

# Project management

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- ◆ Organizing, planning and scheduling software projects

# Objectives

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- ◆ To introduce software project management and to describe its distinctive characteristics.
- ◆ To discuss project planning and the planning process.
- ◆ To show how graphical schedule representations are used by project management.

# Topics covered

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- ◆ Management activities
- ◆ Project planning
- ◆ Activity organization
- ◆ Project scheduling

# Software project management

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- ◆ Concerned with activities involved in ensuring that software is delivered:
  - on time
  - on schedule
  - in accordance with the requirements of the organizations developing and procuring the software

# Why is management important?

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- ◆ Software engineering is an economic activity and therefore is subject to economic, non-technical constraints.
- ◆ Well-managed projects sometimes fail. Badly managed projects inevitably fail.
- ◆ The objective of this lecture is to introduce management activities rather than teach you to be managers.
- ◆ **You can only learn to manage by managing**

# Software management distinctions

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- ◆ The product is intangible.
- ◆ The product is uniquely flexible.
- ◆ The software development process is not standardized.
- ◆ Most software projects are “one-off” projects.

# Management activities

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- ◆ Proposal writing
- ◆ Project costing
- ◆ Project planning and scheduling
- ◆ Project monitoring and reviews
- ◆ Personnel selection and evaluation
- ◆ Report writing and presentations

# Management commonalities

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- ◆ These activities are not peculiar to software management.
- ◆ Many techniques of engineering project management are equally applicable to software project management.
- ◆ Technically complex engineering systems tend to suffer from the same problems as software systems.



# Project staffing

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- ◆ May not be possible to appoint the ideal people to work on a project:
  - Project budget may not allow for the use of highly-paid staff.
  - Staff with the appropriate experience may not be available.
  - An organization may wish to develop employee skills on a software project.

# Project planning

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- ◆ Probably the most time-consuming project management activity.
- ◆ Continuous activity from initial concept through to system delivery.
- ◆ Plans must be regularly revised as new information becomes available.

# Project plan structure

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- ◆ Introduction
- ◆ Project organization
- ◆ Risk analysis
- ◆ Hardware and software resource requirements
- ◆ Work breakdown
- ◆ Project schedule
- ◆ Monitoring and reporting mechanisms

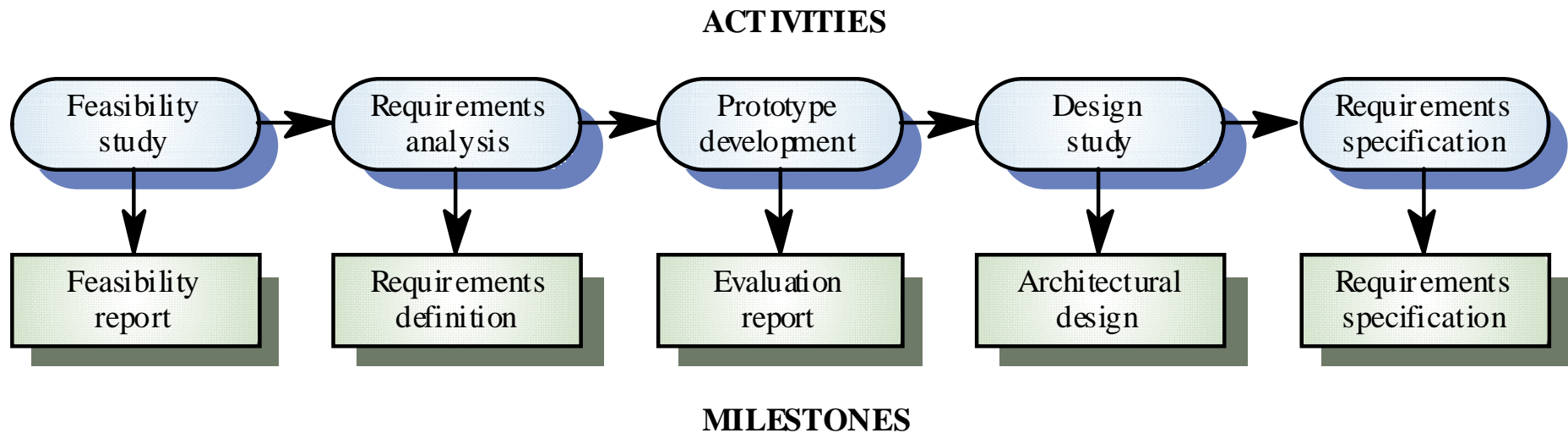
# Activity organization

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- ◆ Activities in a project should be organized to produce tangible outputs for management to judge progress.
- ◆ *Milestones* are the end-point of a process activity.
- ◆ *Deliverables* are project results delivered to customers.
- ◆ The waterfall process allows for the straightforward definition of progress milestones.

