Definition Step Three
Estimating your Resource Requirements

This Chapter of the Workbook explores the subject matter of estimating and looks to ways in which you can ensure that the estimates you and your stakeholders make are as accurate and reasonable as possible.

By the end of this Chapter, you will be able to:

- Explain the purpose and benefits of "estimating"
- Explain and demonstrate best practice approach to estimating the resource requirements of your Project
- Appreciate some of the jargon and standard terms used when estimating
- Understand and list some of the common pitfalls of estimating
- Explain how this information will be used in the planning process subsequently

Where are we in the Project Lifecycle?

- We have a Product Breakdown Structure, which lists all of the outputs or deliverables identified by our Project Team, that will lead to the successful delivery of the objectives of our plan
- Using the PBS as a starting point, we have identified all of the activities that need to be carried out in order to create these products and documented these activities in a Work Breakdown Structure
- We now have a large sheet of brown paper, covered in Post-It notes that bear a summary of each activity and a unique reference number attributed to each one. We also have a key to explain each reference number and an increasing Assumptions Log that gives details of all of the assumptions underpinning our work to date.

The next stage in the planning process is to determine how long each of these activities will take to carry out.

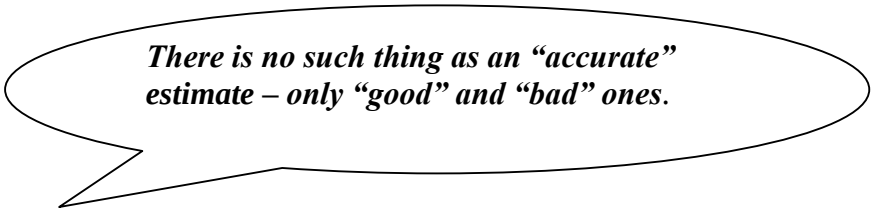
There are a number of reasons why we now need to work out how long each activity will take:

- By adding up the durations we will have a very rough idea of how long the project will take from start to finish
- The estimated duration of each task will go some way to telling us how much it will cost to complete
- We will be going on to schedule the tasks in the order they need to be completed and so it will help us to maximise the use of the time available.

Estimating – a best practice approach

Throughout the rest of this Chapter, we will look at some of the issues around estimating and how to ensure that the estimates in your Project Plan are as well thought through as they can possibly be.

If you read any text book or guide to estimating you will often find the following statement:



Therefore, this Chapter of the Workbook is about helping you and your Project Team to ensure that your estimates are as "good" as possible.

We will look at the following areas:

- Where to start
- How to improve the accuracy of your estimate
- The distinction between "duration" and "effort" in estimating
- The challenge of estimating in an environment of deadlines
- Validating your estimates
- Accuracy tolerances
- "Contingency"
- Common traps and pitfalls of estimates
- How to record your estimates in your planning documents

Estimating – where to start

Clearly, there are going to be occasions where the duration of a task is absolutely certain and unequivocal. Where this is the case, no further debate is required.

More often than not, however, you or your colleagues will need to use some sort of rationale to establish and later justify your estimates for how long a given task will take (and therefore cost). But where do you start?

Unless the exact time that a particular task will take is clearly known in advance, you should start your estimates with a range of likely times, as they can reflect the initial uncertainty in mapping out the duration of each task.

 To use a real life example, how long does it take to buy a house, from having your offer accepted, to moving in?

Speak to colleagues or family too, as they may have had different experiences to your own.

You should now have a range of durations for the house move. It is important to remember that the figures that each person you asked submitted will have been coloured by a number of factors:

- Their own experiences
- Location – there is a different house buying process in different countries.
- Whether their solicitor was a friend of theirs?

Having a range can be an effective tool for reflecting uncertainty, but ranges have limitations when applied to a project plan. If every task on your WBS was given a range for its duration, you could end up with a Project plan with an estimated total duration of between three weeks and 20 years!!

