Software Project Management

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Outline

- Software Engineering Problem
- Introduction/Management Activities
- Project Planning
- Project Scheduling
- Risk Management

Software Engineering Problem

- Rapid technology advancement
- Increasing customer demands
- Time limitations
- Limited infrastructure/resources
- Conflicts with **software** testing teams

Software as a product (SaaP, also programming product, software product) — is a product, software, which is made to be sold to users, and users pay for licence which allows them to use it, in contrast to SaaS, where users buy subscription and where the software is centrally hosted.

Software Project Management Framework

The software project management framework provides structure and direction to a project. However, unlike software project management methodologies it is neither too detailed nor too rigid. Frameworks guide projects to their goal while being flexible enough to adapt to evolving conditions.

Framework and Methodology

Framework	Methodology
Gives an overview of how guidelines can be implemented	Offers rigid rules and practices for completing a project
Offers space for creative adaptation	Is pretty rigid and prescriptive
Preferred by experts	Preferred by beginners
Makes it hard to develop and implement performance metrics	Spells out all performance guidelines in granular detail
Leaves room to include other practices and tools	Cannot be embedded with other practices and tools

Introduction.

- *Software project management* is aimed to ensure that the software is delivered on time, within budget and schedule constraints, and satisfies the requirements of the client
- Management of software projects is different from other types of management because:
  - Software is not tangible
  - Software processes are relatively new and still “under trial”
  - Larger software projects are usually “one-off” projects
  - Computer technology evolves very rapidly

.Introduction

- Management activities:
  - Writing proposals
  - Planning the project
  - Scheduling the project
  - Estimating the cost of the project
  - Monitoring and reviewing the project’s progress
  - Selecting, hiring, and evaluating personnel
  - Writing reports and giving presentations

Project Planning...

- A *project plan* should be drawn at the start of the project. This plan drives the project and needs to be continuously adjusted
- The role of the project manager is to anticipate possible problems and be prepared with solutions for these problems
- Other plans that need be developed:
  - Quality plan
  - Validation and verification plan
  - Configuration management plan
  - Maintenance plan
  - Staff development plan

.Project Planning..

