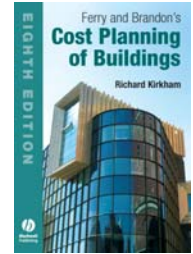


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Chapter 16 Resource-based Cost Models



There are 2 parts to this tutorial; Part 1 includes a simple tutorial for students to produce some simple project plans in MS Project. Part 2 consists of some general questions on the content of Chapter 16.

Part 1: Using MS Project for Project Management Planning and Scheduling

1. Introduction

Microsoft Project is a powerful project management software application, which can be used to plan, manage and communicate a project schedule and associated information. As the application allows information transfer to and from other Microsoft Office products, Project is widely used in all sectors of industry and commerce, and is rapidly becoming the project management standard for small to medium sized projects. In Construction, there are several other standards such as PowerProject and Microplanner. Some packages interface directly with CAD packages and architectural drawing software

Microsoft Project considers projects to be composed of **Tasks**, **Milestones** and **Resources** and facilitates the scheduling of the tasks to meet project goals and constraints.

The first step to using MS Project is to determine the project goal in terms of start dates, number of phases and related items, e.g. for clarification of the project scope, **boundaries** and time-scales.

2. Project Goal

To assess the project goal we need to consider:

- The complexity of the project
- The level of planning required, which will usually be related to the level of complexity
- The constraints, which could impact on successfully meeting the initial plan

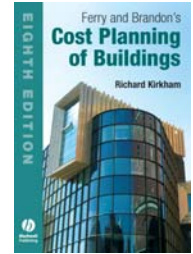
By addressing the three points above it should be possible to define the main project objectives.

3. Project Task Definitions

Tasks, which are often called 'steps', are usually the most detailed description of the structure of the project. Several tasks may be grouped together to form 'phases' within the project hierarchy (quite often specified in terms of a Work Breakdown Structure – WBS).

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Chapter 16 Resource-based Cost Models



4. Task Durations

The amount of time taken to complete a task is termed its 'duration'. It is important to accurately specify the time taken to complete the tasks.

In practice, estimations can be:

- Historical – exactly the same as a task performed in the past
- Intuitive – estimation based on a similar task in the past but not in the same conditions
- Unknown – have not done the task before

In Microsoft Project durations can be months, days, hours or minutes either in:

- Working days, excluding Saturdays and Sundays
- Elapsed time for continuous working

5. Milestones

Milestones are tasks of zero duration or points in the project at which significant events occur (e.g. completion of workflow analysis in a business reengineering project).

6. Resources

Resources may be assigned to tasks for a percentage of their available time or for more than their normal resource time, e.g. when a resource works overtime.

Several categories of resource exist:

- People – e.g. numbers, skills, availability e.g. programmers, electricians, production workers
- Equipment – e.g. computers, bulldozers, cranes, spectrum analysers, etc.
- Facilities – e.g. storage sites, meeting rooms, docks

7. Identifying Project Phases

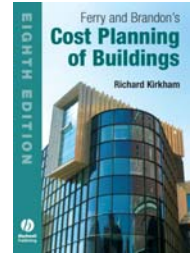
With most projects it is helpful to break the project down into sections or phases. Consider the following distinct phases:

- Create a realistic project schedule
- Manage the project and adjust to changes
- Communicate results and progress
- Evaluate Project performance against competition

The interrelationships between the above phases are indicated in Figure 1.

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Chapter 16 Resource-based Cost Models



8. Using the Application

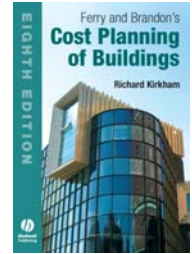
In order to demonstrate the functionality and flexibility of the application you will use MS Project for a simple project management scenario. Consider the activities required to undertake a small market survey for a construction contracting company.