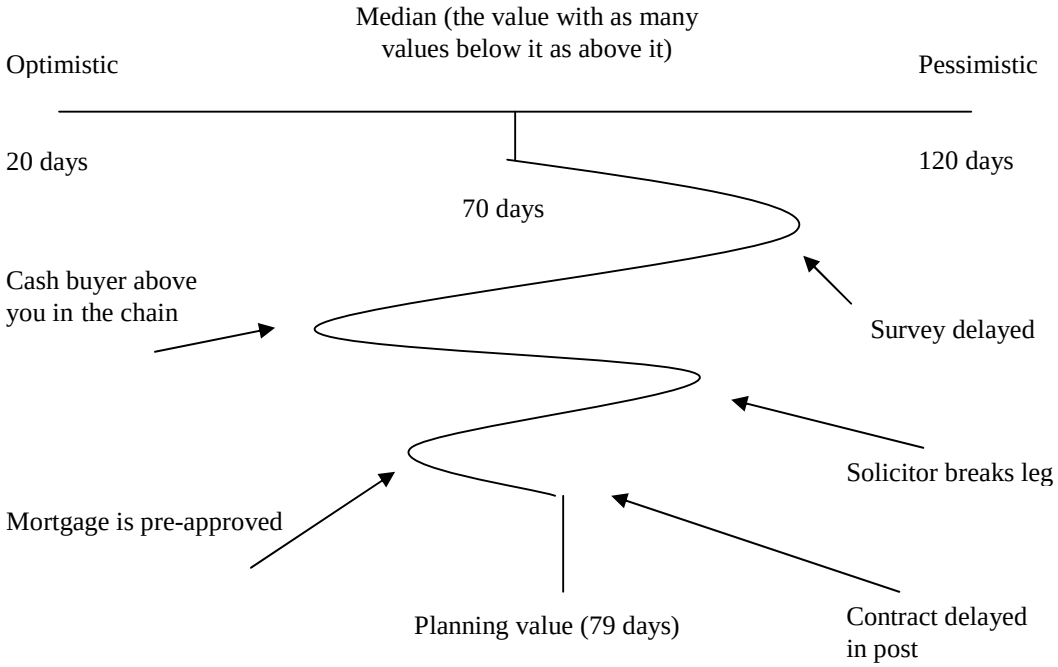
Therefore, you need to apply a logical process to your range, in order to nail it down to a specific figure for each activity. This figure is what we call a "Planning Value" or "PV"

You obtain your Planning Values for each task by taking your range, which is based on optimistic and pessimistic assumptions about the duration (i.e. 'best case' and 'worst case' scenarios) and considering the underlying factors that shape the estimate.

 Thinking about the house move example from before, what could go WRONG with buying a house that could slow it down?

Conversely, what could go RIGHT to speed things up?

Once you have weighed up all of the pros and cons, you should factor these into your original range estimate to establish your PV. The graph below demonstrates this thought process.



We should emphasise that the examples given and the length of the lines are subjective – the process is more important here, the idea being that the PV you arrive at is less of a 'finger in the air job' than just picking somewhere along the range between the best case and worst case scenarios.
This thought process should be undertaken with each activity in turn in order to arrive at figures that can be built into your plan.

Improving the 'accuracy' of your estimates

Clearly, whilst the use of Planning Values is a more logical way to ensure that the estimates you use are as sound as possible, it would be a nightmare if the PM was expected to do this with every one of potentially hundreds (maybe thousands) of activities.

Some suggestions for techniques to improve the quality of your estimates include:

Consulting the 'experts'	As with the compilation of the PBS and WBS, get the people that are actually going to be doing the work to do the estimates: o They will know more about it than you o They will understand the constraints under which they will be operating, for example having to balance the project work with 'doing their day job' o They may have done something similar in the past o It will help their commitment to the deadlines that they themselves are setting
Using your instinct	Having a process to follow should not stifle your own intuition. What does your gut feeling tell you about the task or the estimate?
Comparing it with past experiences	Ever felt sometimes like you're being asked to reinvent the wheel? Refer to previous projects and their PM records.
Documenting your assumptions	The quality of your estimate may depend on certain assumptions, like the availability of a worker with a particular skill. For example, an estimate for building a patio might be based on having a master craftsman to hand – if so, make sure you capture this so that you will understand the Time-Cost-Quality implications if you are given an apprentice to do the work instead.
Referring to conventions or 'rules of thumb'	A classic example of this is 'Please allow 28 days for delivery'. Rules of thumb can be especially useful if someone gives you an estimate that seems wildly optimistic, in that it allows you to challenge the assumptions behind it – "How confident are you about that estimate, given that it usually takes..." Of course, answer to this challenge may depend on the extent to which the person doing the estimate has built contingency into the duration – but more on contingency later…

Remember at all times that we're not looking for a perfectly accurate estimate – there is no such thing. An 'estimate' will by definition never be 100% accurate – merely as sound an estimate as we can get in the current climate.

