

Project management

- ◆ Organizing, planning and scheduling software projects

Objectives

- ◆ 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

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

Software project management

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

Why is management important?

- ◆ Software engineering is an economic activity and therefore is subject to economic, non-technical constraints
- ◆ Well-managed projects sometimes fail. Badly managed projects often fail

Software management distinctions

- ◆ The product is intangible
- ◆ The product is uniquely flexible
- ◆ Software engineering is not recognized as an engineering discipline with the same status as mechanical, electrical engineering, etc.
- ◆ The software development process is not standardized
- ◆ Many software projects are 'one-off' projects

Management activities

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

Management commonalities

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

Project staffing

- ◆ 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

- ◆ 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

Types of project plan

Plan	Description
Quality plan	Describes the quality procedures and standards that will be used in a project.
Validation plan	Describes the approach, resources and schedule used for system validation.
Configuration management plan	Describes the configuration management procedures and structures to be used.
Maintenance plan	Predicts the maintenance requirements of the system, maintenance costs and effort required.
Staff development plan.	Describes how the skills and experience of the project team members will be developed.

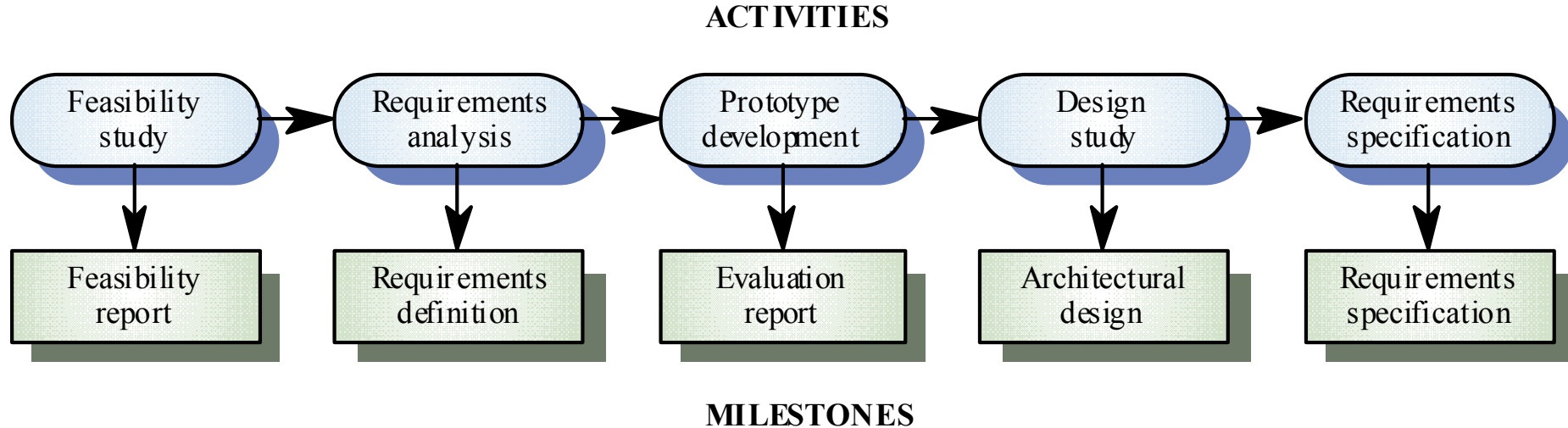
Project plan structure

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

Activity organization

- ◆ 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



Project scheduling

- ◆ 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

- ◆ 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

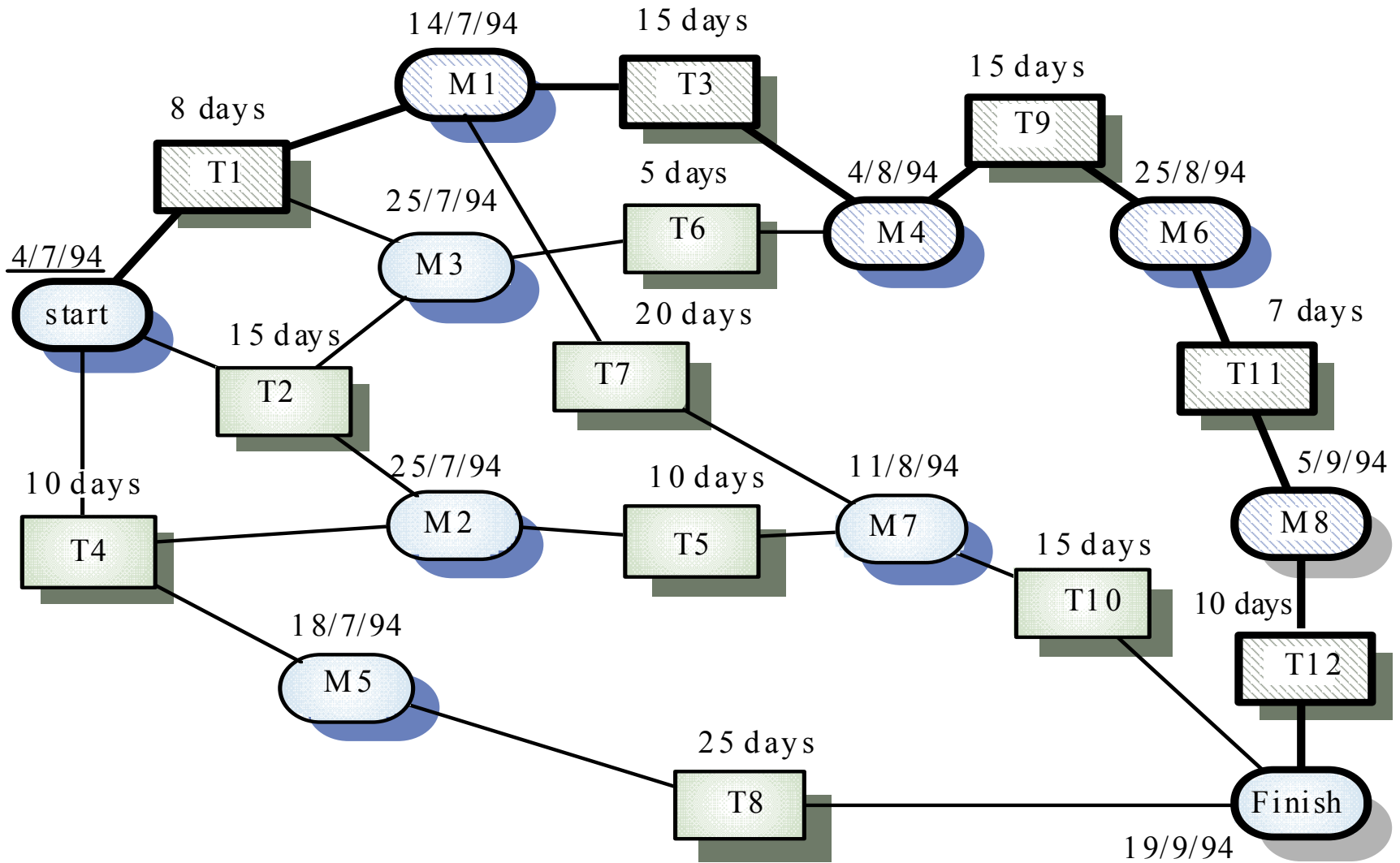
Bar charts and activity networks

- ◆ 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

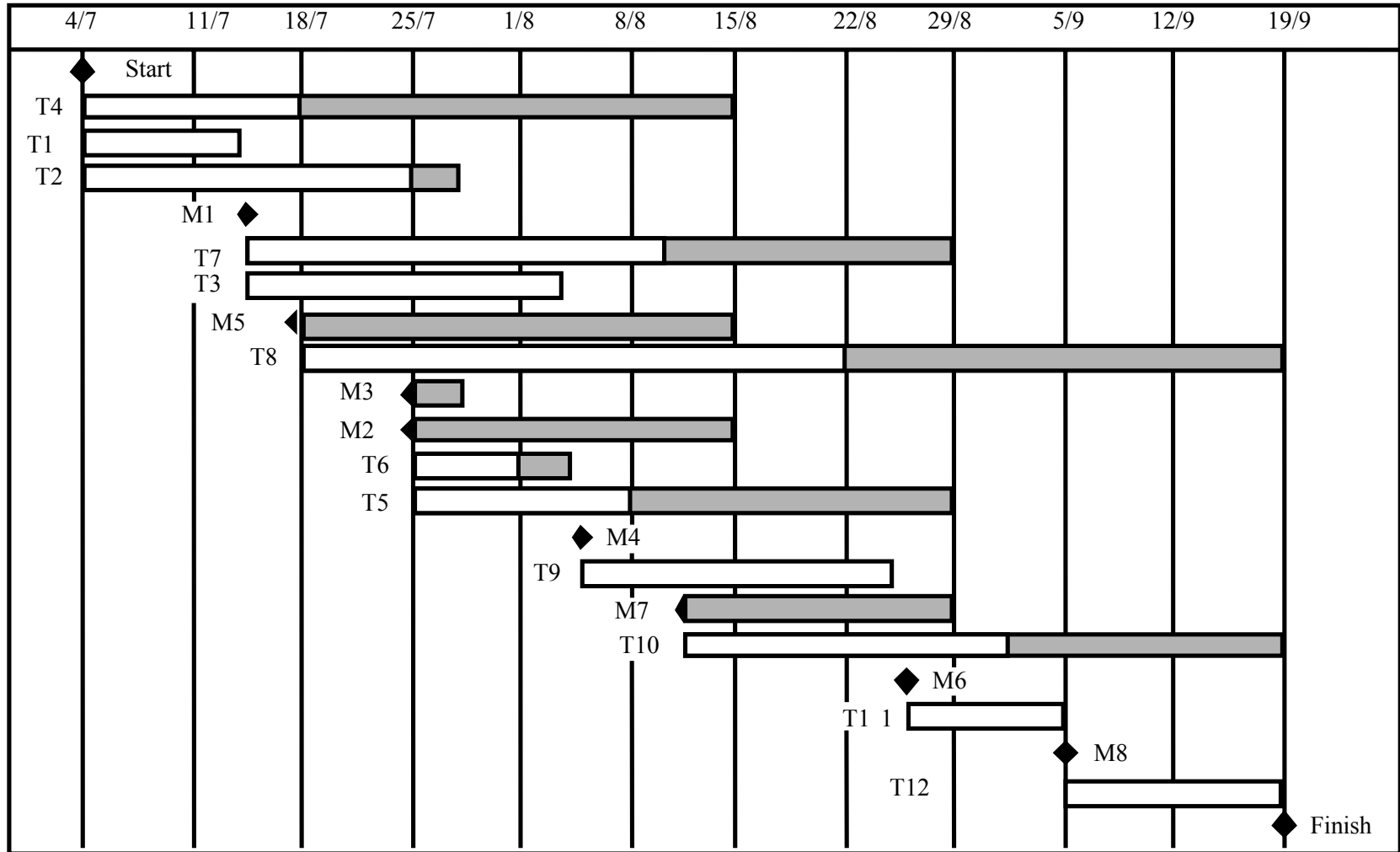
Task durations and dependencies

Task	Duration (days)	Dependencies
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

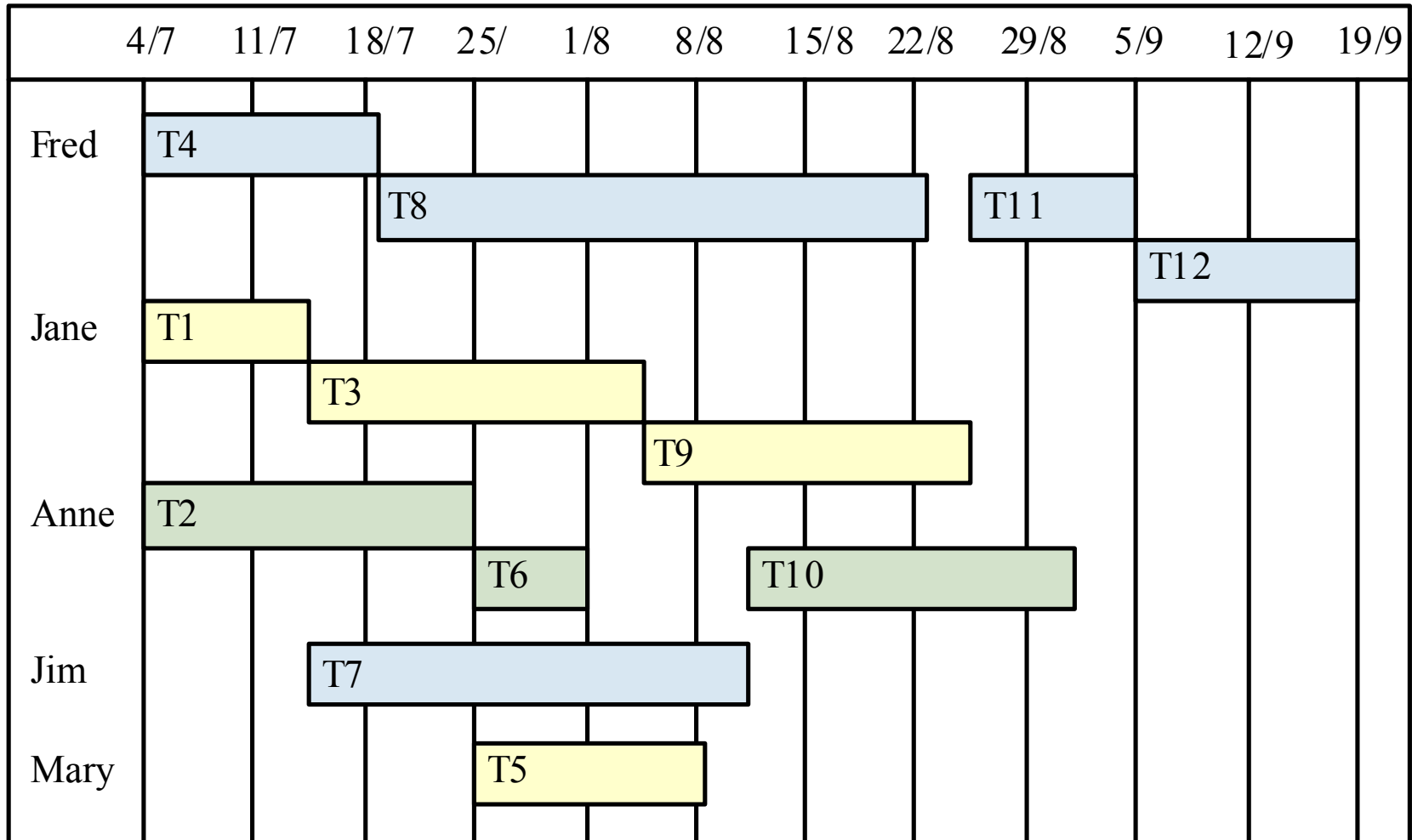
Activity network



Activity timeline



Staff allocation



Key points

- ◆ 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

- ◆ 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