

Planning and Organising a Project

1 What is project management?

Project management is the application of knowledge, skills and tools to enable you to reach an objective.

Project management can be divided into two parts: planning a project and then managing a project after it has begun. The first part – planning a project – should be completed before a project has started, but should be kept up to date as the project evolves. The second part happens when planning is complete and the project begins. From then on, the progress of the project will need to be tracked. The plan will most likely need to be adjusted to accommodate changing circumstances – that's when management can be tricky and stressful.

Projects are as old as time but it seems as if everyone is doing projects these days. Project management, though, is a dynamic and relatively young subject. Like any subject, there are some accepted terms and practices, and many of them will be explained in this document.

Applying the information in this document will improve your project management.

Our aim is to provide you with some tools and techniques that will help you plan and manage your project successfully and help with aspects of your assignments.

Organising, scheduling, and managing sets of tasks are the key activities in a project. A project should not be started before these have been written into the plan. The organising part involves setting your project's goals, restrictions, and assumptions. The scheduling part involves getting knowledge, skills and tools to the right place at the right time, and estimating how long tasks take to do.

Your project should be divided into phases and the phases then divided into identifiable tasks. The duration of each task must be estimated.

If you are new to project management, the glossary at the end of this document should be helpful.

2 Why do you need a plan?

It is worth having a well-thought-out plan because it will:

- help you achieve your project objectives on time
- make you think carefully about the details of the project
- improve your ability to visualise, organise and refine the project
- define start and finish dates to help you schedule your work
- help keep track of your progress more effectively.

Even with a well-thought-out plan, it is likely that changes will be made as the project progresses. However, when you need to make changes you will find it easier if the project has been planned.

3 Software projects

In addition to the general project management techniques described in this document, software projects often make use of specialist project management methods designed for this type of project. The document *Choosing a Life-Cycle Model* describes a number of these approaches. If you are undertaking a software or system development project it is important that you read it.

4 Scheduling, phases and tasks

One of the purposes of undertaking a project towards the end of your undergraduate degree is to gain experience of project management, using the same concepts as found in commerce and industry. However, as your project will be on a smaller scale than most, it would be too restricting and time-consuming to ask you to use every feature used in commercial practice. So, we advise adapting the selected components of scheduling, phases and tasks.

4.1 Scheduling

The schedule has to comply with one of the main constraints of a project: time. For your project there are already certain dates that cannot be moved. These can be used to justify changes to the project definition, preferably before the project begins, but also during the project.

An effective schedule:

- is firmly based on the project aims
- promotes a disciplined approach
- allows problems to be anticipated
- concentrates attention on key decisions
- provides a basis for monitoring and control
- improves the confidence and understanding of those involved.

After you've planned your project don't think of your schedule as something carved in stone. Remember that planning is iterative and your schedule will need to be updated to be useful.

Normally, the key element of a schedule is time. Other elements that may be addressed include risk or uncertainty, quality, and cost – these are of less importance to most student projects.

Unit of time. To start, choose a unit of time for the schedule. It is likely that a week is the most appropriate for the overall view, but you are likely to want to use hours when you specify tasks in more detail.

Calendar. Using a calendar, map out the dates in pencil on a large piece of paper (have an eraser handy) or electronically, so that phases and tasks can be added to it.

Key dates and time allocation. Ensure the key dates such as TMA submission dates and any personal commitments that may affect the schedule are identified. It is also important to have an idea of the amount of time you will be able to spend each week – this should average around ten hours per week.

4.2 Phases

Now you are ready to have the first go at defining the phases of the project.

The number of phases will depend on the type of project you are doing. Likewise, how you split the phases into tasks will vary between projects. You will have to use common sense and devise a plan that will be the best way for you to ensure you meet the target of finishing the TMAs and EMA on time.

Most projects can normally be broken down into phases such as:

- concept development
- planning
- research
- design
- development
- testing
- evaluation
- implementation
- writing of report.