The distinction between "Effort" and "Duration"

You may have noticed that we have been referring to "duration" as the measurement of time in projects, rather than "effort".

The reason we refer to duration in project planning is clear – this is the actual elapsed time needed in order for each task to be completed to a given standard and this is therefore the figure that needs to be carried forward into a schedule that will tell us how long the Project will take and when each task should begin.

This does not mean, however, that effort should be overlooked – in fact, it can form a valuable negotiating tool in relation to the Time-Cost-Quality triangle of your Project…

Supposing your Sponsor tells you that your Project duration is too long, due to other considerations, and you need to make it shorter and suppose you have a task that is estimated to have duration of 20 days. The underlying effort of this task is also 20 man-days (i.e. there is no 'please allow X days for delivery' involved) and the estimate is based upon one person carrying it out.

By doubling the available manpower, you can halve the duration of the task to 10 days (assuming that you maintain the same level of productivity).

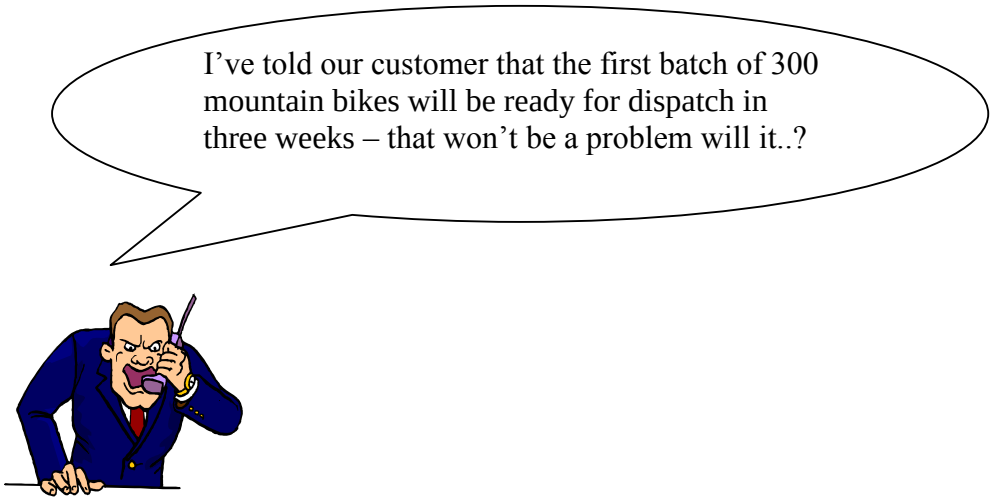
Of course, this additional resource may not be immediately available and could require you to buy in outside resource, like a consultant or subcontractor, to assist the person already earmarked for the job. Therefore, although you are still paying for 20 man-days, 10 of them will be dearer – hence the impact on your Time-Cost-Quality triangle.

When putting together your estimates, it is good practice to use the back of the Post-It Notes to record the basis on which the duration figures have been arrived at – for example,"20 days based on one competent person" or "10 days based on two experts and one apprentice". That way, if and when your durations are challenged or if you need to review your resource requirements, the information to back up your decisions is immediately available.