- The planning process

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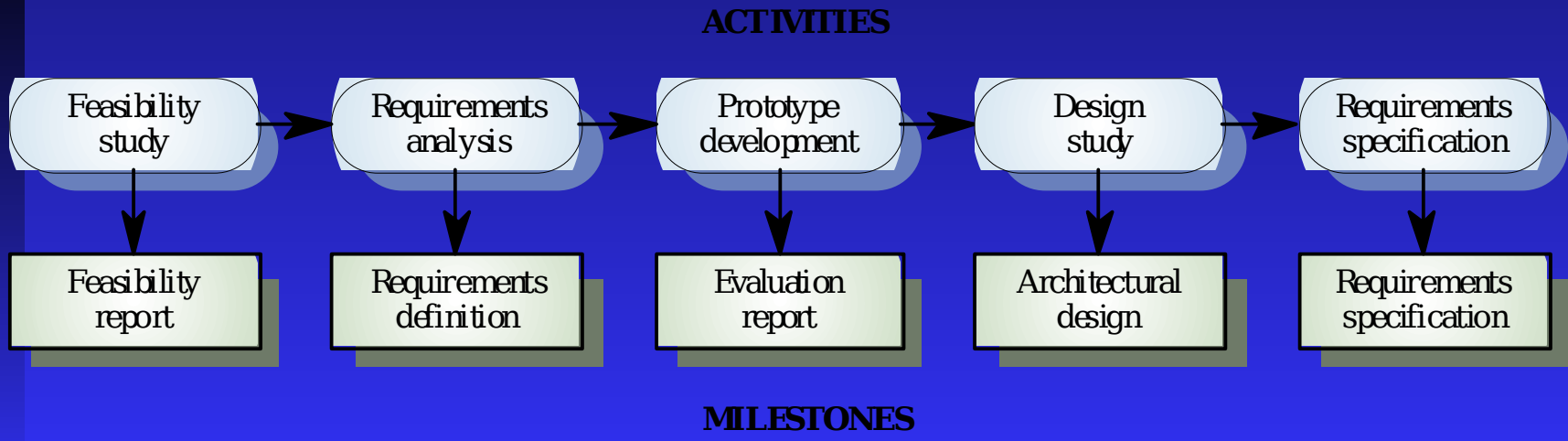
Establish the project constraints
Make initial assessments of the project parameters
Define project milestones and deliverables
while project has not been completed or cancelled loop
        Draw up project schedule
        Initiate activities according to schedule
        Wait ( for a while )
        Review project progress
        Revise estimates of project parameters
        Update the project schedule
        Re-negotiate project constraints and deliverables
        if ( problems arise ) then
              Initiate technical review and possible revision
        end if
end loop
```

..Project Planning.

- The structure of the project plan:
  - Introduction (objectives, constraints)
  - Project organization (team structure, personnel involved, roles)
  - Risk analysis (types of risk, probabilities, solutions to prevent or reduce the risk)
  - Hardware and software resources needed (prices, delivery schedule)
  - Work breakdown (activities, milestones, deliverables)
  - Project schedule (dependencies between activities/tasks, work assignments, time allocated per task)
  - Monitoring and reporting mechanisms (reports, dates)

...Project Planning

- *Milestone* = end-point of a specific, distinct software process activity or task (for each milestone a report should be presented to the management)