Not every project needs to involve all these phases, although some stages – such as planning, research, evaluation, and report writing – *must* be included. Also, some stages are likely to be iterated while you plan subsequent ones.

Sometimes a project can be planned with a single route from start to finish, but often you will not have enough information or knowledge to construct an effective plan at the start. In an incremental approach the sequence from planning to evaluation may be repeated several times as you gain knowledge of how to achieve your goal. The evaluation of one cycle feeds back into the planning of the next. An incremental approach to project management may also be adopted when there is some core product that provides a basic working solution and which can then be elaborated to provide more and richer features. At each stage there is a working, albeit partial, solution to the problem, getting you closer to your final solution. This approach also has the advantage that you are building a balanced project that can form the basis for your final report, even if you have not achieved all your aims.

4.3 Tasks

For most projects it will be best to have a detailed plan, which will mean splitting phases into tasks. Many phases will need only a few tasks, but some will benefit from a longer list and even subdividing some tasks into subtasks. Because there will be so many different projects we cannot prescribe what will be best in each case.

Research

Here is a specific example of dividing a research phase into tasks:

- complete a literature search
- analyse literature
- compile list of literature for possible use in project
- write down relevant points from list
- follow up links from literature
- complete review of literature.

Such 'high-level' tasks will probably need to be broken down later into subtasks.

Other examples of tasks are 'writing TMA 02', 'starting analysis of requirements', 'completing analysis phase', 'creating an appropriate model', and 'testing prototype'.

When you write the schedule during planning, determine when each task will start and finish. After the project has begun, a task may take longer than scheduled and the schedule will need to be adjusted to show that.

Example schedule with charts

Let's look at one example of a schedule for a project. Beware of copying this for your own case because the majority of tasks will probably be different. Also, the amount of detail you need will vary depending on the type of project you are doing.

- Step 1
- Define a unit of time for the majority of the tasks. You may need other time units that you can apply to special tasks. For this project, the basic time unit is a week.
- Step 2
- Define the deadlines. You will have the cut-off dates for the TMAs and the EMA, but these deadlines are only a small part of your work. You need to specify deadlines for other tasks, too.
- Step 3
- Put in any dates you know you will not be able to work on the project such as family commitments, holidays, business trips or upcoming periods of intense activity in your employment.
- Step 4
- Break the project down into a set of phases. These do not have to be detailed, so you could write 'read module literature', 'literature search', and so on.

For some projects this will be all you need: you will not need a more detailed schedule to ensure you meet the deadlines.

Figure 4.1 shows such a basic plan. A spreadsheet program should be sufficient for generating such a plan.



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Figure 4.1 Planned phases for a project

Figure 4.2 shows a program evaluation and review technique (PERT) chart (network diagram) that corresponds to the plan in Figure 4.1. You will only need to use such charts, and the software that generates them, if it is appropriate for your particular project. However, it is useful for you to know that such tools are available, should you need them.