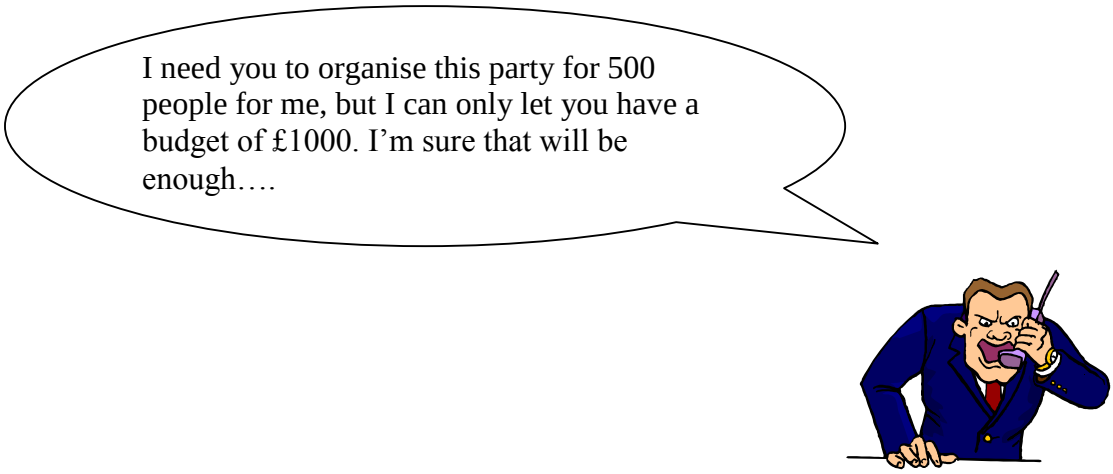
The challenge of estimating in an environment of deadlines

The techniques we have talked about so far rely on one overriding assumption – that the PM has been given a free hand to schedule the Project, without any deadlines or time constraints.

In reality this seldom is possible. – it is more likely that your Sponsor will come to you with a request with a deadline already attached.



Alternatively, the same could be true of budgetary constraints…



Given that the imposition of deadlines and budgets is a fact of life, it is important to recognise an approach to estimating that will allow you to make the most of the available time and/or money.

The ideal approach to estimating is what we call "Bottom Up" estimating, where your final total estimate of cost or time is a combination of all of the individual tasks within your Project plan. Doing so allows you accurately to define your Time-Cost-Quality triangle.

"Bottom Up" estimating is a scientific method that ensures that tasks are neither omitted nor rushed and is seen to reduce the likelihood of cost or time overruns in implementing your Project.

A "Top Down" estimate is one based on intuition rather than science – an intuitive assessment of the likely duration and / or resource requirements of the project, without exploring the underlying tasks.

The comment above about the £1000 budget is a top down estimate, as in the house move example earlier in this Chapter. Knowing from past experience that it takes 79 days to move house might shape future plans.

However, there are some disadvantages to "Top Down" estimating, such as:

- It could stifle choices and creativity – "I'd like to have table entertainers at the Party but I know we won't have the budget for it"
- It could threaten quality, if checking mechanism are omitted in order to save time
- It is harder to build in contingency into your estimates in case things go wrong (we'll talk about contingency later in the Chapter)
- The people doing the estimates may feel that they are being pressurised into cutting corners, knowing that a budget or deadline is hanging over them.

Advantages could include:

- It can serve as a 'reality check' to get people to focus on products and activities that will add the maximum value to the issue at hand
- Some people are motivated by deadlines and budgets and will therefore see them as challenges, rather than obstacles

We should also bear in mind that budgetary limits and deadlines are a fact of business and very often cannot be ignored or swept under the carpet.

A sensible strategy when given a deadline or budget which combines the best qualities of both, is to start off with a "Bottom Up" estimate, which is then sense checked by doing a "Top Down" based on the resource available.
By doing both, you can approach your Sponsor with some real alternatives, based on the Time-Cost-Quality model – "With the time available, I can do this, this and this. However, *this* is what I can do with this much extra budget/time"

Of course this approach is going to take longer – but your Sponsor may appreciate the extra alternatives and insight provided.

Validating your estimates

So far we have looked at the best practices about how to compile, improve and 'sense check' your estimates, the basis on which they should be made and how to balance them against deadlines and budgetary constraints.

We've mentioned that there is no such thing as an 'accurate' estimate – only good ones and bad ones – and so it is important to emphasise the need to validate your estimates.

The dictionary defines 'valid' as "sound, defensible, well-grounded" and thus a "validated" estimate is one that you should feel comfortable defending (or perhaps rationalising would be a better word to use) when challenged by your Sponsor or any other stakeholder.

