionary), Activity List and so on, so that a clearer and truer picture of the project emerges.

The WBS is the “big picture” of the entire project and comprises all the deliverables, down to work package level. And so it should come as no surprise that it is a major input to the Define Activities process.

But unlike previous versions of PMBOK, in the Fourth edition, **the WBS, is not used by itself** as an input, but rather it is combined with the detailed Project Scope Statement and the WBS Dictionary, and the combination of the three referred to as the “Scope Baseline”, it's important you remember this:

Scope baseline = Scope Statement + WBS + WBS Dictionary

So of course the Scope Baseline includes information such as Constraints and Assumptions, as these are included in the Scope Statement

For the exam you will need to know that the project schedule is a combination of the schedule data + schedule calculations (known as the schedule model) and its graphical representation. Some project managers separate the two, but not PMBOK

Project Schedule = Schedule Model + Schedule graphical representation

Important points

When trying to understand the PMBOK, bear in mind the viewpoint of PMI. PMBOK projects are enormous, so you can forget about your, “Planning Auntie's birthday party” size projects. This is partially because the PMBOK was originally largely based on the project management tools and techniques from the early space program. So project management isn't rocket science, but it's related to it.

The other factor to bear in mind is that in the exam, the project manager is considered to be an employee of the organization, and not a contractor, consultant or external provider.

Recap on Scope Management

In Scope Management you defined what the project will and won't deliver (the Scope Statement). Next the deliverables were decomposed (broken down) to "work packages" (lowest level deliverables), using the WBS. **The WBS contains only deliverables (nouns)** and no activities (verbs), all activities will be found in an extension of the WBS, called the Activity List.

The **WBS is not time ordered**, so e.g. it could show a roof being constructed before the foundation is laid. This is ok because the WBS is create before the schedule; in fact a major goal of project management is to schedule the creation of every deliverable on the WBS.

In Time Management the schedule is developed from the Scope Baseline, and of course the schedule is time ordered.

The deliverables at the bottom of the WBS are called "**work packages**", the deliverables at the top of the WBS (i.e the first level under the main project) are called, "**control accounts**", and the deliverables in between are called "**planning packages**". Each box on the WBS has a unique code number, e.g. 3.1.2, and the collection of all code numbers in a WBS is called the "code of accounts".

The **code of accounts** is used to determine the decomposition level of any work package within the WBS, and by assigning each code in the code of accounts to a code in the chart of accounts (in the organizations general ledger), the cost associated with any item in the WBS can be tracked throughout the project.

Activity List

One of the first tasks in Time Management it create an extension to the WBS called the Activity List. The Define Activities process decomposes (breaks down) the work packages (deliverables) into the **activities** needed to deliver them.

I said "one of the first tasks in Time Management" because inherent in the system is a period of planning by the project management team, prior to conducting Time management, which results in a Schedule Management Plan. But this planning effort is not shown as a separate process.

After the activities are defined, the Sequence Activities process is where you will **determine the sequence** in which the activities should be performed, and which activities can be performed in parallel.

Following this, the **Estimate Activity Resources** is performed. Resources may include the type and quantities of material, people, equipment, or supplies required to perform each activity.

The next step is to **estimate the duration** for each activity, then the **Develop Schedule** process attempts to get everything in the right order and at the right time, by analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule, by way of scheduling software. This is a process which will be iterated (repeated and refined)

throughout the life of the project. This process determines the planned start and finish dates for each of project activities and determines the milestones.

When you hit a brick wall in Schedule development, or your finish time is unacceptable to key stakeholders, you will have to review your duration estimates and resource estimates, and try again.

Be aware, that **you can't just guess** or change estimates to make them fit someone's schedule. You must record the method used for each estimate, as you may be called to justify it (usually when the project is running late, or fails).

Estimation methods

Expert Judgment. Should always be guided by historical information. Expert judgment can (assisted by historical information) provide duration estimates, or can advise on the use of the other estimating methods (including the combination of the other methods).

Analogous Estimating is used when there is a limited amount of detailed information, and so obviously cannot have a high level of accuracy, but it is generally at a **relatively low cost**. Analogous Estimating means a comparison with previous (or parts of previous) similar projects, and the amount is then multiplied by an estimated "complexity figure". For example, you have built a one-story house, and now you have to build a two-story house. It is very unlikely that the two-story house will cost twice as much as a one-story



times a complexity factor =



This information comes from your organizational process assets. This is a top-down approach, so it costs less than other more detailed methods, but of course is less accurate. Sometimes this method is used to provide a "ball-park figure", and is followed up by one of the following methods.

Note that for analogous estimating it is very important of course that the projects being compared are truly similar (and that the conditions are similar, e.g. an outdoor construction project in winter might be quite different in summer). Analogous Estimating uses expert judgment and historical information.

Parametric estimating uses a parameter e.g. if we know how long it takes to lay a square meter of bricks then we simply multiply the total area of the planned wall, by this figure (parameter) to arrive at the total time for this task. In the building industry much of this sort of information can be found in commercial tables – the same is not generally true of the IT industry (e.g. you are unlikely to find tables of "lines of code per hour", and if you did they would probably be

rubbish. Consider any unit such as square feet painted per hour or number of units created per day etc, as a likely candidate for parametric estimating.

CPM is the most common schedule developing method (certainly in the exam), followed by PERT. PERT and GERT were removed from PMBOK Third edition, but with the Fourth edition, PERT seems to be back again, so you can expect to see it in the exam.

GERT was the only network diagramming method that can cater for loops and conditional branching

Lags and Leads

A **Lag** is a positive time added to a task to cause it to wait (e.g. time for concrete to cure).