Following the agreement of a detailed plan (3 days) a suitable questionnaire is developed (8 days) and selection of the sample, its size and location is done (2 days). Survey staff are then recruited (6 days) and trained (5 days) which then allows the survey to be performed (10 days). Finally the results are analysed (5 days) and a report is written (5 days). Four different roles are used in the project (manager, analyst, survey staff and a trainer).

Eight steps or tasks are therefore required for the project and if the tasks are carried out one after the other the project will take 40 working days. However, certain tasks may be performed in parallel which will reduce the total time to 36 days as shown in the table and network diagram on Page 4. **You should fill in the task names on the table.**

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Chapter 16 Resource-based Cost Models



9. Project Phases

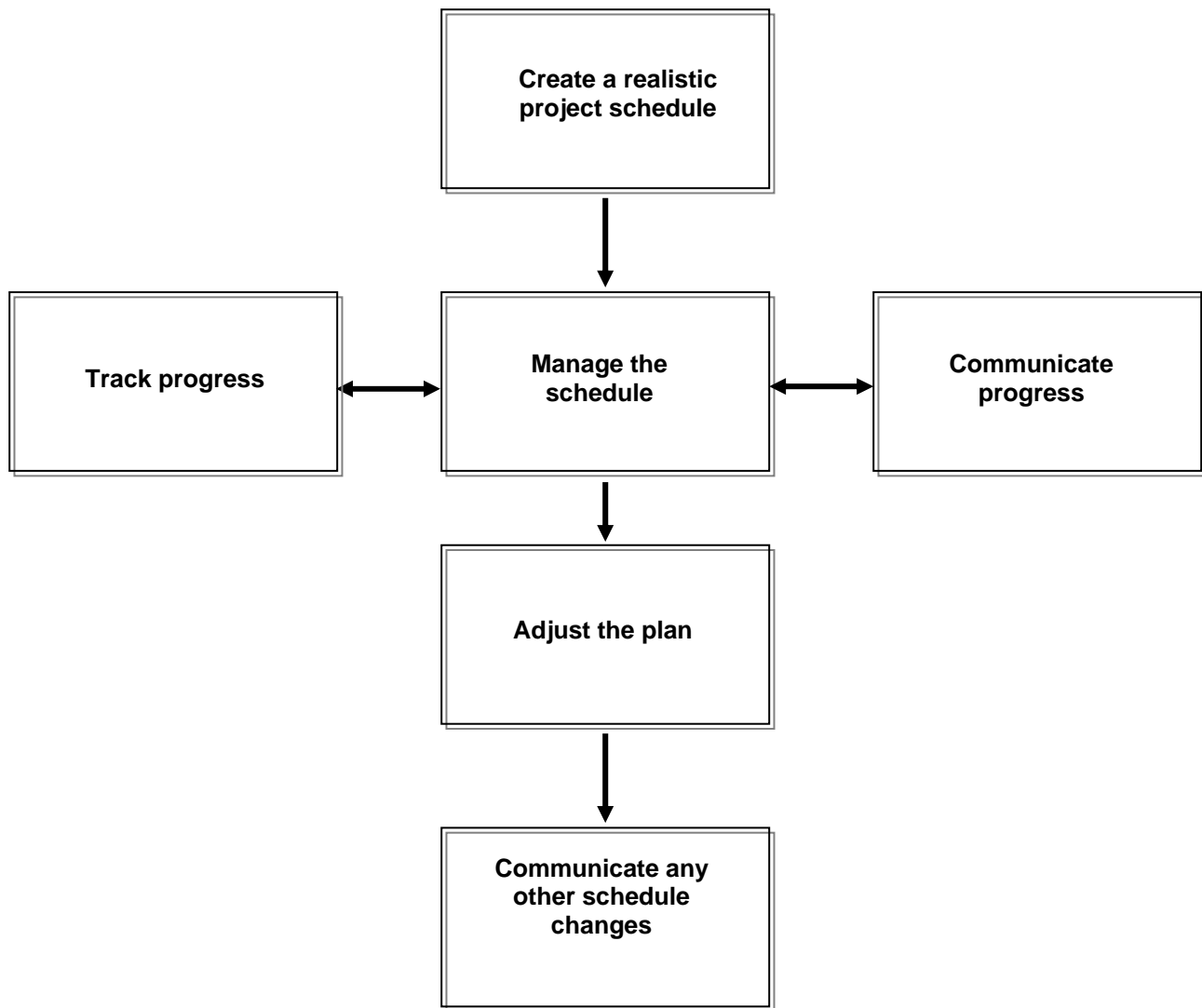
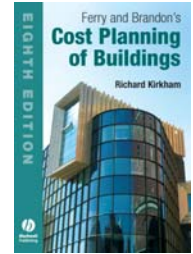