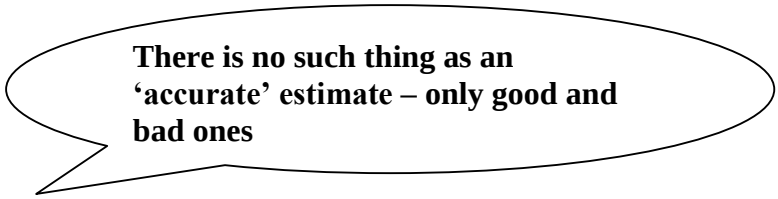
Many of the techniques you can use for checking the accuracy of your estimates can also be referred to when seeking to verify or validate them including:

- Referring to experts
- Checking with the people that are actually going to do the work
- Rules of thumb
- Your own instinct and gut feeling
- Comparing the estimate with similar pieces of work done in the past

The most important thing from the Project's point of view is that the success or otherwise of the Project will depend on the quality of the estimate, and that you owe it to the rest of the Team (and business) to ensure that your estimates are more than just a 'finger in the air'.

Accuracy tolerances

A couple of times in this Chapter, you will have seen the following quote...

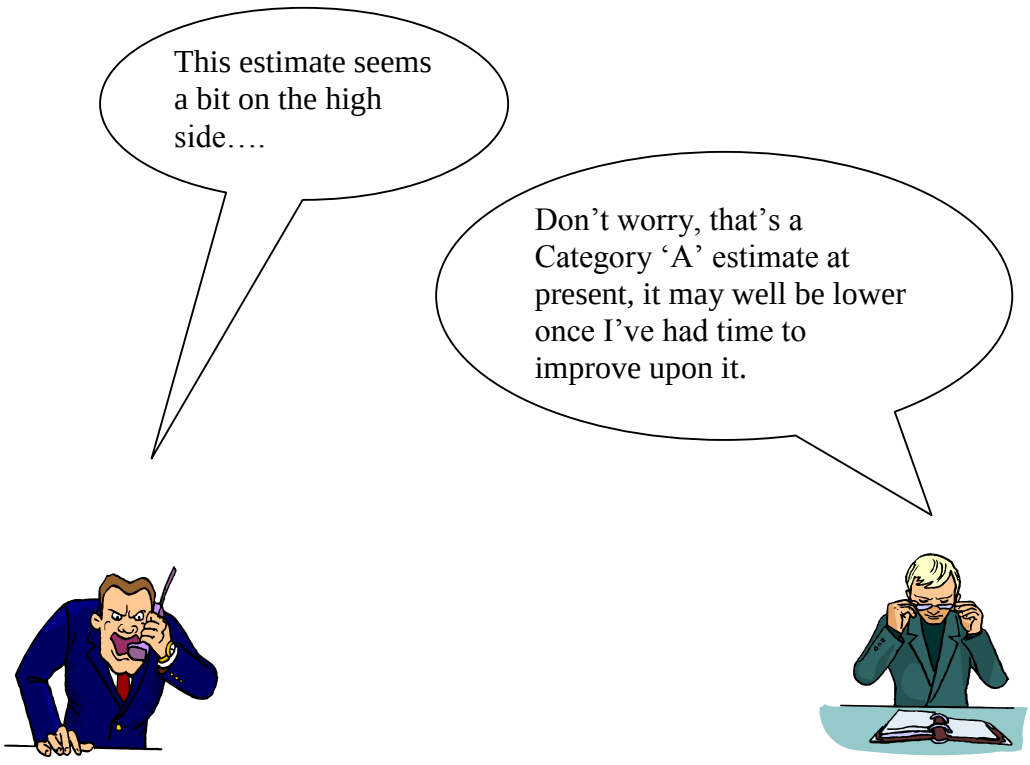


No matter how much time you spend on deriving, checking and validating your estimates, it is inevitable that the final duration or outlay will differ from the plan. Despite this, your stakeholders will usually want to question you about the supposed 'accuracy' of the figures you are using.

There is an industry-wide accepted scale for how 'accurate' your estimates are expected to be at any given point in the planning process.

Accuracy Level	Range Allowed	When Appropriate
Category 'A'	200% above final to 67% below	Feasibility
Category 'B'	100% above final to 33% below	During Definition Stage
Category 'C'	Plus or minus 25%	Once into Execution of the Plan

The further you go into your plan the more accurate your estimate is likely to be. The existence of this standard scale of accuracy helps PM's to discuss their estimates with their Sponsors and stakeholders and to negotiate with them over their resource requirements.