A **Lead** (pronounced "leed") is negative time added to speed a task up. So if you are painting a room and the required time to paint the whole room is 4 hours, and the paint has to dry for two hours before you can apply the second coat, then it will take you 8 hours to put two coats of paint on the room. But suppose when you have finished painting the first coat on half of the room (which takes 2 hours), then a second person can start applying the second coat as the first painter keeps working, so the total time to paint the room with 2 coats of paint is now just 6 hours, because of the 2 hour lead on the second painter. Note this reduced the duration of the total task, **but the level of effort is still the same (2 x 4 = 8)**

Compressing project time

Fast tracking arranges tasks to be performed in parallel rather than in sequence. Tasks which can be performed in parallel are usually identified in the Sequence Activities process. This arrangement can reduce the project duration (not the labor), but at an increased risk. To remember this, image two high-speed trains on the same track, one behind the other and heading the same direction. The second train can't arrive at the station until the first train has unloaded its passengers. Now imagine the same trains on parallel tracks, travelling in the same direction and arriving at parallel platforms around the same time, there is no waiting, both can transfer passengers at the same time. So trains in parallel on fast tracks deliver the passengers sooner. Note that fast tracking increases risk because it introduces dependencies, e.g. suppose a carpenter is building a wooden fence and a painter is painting the fence as it is erected. This saves time of course, but if the carpenter has to stop for any reason, the painter has to stop too.



Fast Tracking (working in parallel)

Crashing means adding resources to activities to decrease their duration, which usually **increases cost**, but also usually **reduces efficiency** too – e.g. if a person can unload a truck with a forklift in two hours, you may think that two people with two forklifts should take one hour – but in reality they usually take longer, because they get in each other's way a bit. And if there's only one forklift, then you may be paying for one person to stand idle.

Or even worse – what if your forklift truck driver has to train the new driver, then you may get very little work for a while.

To remember crashing, Imagine your project area is full of Keystone Cops and they're running around and crashing into each other, so while the overall project takes less time, it is less efficient.



Crashing (adding more resources)

Crashing doesn't always work, e.g. If a man and a woman can produce baby in 9 months, how many men and women would it take to produce the same baby in one month? Even though it's impossible – how many men to you think would be willing to try?

Note that overtime is still considered crashing, because you are still increasing resources (extra input from the same resources).

Resource Leveling is another tool the project manager can use to compress project time. In this case the project has peaks of activity then troughs. Resource leveling smoothes out the project schedule so resources are not over-allocated.

Other Exam Tips

Monte Carlo Analysis is a computer simulation to estimate the many possible variables within a project schedule, produces probable ranges of dates and ranges of critical paths, not single ones.

The **Critical Path** in a project usually has zero float, and is the path with the longest duration to completion, but takes the shortest time to complete.

There **can be more than one** critical path in a network diagram (but if there are, then they are all an identical duration). Should delays happen on near-critical paths, and all float is consumed, the critical path may suddenly change, so monitor the CP(s) and near-CP's

The **project schedule** is a calendar-based system used to predict when the project, and each individual activity in it, will start and end, it is often mistakenly called the "project plan"

Gantt charts map activities against a calendar, a true Gantt chart does not show the relationships and dependencies between activities.

A Gantt chart is:

- NOT a project management plan
- A weak organizing tool (WBS and network diagrams are strong organizing tools)
- A good communication tool.
- Created from a WBS/Activity List and/or network diagrams
- Real Gantt charts do not show task interdependencies or resource assignments (forget about what MS Project "Gantt charts" show, the exam will consider a genuine Gantt chart).

Milestone charts show when key deliverables are expected; they do not show the relationship between activities.

Problematic areas in exam:

- Manually calculating network diagrams
- Schedule development

Other Exam Tips

PERT estimate

Is calculated by the formula (pessimistic estimate + optimistic estimate + most likely estimate)/3

$$\text{PERT estimate} = (P + O + 4xML)/6$$

Three Point Estimate

A “three-point estimate” is not the same as a PERT estimate, it is simply (pessimistic estimate + optimistic estimate + most likely estimate)/3

$$\text{Three Point estimate} = (P + O + ML)/3$$

A **network diagram** is created after the WBS has been decomposed into work packages (i.e. from the lowest level of the WBS), and after the WBS has been decomposed into an Activity List.

You need to understand **PDM** (Precedence Diagramming Method, also called AON or Activity on Node)

AOA (Activity on Arrow) is not in PMBOK any more

GERT has gone from PMBOK as well

The Project Manager does not estimate activity durations, the estimates are performed by the people who will do the work – but the PM has to provide them with sufficient information to do an estimate, and then gives the estimate a reasonableness check (expert judgment can be used for checking estimates).

The WBS should be created in conjunction with the team – not by the PM alone.

WBS updates are called “refinements”.

Dependencies:

- Hard logic (mandatory logic) set by nature of work – have to build computer before installing software; have to build walls before roof.
- Soft logic (discretionary or preferential logic) means the sequence of events is merely someone’s preferred order – paint the outside of the house before or after the inside (normally you use experience to make a sound choice)
- External e.g. set by Government agency, Union, major supplier etc.

A common mistake on exam – when squaring a number, people often multiply by 2 instead of squaring – but now we’re all squared, you’ve no excuse 😊

N.B. Some project managers may have different viewpoints or opinions to those expressed here – but PMI are marking your exam, so the PMBOK is *always* right and if I say anything that appears to contradict the PMBOK, then believe the PMBOK.

PS I’ve made every effort to get this right to help you in your exam – but if I’ve missed something please let me know.

Regards, Jim Owens PMP

Columnist with www.PMHub.net