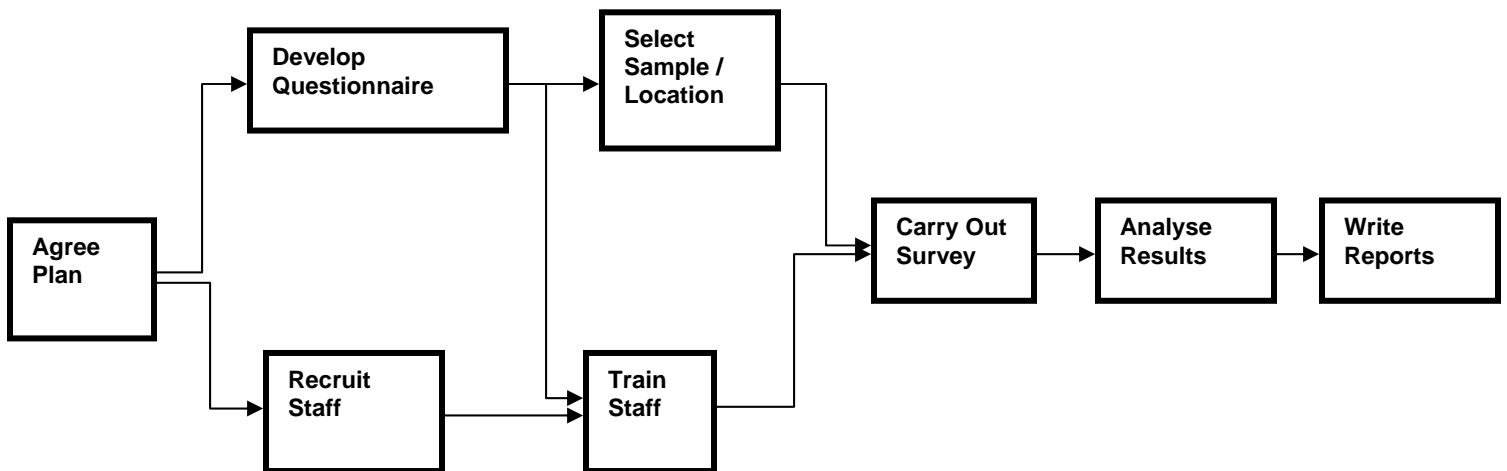
Figure 1: Project phases

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Chapter 16 Resource-based Cost Models



Task number	Activity	Predecessors	Successors	Time (days)
1		none	2,4	3
2		1	3,5	8
3		2	5	2
4		1	5	6
5		2,4	6	5
6		3,5	7	10
7		6	8	5
8		7		5



10. Project Views

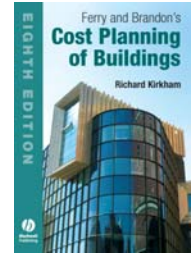
To aid interpretation and increase the level of information available there are several ways to view a project. The most important are:

- Calendar View
- Gantt Chart (or bar chart)
- PERT (or network diagram)

For the purposes of this tutorial the Gantt view will be used. However, you should inspect the PERT diagram and the calendar view as well.