- *Deliverable* = project result delivered to the client
- In order to establish milestones the phases of the software process need be divided in basic activities/tasks. Example for requirements engineering

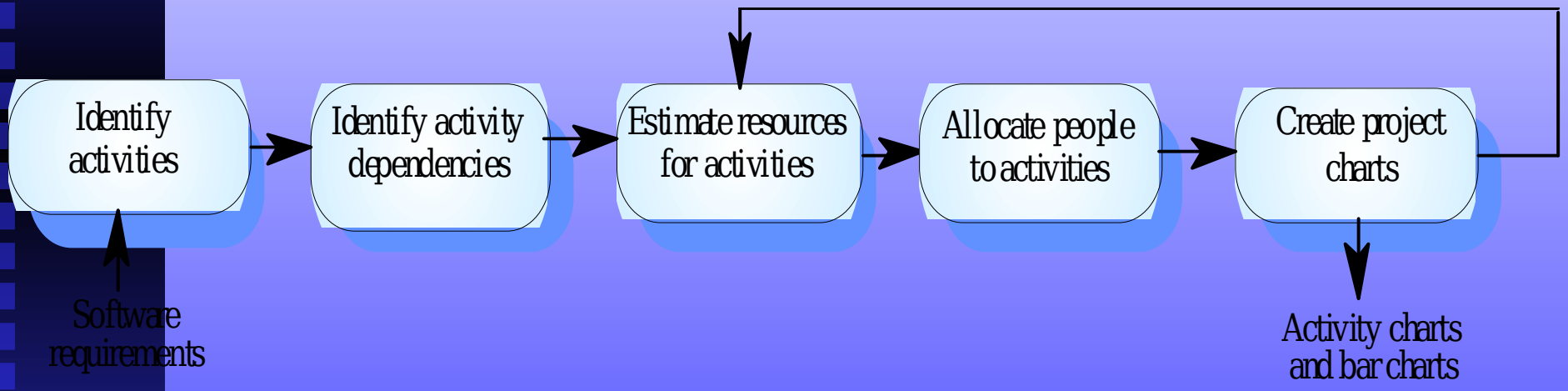


Project Scheduling……

- Software managers:
  - Divide the project in activities/tasks
  - Estimate time and resources needed to finish the project
  - Allocate resources to tasks
  - Try to employ efficiently all the project personnel
  - Minimize dependencies between tasks and teams
  - Prepare contingency plans
  - Rely on experience and intuition

.Project Scheduling.....

- The scheduling process]



..Project Scheduling....

- Graphical notations used in software project scheduling:
  - Tables: summary description of tasks
  - *Bar charts*: show schedule against the time
  - *Activity charts*: graphs that depict dependencies between tasks and indicate the *critical path* (the longest path in the activity graph)

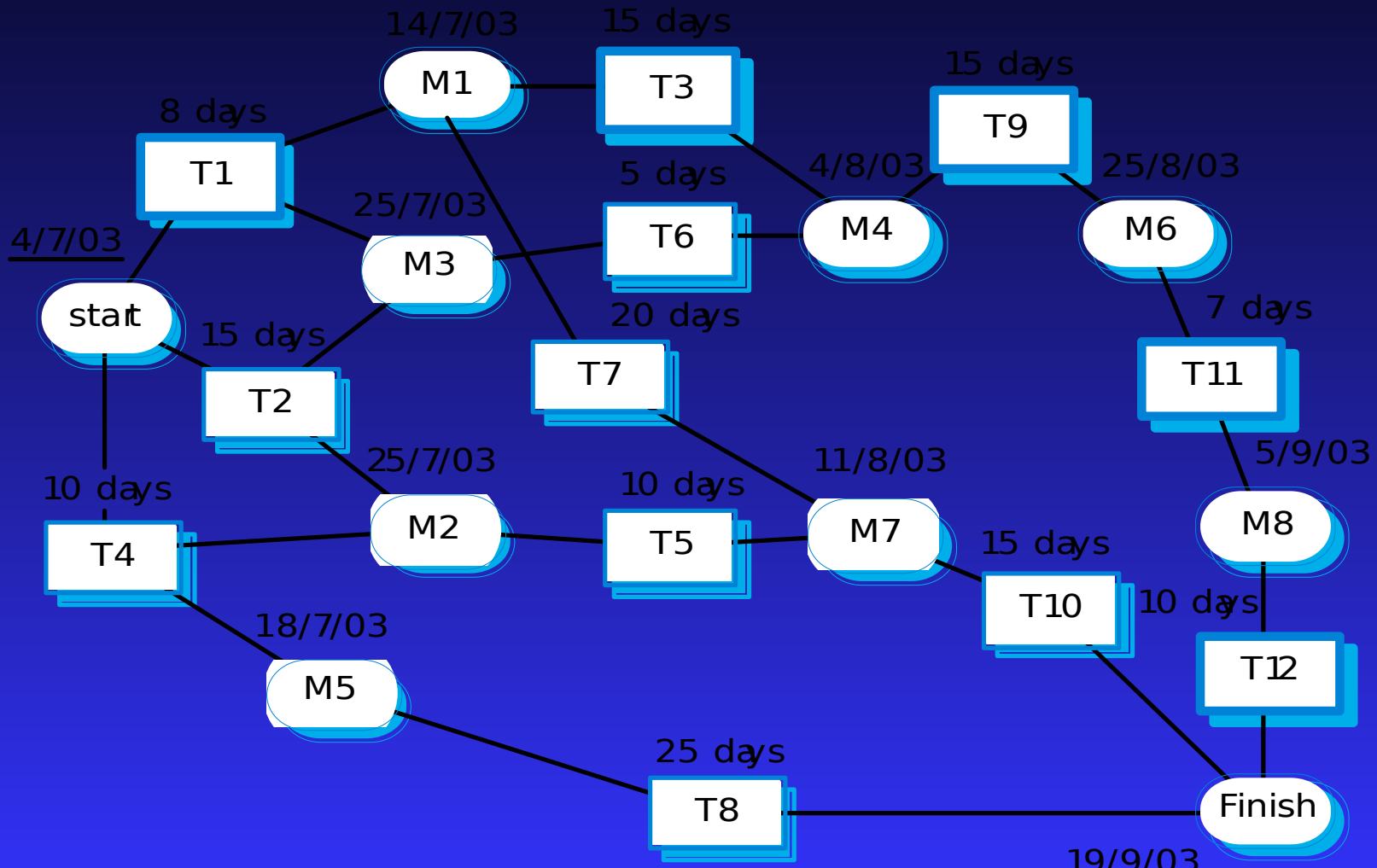
...Project Scheduling...

- Example of tabular description :

Task	Duration (days)	Dependencies
T1	8	
T2	15	
T3	15	T1 (M1)
T4	10	
T5	10	T2, T4 (M2)
T6	5	T1, T2 (M3)
T7	20	T1 (M1)
T8	25	T4 (M5)
T9	15	T3, T6 (M4)
T10	15	T5, T7 (M7)
T11	7	T9 (M6)
T12	10	T11 (M8)

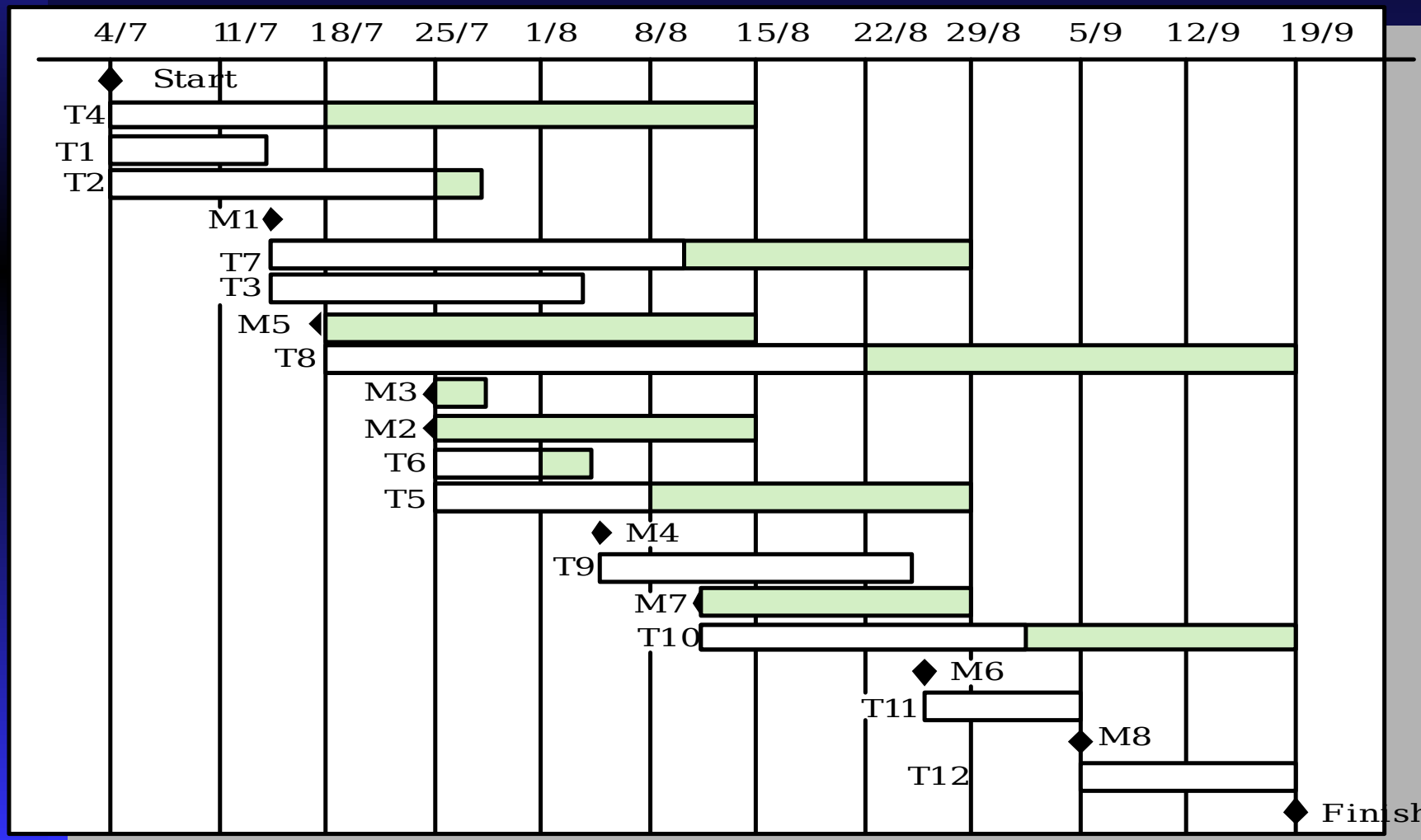
....Project Scheduling..

- Example of activity chart