# Milestones and deliverables

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# Project scheduling

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- ◆ Split project into tasks and estimate time and resources required to complete each task.
- ◆ Organize tasks concurrently to make optimal use of workforce.
- ◆ Minimize task dependencies to avoid delays caused by one task waiting for another to complete.
- ◆ Dependent on project managers intuition and experience.

# Scheduling problems

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- ◆ Estimating the difficulty of problems and hence the cost of developing a solution is hard.
- ◆ Productivity is not proportional to the number of people working on a task.
- ◆ Adding people to a late project makes it later because of communication overheads.
- ◆ The unexpected always happens. Always allow contingency in planning.

# Bar charts and activity networks

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- ◆ Graphical notations used to illustrate the project schedule.
- ◆ Show project breakdown into tasks. Tasks should not be too small. They should take about a week or two.
- ◆ Activity charts show task dependencies and the the critical path.
- ◆ Bar charts show schedule against calendar time.

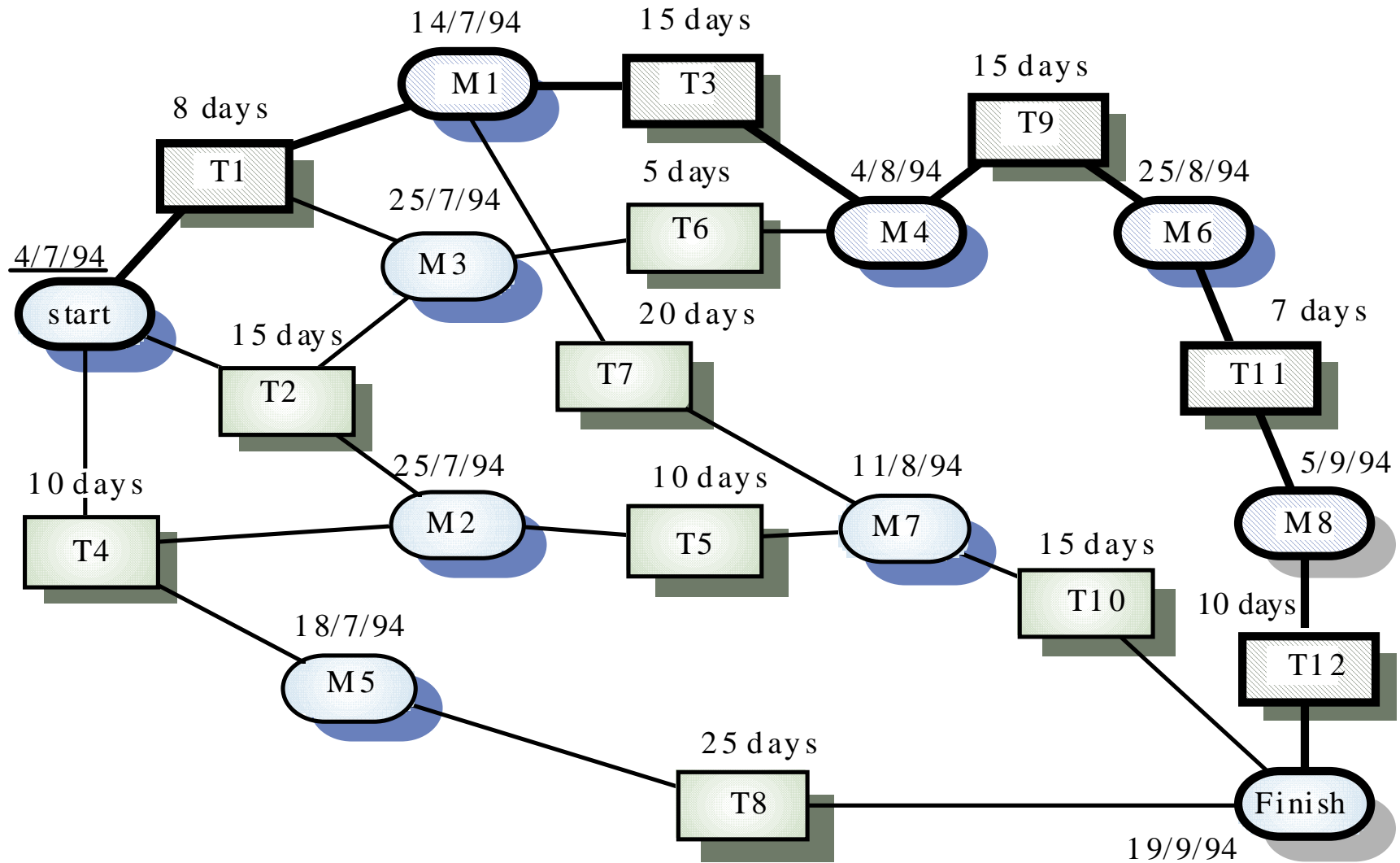


# Task durations and dependencies

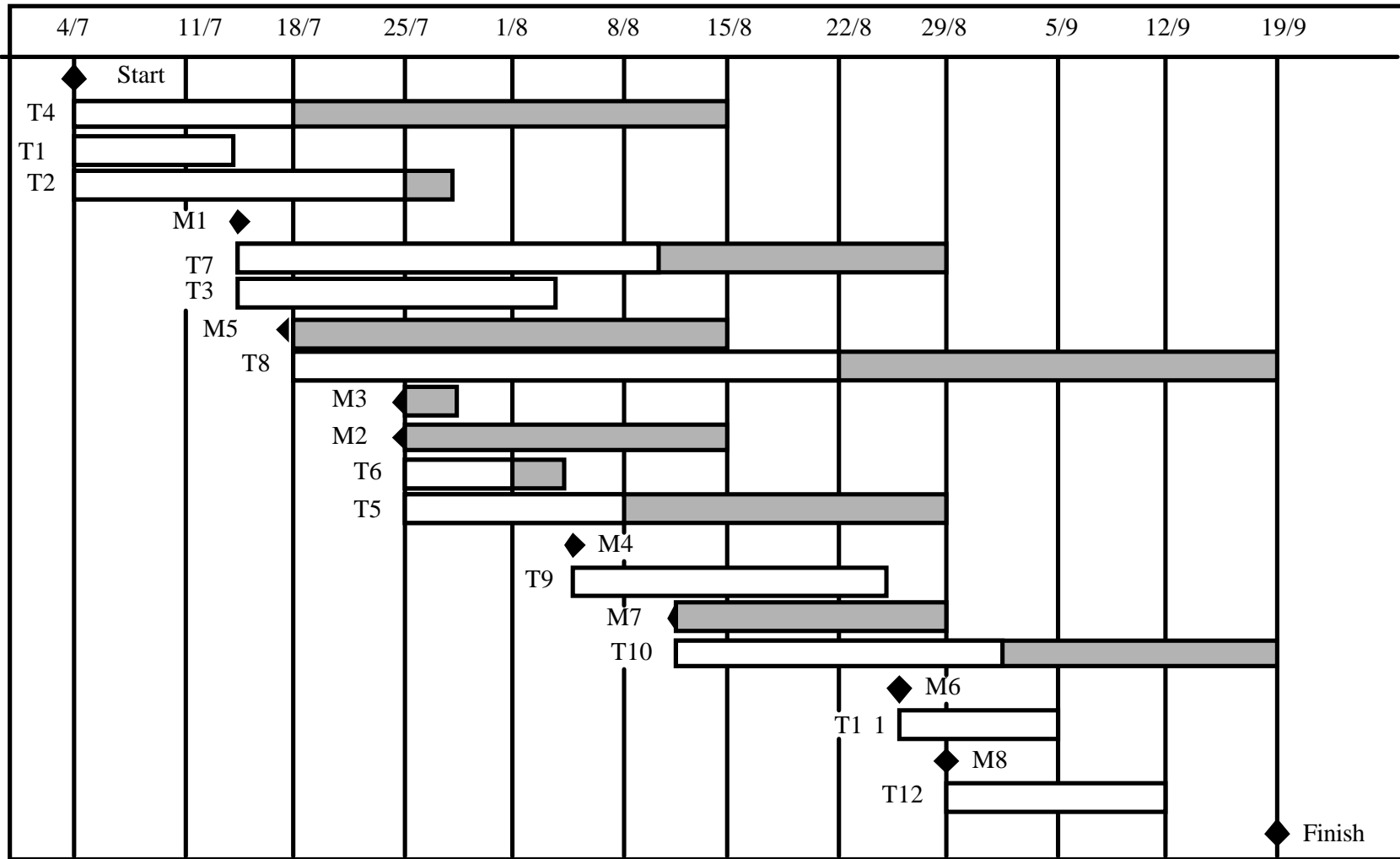
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<b>Task</b>	<b>Duration (days)</b>	<b>Dependencies</b>
T1	8	
T2	15	
T3	15	T1
T4	10	
T5	10	T2, T4
T6	5	T1, T2
T7	20	T1
T8	25	T4
T9	15	T3, T6
T10	15	T5, T7
T11	7	T9
T12	10	T11