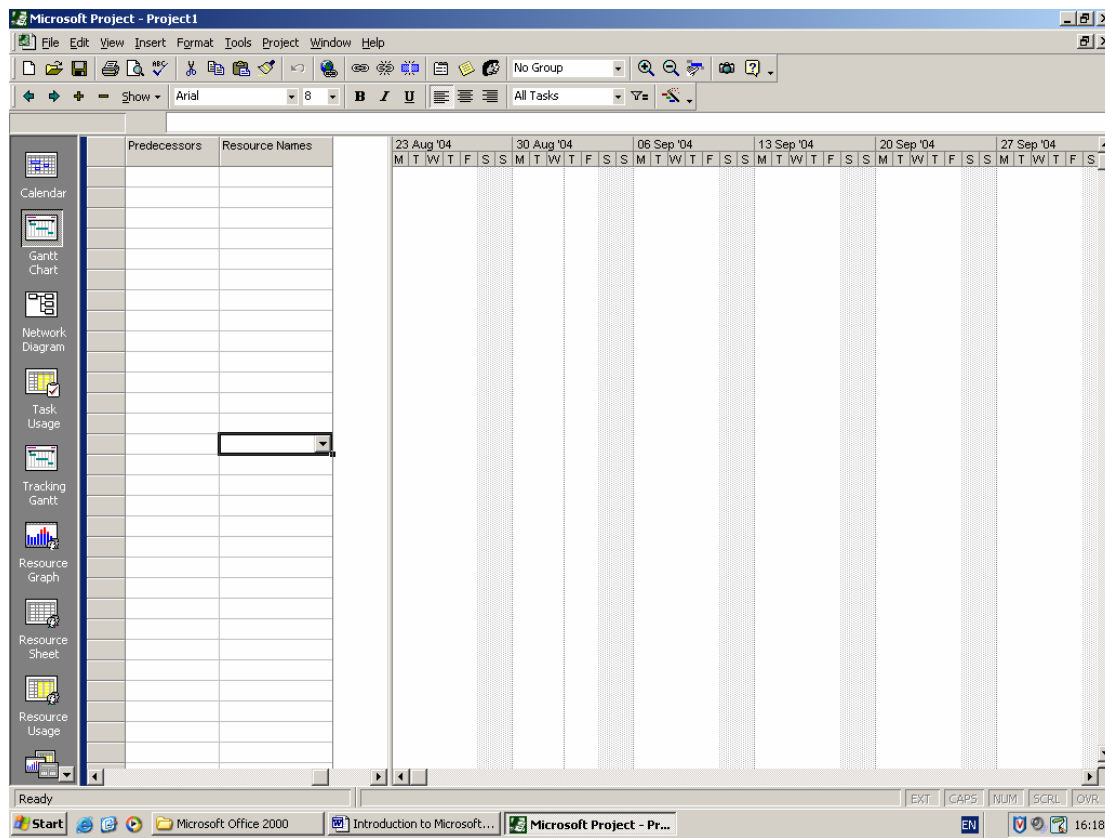
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Chapter 16 Resource-based Cost Models



11. Entering Project Information

Start Project and open a blank project in Gantt chart format.