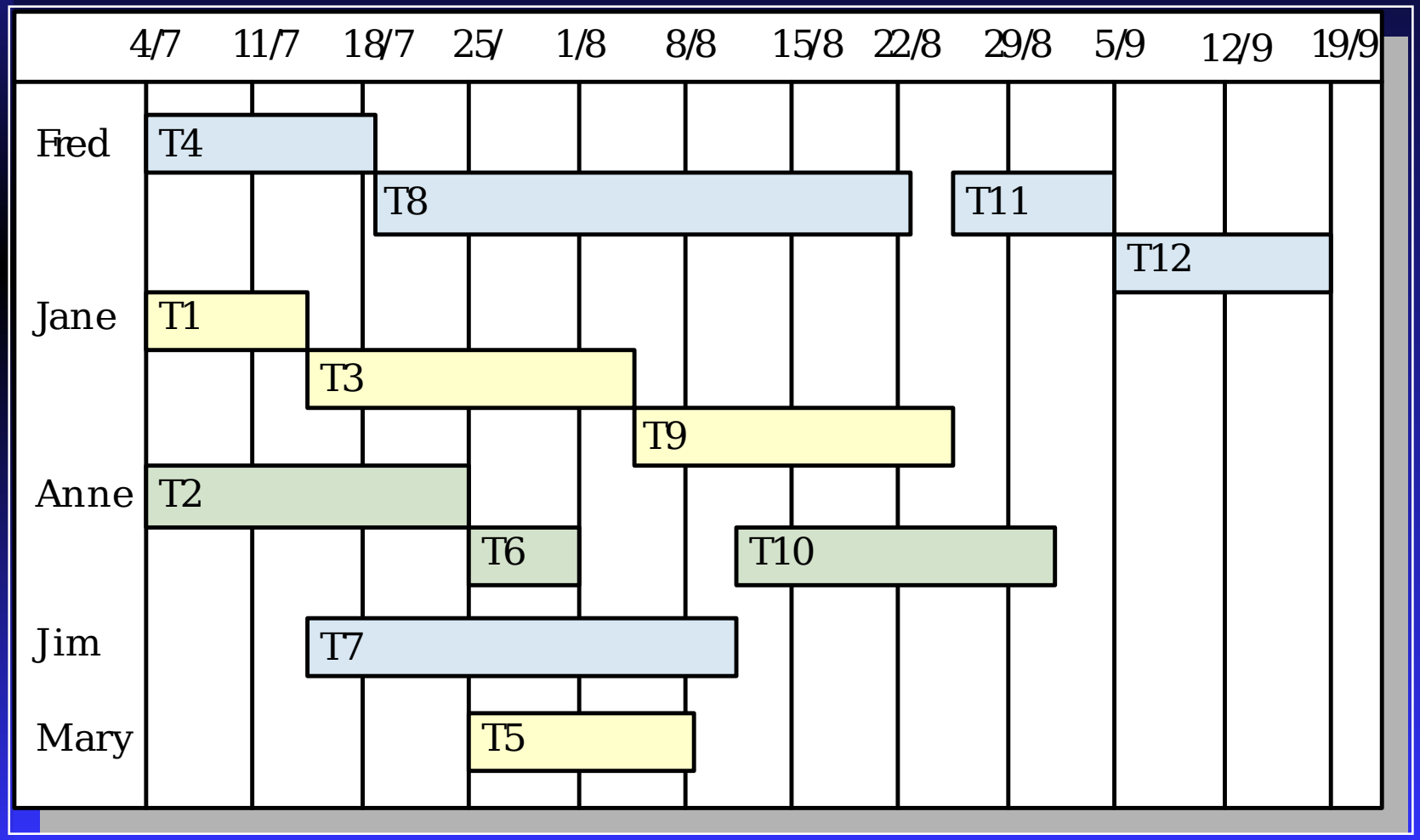
.....Project Scheduling.

- Example of bar chart



.....Project Scheduling

- Staff allocation chart



Risk Management.....

- *Risk* = some adverse circumstance that may happen and affect negatively the project, the product, and/or the business
- Categories of risk:
  - Project risks
  - Product risks
  - Business risks
- *Risk management* means anticipating risks and preparing plans to reduce their effect

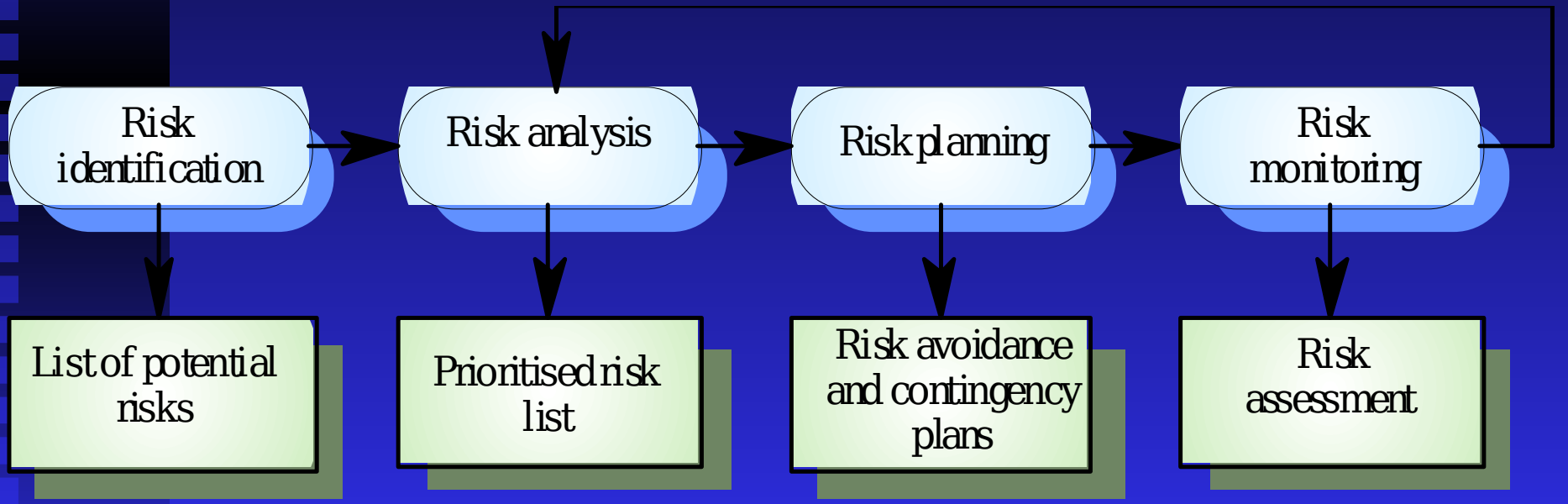
.Risk Management.....

- Examples of risks in the software process

Risk	Affects	Description
Staff turnover	Project	Experienced staff will leave the project before it is finished.
Management change	Project	There will be a change of organisational management with different priorities.
Hardware unavailability	Project	Hardware that is essential for the project will not be delivered on schedule.
Requirements change	Project and product	There will be a larger number of changes to the requirements than anticipated.
Specification delays	Project and product	Specifications of essential interfaces are not available on schedule
Size underestimate	Project and product	The size of the system has been underestimated.
CASE tool under-performance	Product	CASE tools which support the project do not perform as anticipated
Technology change	Business	The underlying technology on which the system is built is superseded by new technology.