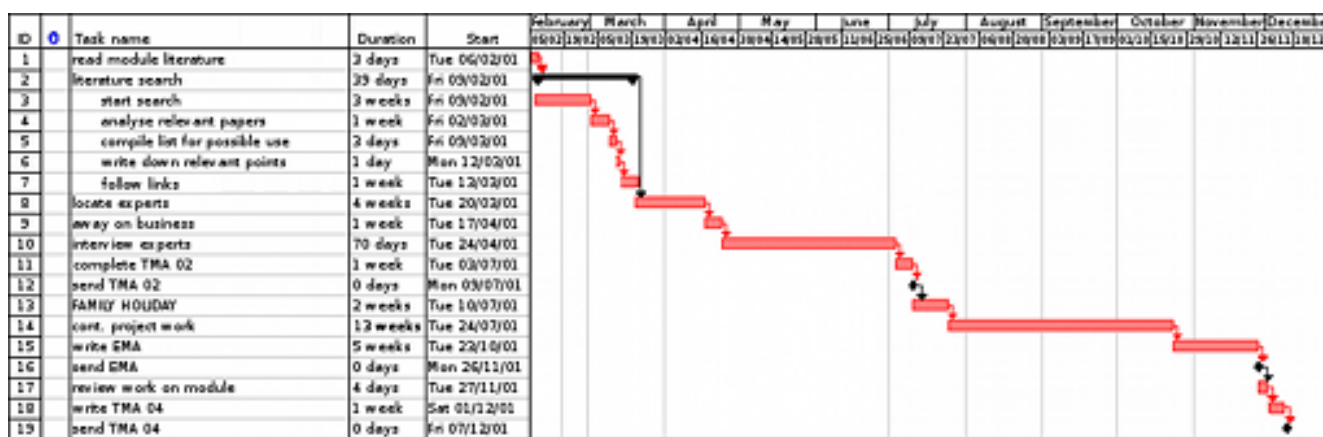


Figure 4.2 PERT chart or network diagram

If you feel it will help you better in scheduling your work to have greater detail, continue the process with Step 5.

Step 5

Divide phases into tasks, such as dividing the literature search into tasks. Figure 4.3 shows the plan from Figure 4.1 but with the literature search broken into subtasks. You can continue the process until you feel you have a plan that best suits your needs.



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Figure 4.3 Planned phases with literature search phase divided into tasks

Recommended technique: work breakdown structure

We recommend you use the aims of the project to create a 'work breakdown structure' (WBS). The clearer your aims, the easier the WBS is to define.

- Take each aim and divide it into phases.
- A phase is made up of tasks.
- Expand each phase into tasks – make the list exhaustive as it is easier to omit than to add.
- A task is an identifiable piece of work with a start and a finish point, actual outcomes and a relatively short time span. It is distinct from other tasks.
- Estimate the likely time you would need to do each task and therefore each phase.
- Map these phases onto your schedule (in pencil if on paper, so you can erase if necessary) to establish the likely duration (actual dates) of the phases. Some people use sticky notes to experiment with order and timings. Even if you have project

management software, it is often easier to work with such 'concrete' objects, at least in the initial stage.

- Check the logic of the phases to ensure you haven't planned to do a task before the essential preceding tasks have been completed.

This is probably the most important stage of the planning, so take your time and put a lot of effort into it. List the phases such as literature search, background reading or report writing, and then expand each phase into specific tasks such as getting access to a library database or photocopying your report. You will notice that even mundane tasks performed by others need to be included.

You will have probably realised that some phases and tasks cannot begin until others have finished. This is where the logic of the project comes into planning. Once you have a list of phases and tasks, then you can work out the logic required to execute them. You will invariably find more tasks as you do this, so don't worry if nothing seems settled because it is a *dynamic* process.

A WBS helps when time is short. You will only have a certain number of hours available per week to work on your project. So although a task may only take, for example, three hours' work, because you may not have three hours available in a particular week it may not be completed for two weeks, hence the duration will be two weeks. The WBS will allow you to decide which task is more important to the progress of the project when time is short.

4.4 Key events and milestones

Monitoring progress requires the identification of key events and milestones. This is done at the planning stage and they will appear on the schedule, so map them out on your schedule as soon as you feel you have enough detail in the phases and tasks.

A key event is defined as an interface between tasks, when one task has finished so another can begin. When delays in key events cause a delay to the overall project, the key events are said to be on the critical path.

Milestones are generally key events that are evenly spread throughout the programme. Their importance is that they force you to look at your programme and measure your progress.

To use milestones effectively requires you to be disciplined, but always bear in mind that project management is not a matter of hard-and-fast rules; its whole purpose is to get the project to succeed in its aims. In our experience, nothing is gained and a lot is risked if project reviews are postponed. It is better to identify the delays and potential problems than to believe they will correct themselves. We will look at recovering from delays below.