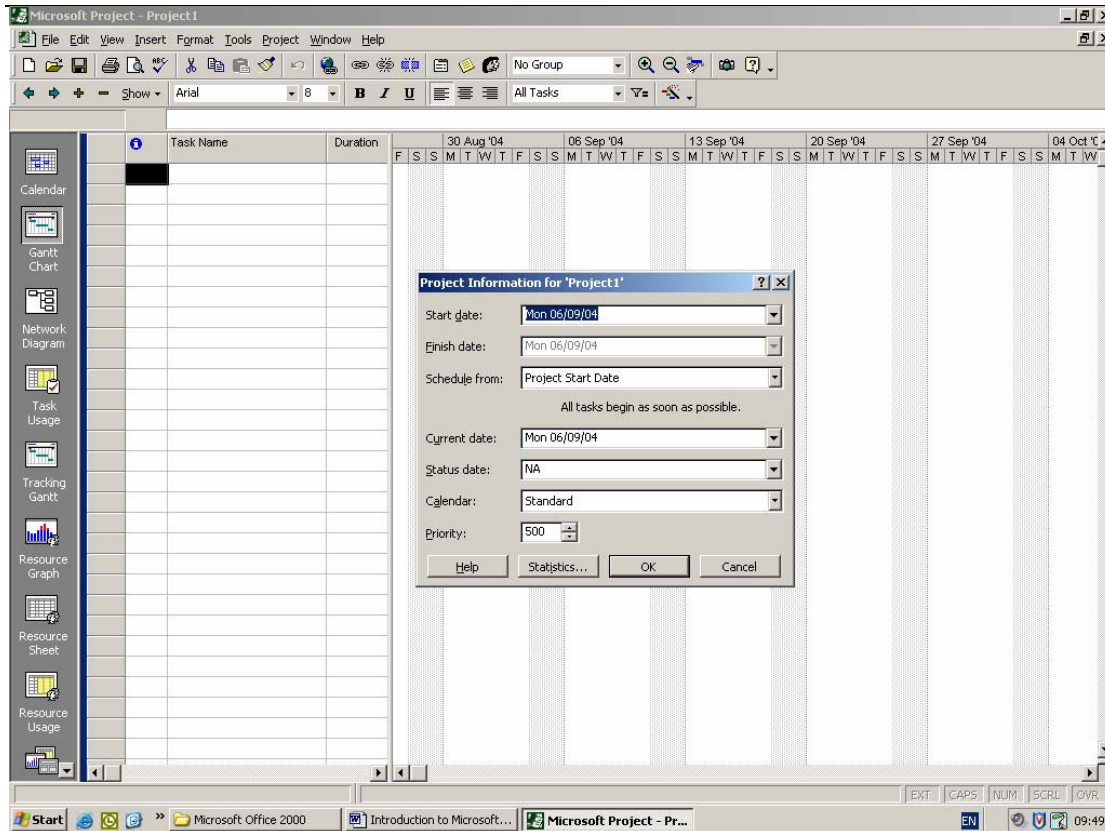
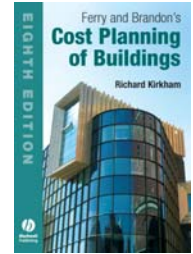


Select the Project, Project Information sub-menu and check that a) the start date is today's date and b) the project is scheduled to start from the project start date.

Additional descriptive information may be entered in the properties menu which can be found in the File, Properties sub menu.