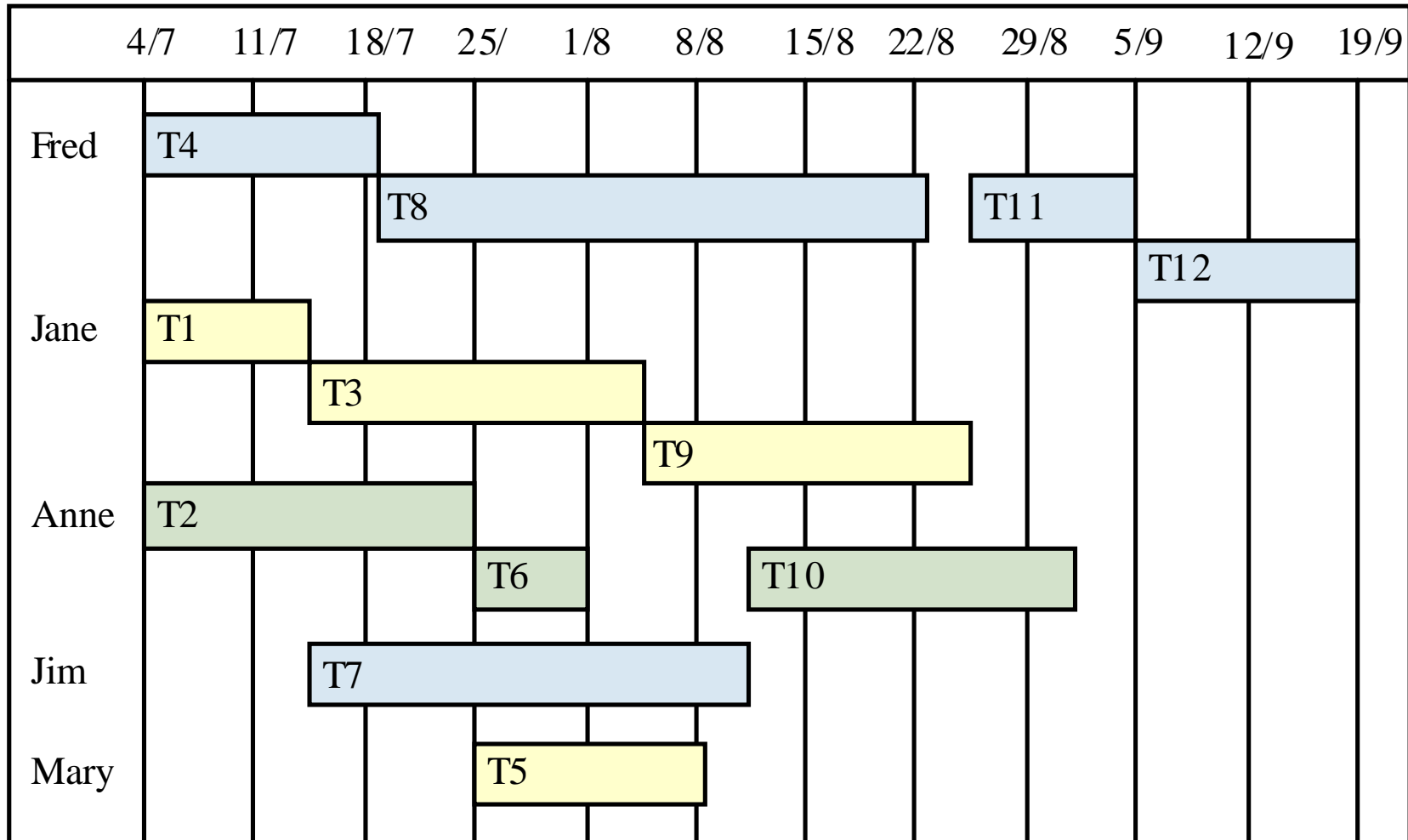
# Activity network



# Activity time-line



# Staff allocation



# Key points

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- ◆ Good project management is essential for project success.
- ◆ The intangible nature of software causes problems for management.
- ◆ Managers have diverse roles but their most significant activities are planning, estimating and scheduling.
- ◆ Planning and estimating are iterative processes which continue throughout the course of a project.

# Key points

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- ◆ A project milestone is a predictable state where some formal report of progress is presented to management.
- ◆ Activity charts and bar charts are graphical representations of a project schedule.