4.5 Monitoring progress and revising the plan

Review and revise

- Set up a review just after a milestone so that attention is focused on future tasks.
- A review should be conducted with other people – for example, your partner, work colleague or tutor – so that some external scrutiny can take place.
- Working without an agenda only leads to problems, so be sure to have a workable set of headings – not too many and not too obscure.
- Look at items such as tasks completed, measurements of progress and setbacks.
- Reflect on the project aims and consider the remaining phases and tasks.
- Use the schedule as the guide and be prepared to revise the plan.
- Be ruthless in selecting the project tasks so don't keep any 'nice to have, but not strictly necessary' items.

4.6 Recovering from delays

When a delay has occurred there will be an effect on the subsequent activities; in most cases the effect will not be beneficial. Because the project end has a fixed date, it cannot slip. This means phases will need to be reviewed.

If a delay occurs you need to identify which tasks and phases after the delay can have their duration shortened and what the consequent risks are. It may mean one of the project tasks is deleted. If this is the best course of action, the remaining project tasks could be bolstered. Your overriding concern must be the completion of the remaining project tasks, whether the original or the revised version. Your project management will be judged by how you identify and deal with the dynamic events (the changes) during the period of the project.

Common pitfalls in project design and project management

- Being too ambitious at the planning stage.
- Overloading the available hours in a week.
- Underestimating the time you or others may actually take.
- Believing it will be easy to catch up if you miss milestones.

- Not dividing a phase sufficiently to identify important tasks.
- Not keeping the project plan up to date.
- Failing to start a task that could be running concurrently with others, for example purchasing a reference source or a book, obtaining data from an external body.
- Expecting the full attention, availability and time of people you may call on to help you.

5 Keeping a project log

Keeping a project log is similar to keeping a diary. It is a useful aid in helping to manage a project. In a project log, ideally you should make a log entry each time you have a work session.

Whether recorded on paper or electronically, your log is where you keep details at regular intervals of salient events or facts that have occurred in your project. The log differs from your plan in that it provides more detail of things you have done, whereas the plan is a schedule of what you are or should be doing. The log is purely historical information; it can contain facts about your project but probably more important is writing down reflections about what you are doing.

Log sheets serve three purposes:

1. They provide a reminder of how your project developed; this will be useful when it comes to writing your TMAs and EMA.
2. They help you when in discussions with your tutor because they provide a record of how you planned your project, how you managed your time, how you tackled the tasks and how you dealt with any problems.
3. Using the log sheets on a regular basis will help you to keep to your schedule, and may suggest changes to your schedule.

Typical layout of a project log sheet

A layout for a log sheet could be as follows. However, more important than the precise format of the log is that you decide on what suits you best, that you stick to it, and write up your log regularly!

Top. Details of the phase of the project you are working on and the TMA you are working towards, the date and how long the work session lasted.

Middle. Briefly record the work you did, any problems encountered and your reflections on them, and any comments about the work done.

Bottom. Jot down how far you got, for example, 'Only did half of what I had planned'. Jot down what you plan to do next.

There are three examples of log sheets below.

Example 1

Log sheet no. 1

Session no. 1

Time spent: 1.5 hours

Work. Logging on to module website, reading through the various guides.

Problems. Not really any problems but it took longer than I expected. A lot of initial reading to digest in one go!

Comments. By the time I had done a quick read through the more interesting aspects of the website and sorted the various ideas into what I need to do an hour had flown by.

Next work planned. Review online resources. Serious read through postponed until the next session.

Example 2

Log sheet no. 5

Session no. 9 & 10

TMA 02 date: 17 April

Time spent: 2 hours

Work. Finished off the last bits and pieces for the TMA. Reread the guide on structuring, styling and editing reports to see if I had covered everything. Rechecked TMA material to make sure that I'd included everything I was asked for. Carried out spell check. Print out – sort out – that's it. TMA finished.