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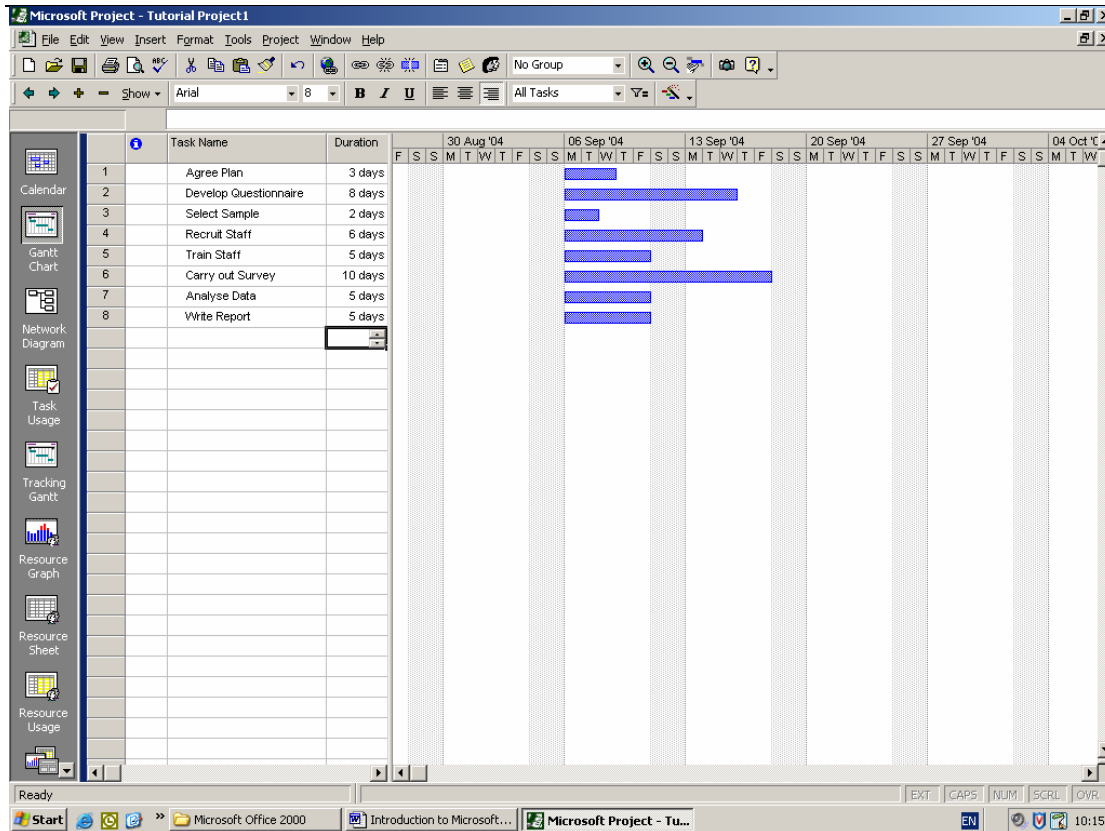
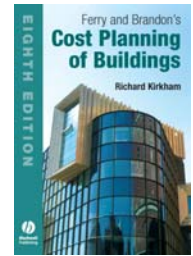
Chapter 16 Resource-based Cost Models



Back on the main Gantt chart enter the task information in the task name column. Some versions of Project (e.g. Project 2000) will also add in a one-day default activity bar on the Gantt chart, which starts at today's date.

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Chapter 16 Resource-based Cost Models



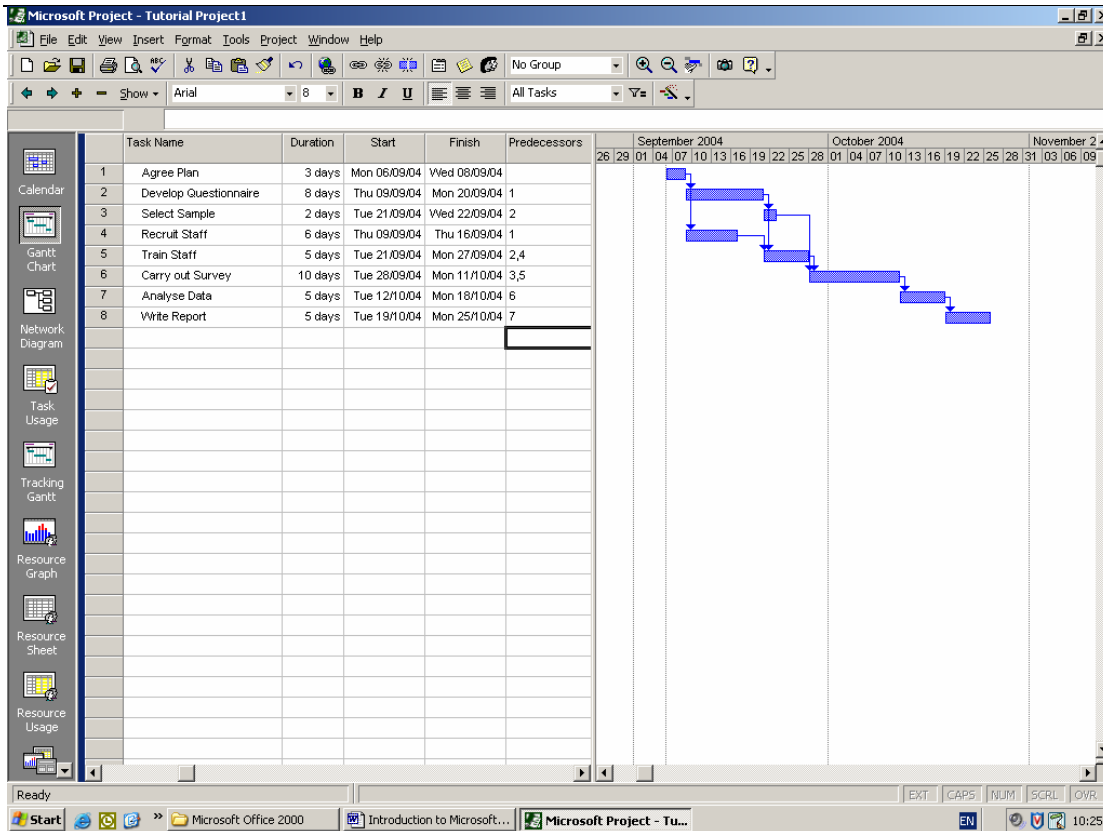
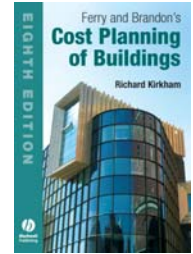
Next, include the task durations and link the tasks together as per the previous information.