The terminology of the Categories is well known within the Project management community and should therefore help you to cement a professional relationship with your Sponsor and stakeholders. Conversely, if they don't understand what you mean, you have a perfect opportunity to share your knowledge with them!

Whatever terminology or sliding scales of accuracy you use, the key point to make here is that the further you progress through the planning process, the greater your understanding should be of the problem and therefore the soundness of your estimates should increase accordingly.

"Contingency"

Whenever people are asked to estimate how long something will take or how much it will cost, there is an inbred temptation to cover themselves by building a bit of leeway into their estimate.

The leeway is commonly known as 'contingency'

Contingency is an allowance of spare capacity, either in time or money, which is there to cover you in the event of something going wrong during the implementation of any given task.

Real life examples include overtime budgets and overdraft facilities (there if you need them, but you'd rather not use them if you can help it).

Contingency can clearly be very useful – after all, no one wants to have too much pressure on their time or budget – and it can have a positive effect on people's perceptions of how you operate.

Having some form of allowance is a good idea in any situation, but being explicit about the existence of leeway or contingency can have its disadvantages.

For example:

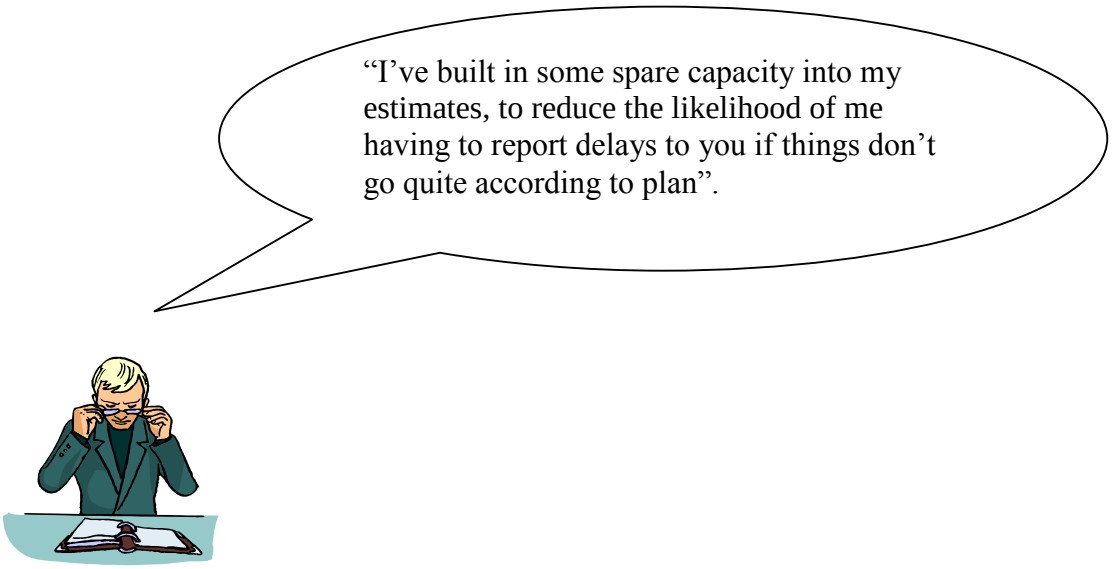
- If your Sponsor knows that you routinely increase your estimates by an arbitrary amount (15% to 20% is commonplace) he or she might tell you to take it out immediately
- If you come in well under your original estimate people may become cynical about the accuracy of your future estimates or may adjust their expectations of you or your team's performance.
- If everyone in a particular work stream adds an arbitrary amount of contingency you could end up with a hugely overestimated overall duration, which could jeopardise the chances of the project being given the go-ahead.

Ideally, by using the best case / worst case / Planning Value approach to compiling the original estimate, the figures should already have a degree of contingency built into them, based upon the likelihood of anything going wrong. If you then choose to flex your estimate to build in a little extra leeway, at least you have a firm grasp of the underlying basis of the estimate to fall back on – just as when selling a car, you would decide upon a realistic price that you would settle for, and then bump it up a little bit to give you some room for manoeuvre.

If someone else has done the estimate for you, it is a good idea to ask them whether they have built in any contingency and if so, how much – that way, if your Sponsor asks you to shave some time off the overall duration, you know where to start.