Problems. Found it difficult to organise my TMA in what would seem a logical manner for reading. Great difficulty in writing about how I tackled the TMA. Must continue to go over the sections on effective report writing.

Comments. Great relief in getting to this point. Finally I have a project skeleton. But shouldn't wait for the verdict before pressing on!

Next work planned. Final check of TMA. Finished on time but still apprehensive about the work I have to do.

Example 3

Log sheet no. 10

Session no. 14

TMA 03 date: 26 June

Time spent: 3.5 hours

Work. First attempt at a model for the design.

Problems. First ideas didn't quite work. Realised it was going to be more complicated than expected.

Comments. Felt quite pleased, in spite of the initial problem of being up a blind alley. It made me think quite hard about the problem. Phoned my tutor – 10 minutes chat was worth it – things are a lot clearer. I think I can get stuck into it now.

6 Tutor-marked assignments and the end-of-module assessment

When you do the TMAs and EMA you will be assisted by your project plan, by your revisions to the plan and if you use one (and you should!) by your project log. Here's why.

The marks on an assignment are split between the scoping of your project, technical aspects, the justification for your actual technical product or evaluation, the management of the project, and the self-evaluation of your work. Your revised plan and log entries will be raw material for these aspects.

Your plan and log should help with questions such as:

- What did I do?
- What worked well and what did not work out too well?
- What would I do differently next time?
- How would I do it?

Regarding the technical aspects, give a positive rationale for your chosen evaluation or solutions, also indicate any false starts or particular difficulties. What have these processes taught you about specifying and designing a problem solution? What demands were placed on you and how did you use your project management skills when tackling the technical tasks?

Regarding the management and self-evaluation aspects, your tutor will be looking for your reflections on your work. They will want to know:

- what you learnt from comparing what you originally planned to do with what you actually did
- how you had to replan
- how much effort you made
- what personal benefits you gained through doing the project.

It is quite possible to get a high mark for a project even if you do not fully succeed in what you hoped to do, provided that you:

- give a good analysis of what went wrong
- reflect on your own performance
- suggest how things could be improved if you were to do the project, or a similar project, again.

7 Glossary of project management terms

actual	Aspects of the project that have actually happened, as opposed to being planned, scheduled or predicted.
baseline	A copy of the schedule dates, work and cost data at a certain time that is used for comparison purposes against which actual work is tracked.
constraint	A parameter that forces a task to fit a certain timing. For example, a task can be constrained to start as late as possible in a project.
critical path	A sequence of tasks that must occur on time in order for the project to finish on time.
critical task	A task on the critical path.

duration	The amount of time it takes to complete a task.
duration variance	The variation between the planned duration of a task and the current estimated task duration.
Gantt chart	A horizontal bar chart used to illustrate both the sequence and expected duration of activities within a project.
fixed date	A task that must occur on a certain date.
float	Amount by which a task can be delayed without affecting the project duration.
lag time	A certain amount of delay time between the end of one task and the start of another.
lead time	The time it takes to complete a task or a set of interdependent tasks.
milestone	A task of zero duration that marks a significant moment of time or accomplishment in the project.
PERT	Program evaluation and review technique.
predecessor	In a dependency relationship, the task that is designated to occur before, or precede, another.
project	A series of steps to reach a specific goal. A project seeks to meet the triple constraints of time, quality and cost.
slack	Total slack is the amount of time by which a task can be delayed without delaying the finish of the project. Free slack is the amount of time a task can be delayed without delaying the schedule for any other task.
slippage	A measure of the amount of time by which a task's schedule is behind its baseline or planned dates.
task	An essential job or operation that must be completed in order for a project to be completed.
timescale	The area of a Gantt chart view that indicates the units of time being displayed.
tracking	The act of recording actual progress in terms of both work completed and costs accrued on tasks in a project.