Note that the durations can be hours, days or weeks either in working days or elapsed days.

To link tasks either enter the relevant task identity numbers in to the predecessors column or press control and highlight the task id row(s) then click the white chain link task icon in the standard toolbar. The screen should take the form:

Lecturer's Tutorial Worksheet

Chapter 16 Resource-based Cost Models



Save the new project as Survey1.mmp without a baseline.

12. Editing Tasks

It is possible to edit a task directly on the Gantt chart including operations such as insert, delete and move.

In order to demonstrate this aspect of the package, add and logically link the following tasks:

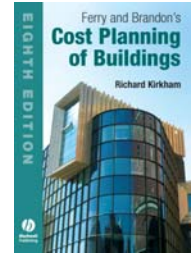
- Prepare project brief 1 day
- Carry out south survey 8 days
- Carry out north survey (in place of the old carry out survey) 10 days
- Transportation for both surveys 1 day

Also add two project milestones (0 days) for the activities of start project (This will be Task 1) and project complete (This will be task 13).

TIP: Redraw a simple Network Diagram (use the one on Page 4 as your basis) to include the new tasks which are identified above. This will then help you produce a new plan in a logical fashion!

Lecturer's Tutorial Worksheet

Chapter 16 Resource-based Cost Models



13. Critical Path Algorithm

The Critical Path in a project is a series of tasks that must be completed on schedule for a project to finish on schedule. Each task on the critical path is a critical task. To generate a Critical Path enter the Format, Gantt Chart Wizard sub menu and follow the instruction on the wizard. Make sure that you select "Critical Path" when asked: "what kind of information do you want to display in your Gantt chart?" Also specify that you do not want information shown on the Critical Path diagram.

The Gantt chart should now consist of critical tasks in red and non-critical in blue. Try manually elongating the non-critical tasks and observe how the critical path changes.

In the menu:

Go to View > Network Diagram

Check that the critical path is shown in red – from here you can see the times and durations for each project task clearly shown.

You have now constructed a basic project plan including a critical path and network diagram. Save this as **Survey2.mmp** without a baseline.

Part 2: General Questions

1. What is the purpose of resource smoothing and how can it be of benefit to the contractor in managing project resources?
2. What policy or procedures can be put into place to ensure, or at least control, the availability of labour on a construction project?
3. How useful do you consider PERT and Gantt Charts are in managing construction projects. Discuss the advantages and disadvantages.