It is important to bear in mind that having overt contingency isn't necessarily a bad idea, however.

Depending on the relationship with your Sponsor and stakeholders, you may be able to communicate the allowance in a way that establishes the benefits of the existence of the contingency to the Sponsor –



Some Project Managers acknowledge and indeed welcome the existence of contingency within the estimates given by their stakeholders and will use the idea of dividing up the "ownership" of it in order to manage it proactively.

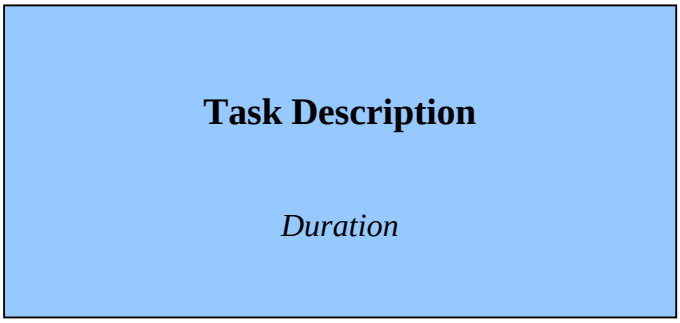
Ownership of contingency involves the PM in actively seeking out the inherent buffers, and pooling them together into a central 'pot' of time. If anyone's task runs over, the 'pot' of contingency is then deployed to cover the delay.

By doing this the PM is maintaining control over the schedule and is better able to understand the consequences of delays.

How to record your estimates in your planning documents

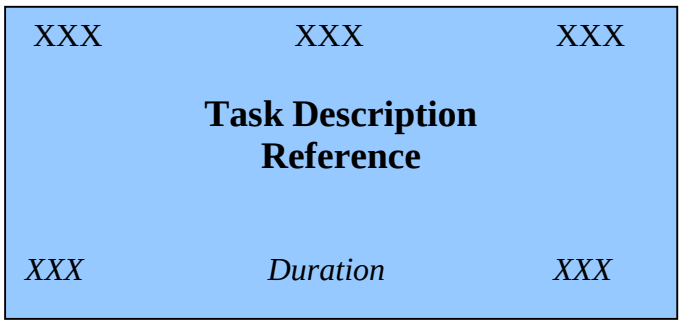
We mentioned earlier that the basis on which you (or your stakeholders) have arrived at the estimate should be documented. Many PM's use the back of the Post-It Notes for this purpose, although it is equally possible to write it down in some other document.

There is however, a standard requirement for where you record the actual duration that you have decided upon and this is at the bottom middle of the Post-It Note. Thus each Post-It note should look something like this...



There is a very good reason why the duration needs to be recorded in that position and why you need to leave a gap around the edges of the Post-It Note.

By the time you have finished your Project Plan, including scheduling each task in accordance with its duration and dependencies, there will be figures all the way around the edges of each Post-It Notes, thus…



The significance of these figures will be explained fully in the next Chapter of the workbook – suffice to say for now that they relate to an invaluable technique for scheduling and prioritising within your plan called Activity Networks.

Finally a brief word on how the times should be recorded. We've already stressed that the figure on the Post-It Note needs to be the duration of the task rather than the underlying effort. The standard practice is to record the duration in days, on the following scale:

Measurement	Equivalent to…
One day	Six hours (the other hour is taken up with breaks)
One week	Five working days
One month	Nineteen working days (the missing day(s) being the odd day off work, Bank holidays, sick days etc)
One year	206 working days (similar to the above, the rest being weekends, holidays, Bank holidays and a reasonable allowance for sickness absence)

Thus a project plan that is calculated with a total duration of 329 working days should take approximately nineteen months to implement.

Case study – making some "good" estimates

Again we return to the Party for which you have been putting together the PDD

Refer to the Post-It Notes that you have already done for your Party, which show the breakdown of tasks for some of the products you have highlighted.

Using the techniques we have just discussed in the Workbook, pick a product and come up with some "good" estimates for each task, and thus an overall duration for the production of that task.

Document any underlying assumptions, best case / worst case events, skill levels etc. on the back of the Post-It notes and then transfer the duration figure for each task onto the front of the Post-It Note as shown above.

Use the space below to keep a permanent record of the exercise if you wish to do so.