Product competition	Business	A competitive product is marketed before the system is completed.

..Risk Management.....

- The risk management activities



...Risk Management....

- Types of risk in *risk identification*

Risk type	Potential indicators
Technology	Late delivery of hardware or support software, many reported technology problems
People	Poor staff morale, poor relationships amongst team member, job availability
Organisational	Organisational gossip, lack of action by senior management
Tools	Reluctance by team members to use tools, complaints about CASE tools, demands for higher-powered workstations
Requirements	Many requirements change requests, customer complaints
Estimation	Failure to meet agreed schedule, failure to clear reported defects

....Risk Management...

- *Risk analysis*:
  - Estimate risk probability:
    - Very low (< 10%)
    - Low (10-25%)
    - Moderate (25-50%)
    - High (50-75%)
    - Very high (> 75%)
  - Establish risk seriousness:
    - Insignificant
    - Tolerable
    - Serious
    - Catastrophic

.....Risk Management..

- *Risk planning* means preparing a strategy to deal with each of the risks identified
- Classes of strategies:
  - Avoidance strategies: the probability of the risk will be diminished
  - Minimization strategies: the effect of the risk will be reduced
  - Contingency strategies: plans for the worst case scenarios

.....Risk Management.

- Examples of risk management strategies]

Risk	Strategy
Organisational financial problems	Prepare a briefing document for senior management showing how the project is making a very important contribution to the goals of the business.
Recruitment problems	Alert customer of potential difficulties and the possibility of delays, investigate buying-in components.
Staff illness	Reorganise team so that there is more overlap of work and people therefore understand each other's jobs
Defective components	Replace potentially defective components with bought-in components of known reliability.

Risk	Strategy
Requirements changes	Derive traceability information to assess requirements change impact, maximise information hiding in the design.
Organisational restructuring	Prepare a briefing document for senior management showing how the project is making a very important contribution to the goals of the business.
Database performance	Investigate the possibility of buying a higher-performance database.
Underestimated development time	Investigate buying in components, investigate use of a program generator

.....Risk Management

- *Risk monitoring*:
  - Frequently re-assess the risks
    - Changes in risk probability?
    - Changes in risk gravity?
  - Take into consideration risk factors
  - Discuss key risks at each management project progress meeting