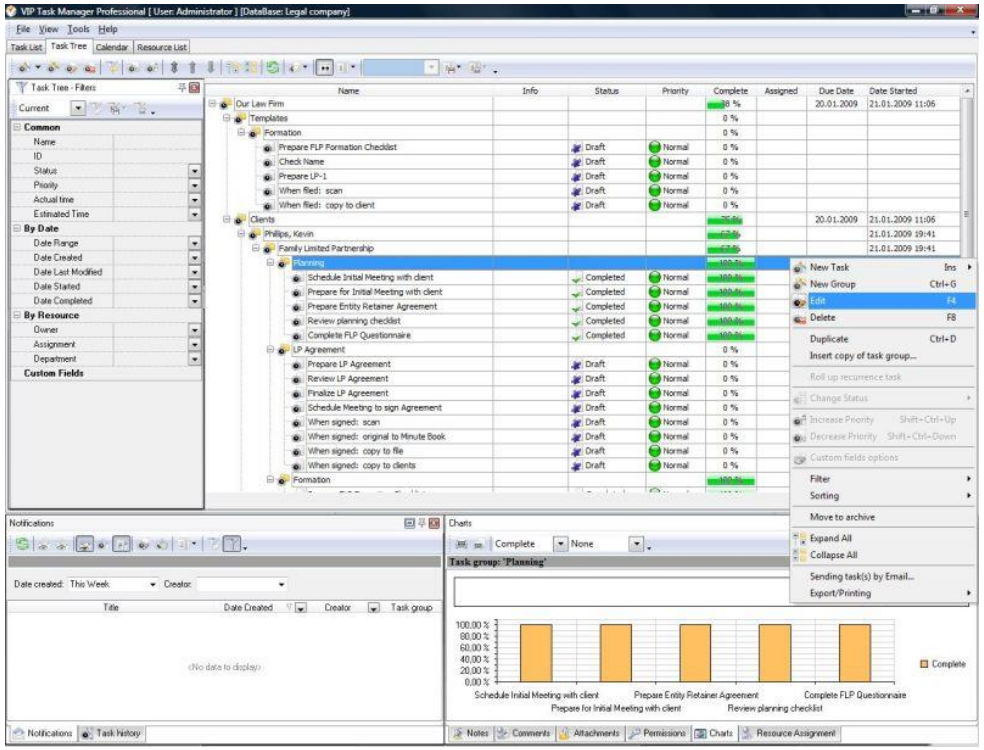


Project Management

Lesson Aim

- To give an overview of Software Project Management which encompasses the following :
  - Management Activities – Part 1
  - Project Planning & Project Scheduling - Part 2
  - Risk Management – Part 3

Lesson Objectives

- Know the principal tasks of software project managers
- Understand why the nature of software makes software project management more difficult than other engineering project management.
- Understand the need for project planning in all software projects.
- Know how graphical representations can be used by project managers to represent project schedules.

Why do projects fail

- People begin programming before they understand the problem
- The team has an unrealistic idea about how much work is involved.
- Defects are injected early but discovered late.
- Programmers have poor habits – and they don't feel accountable for their work

Software Project Management

Software project management is the art and science of planning and leading software projects

Concerned with activities involved in ensuring that software is delivered on time, on schedule and in accordance with the requirements.

Project management is needed because software development is always subject to budget and schedule constraints .

Why is Software Management Difficult?

- The product is intangible.
- The product is uniquely flexible.
- Software engineering is not recognized as an engineering discipline with the sane status as mechanical, electrical engineering, etc.
- The software development process is not standardised.
- Many software projects are 'oneoff' projects.

Why Management Is Important?

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 different organisations involved in software engineering projects have different objectives and management is necessary to ensure that as many of these objectives as possible are satisfied.

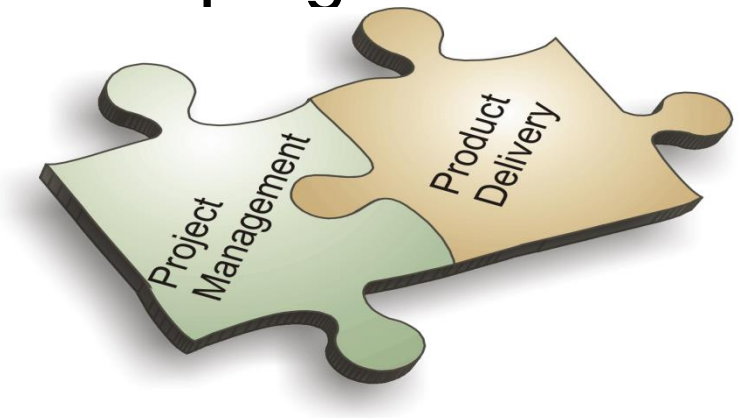
Project Management

Concerned with activities involved in ensuring that the system being procured is delivered:

»on time as set out in the delivery schedule,

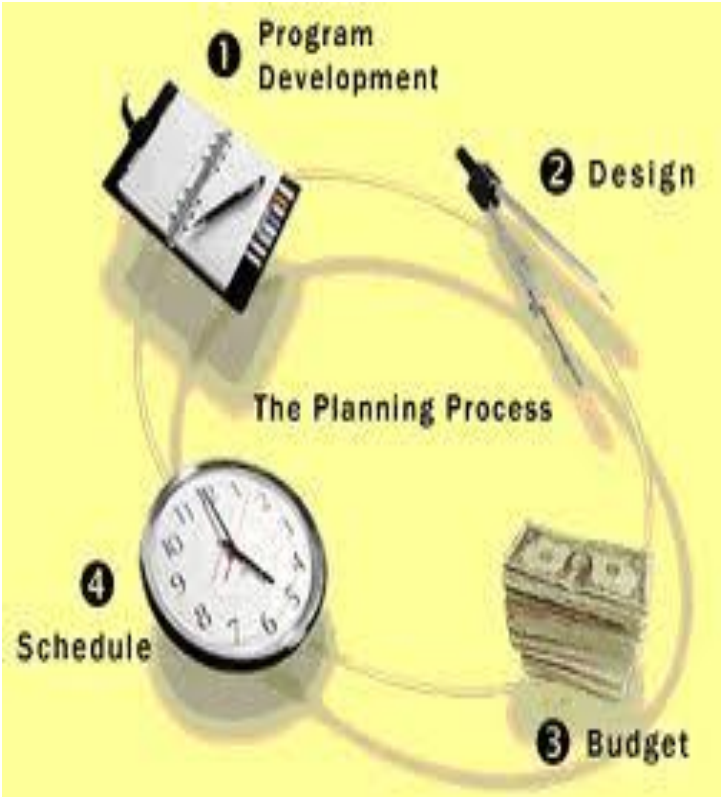
»within the set budget,

»in accordance with the requirements of the organisations procuring and developing the system.



Management Activities

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



1. Proposal Writing

Proposals may have to be written by customer managers to suggest the procurement of a software and by contractor managers in response to a request for tender by a system customer.

A proposal sets out:

- what will be done
- how it will be done
- when it will be done
- how much it will cost.

Contractor proposals will include a justification of why the contractor is qualified to carry out the work.

2. Project Costing

Concerned with estimating the overall cost of a project or sub-project

At a customer level, trade-offs must be made between costs and requirements. Organisational and political factors are very significant.

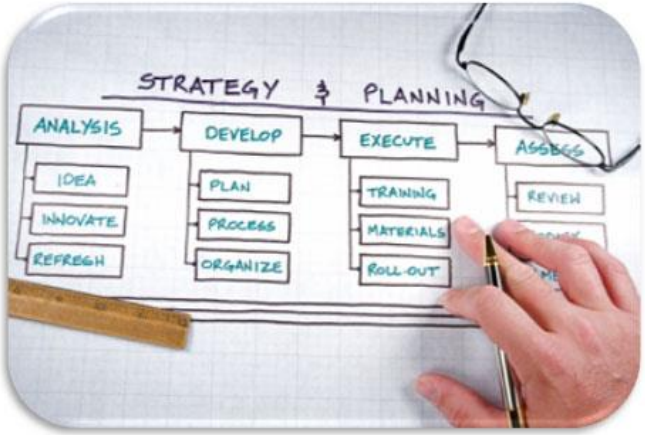
At a contractor level, costs are principally hardware costs plus personnel costs.

Closely related to effort estimation

3. 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



4. 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 organisation may wish to develop employee skills on a software project

5. Project Monitoring

Concerned with evaluating the work of the project to check that it is being carried out in conformance to the project quality standards and the project plan

Information from monitoring feeds back to revisions of the project plan.

Project reviews are formal meetings where progress is discussed and decisions made about possible changes to the project plan.

6. Report Writing & Presentations

Managers must write reports for senior organisational management and for customers describing progress on the project, responses to change requests, problems which have arisen etc.

Generally, reports are supplemented by verbal presentations illustrated by overheads or a Power-point presentation.

Information must be presented clearly and concisely as users of the information do not have time to read lengthy documents

Part 2

Software Project Planning & Project Scheduling

Project Planning

- Probably the most timeconsuming project management activity.
- Continuous activity from initial concept through to system delivery. Plans must be regularly revised as new information becomes available.
- Various different types of plan may be developed to support the main software project plan that is concerned with schedule and budget.

Types of 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.

Activity Organization

Activities in a project should be organised to produce tangible outputs for management to judge progress

Milestones are the end-point of a process activity

- A project milestone is a predictable state where some formal report of progress is presented to management.

Deliverables are project results delivered to customers

Milestones

- Have a duration of zero.
- Identify critical points in your schedule.
- Often used at “review” or “delivery” times.
  - Or at end or beginning of phases
  - Ex: Software Requirements Review (SRR),Feasibility report ,Design Report, User Sign-off.
- It can be added after each task or after two or more tasks.

Project Scheduling Process

- 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

software or hardware to be used for development may be delivered late.

Individuals working on a project may fall ill or may leave

The unexpected always happens. Always allow contingency in planning

Bar Charts and Activity Networks

Graphical notations used to illustrate the project schedule

Activity networks

- show project breakdown into tasks. Tasks should not be too small. They should take about a week or two
- show task dependencies and the critical path

Bar charts show schedule against calendar time

PERT

- PERT (Program Evaluation and Review Technique) consists of representing the activities identified in the precedence table in the form of a graph.
- The pert chart shows the different activities, the dependencies between the different activities and hence the minimum amount of time in which a subsequent activity can start.

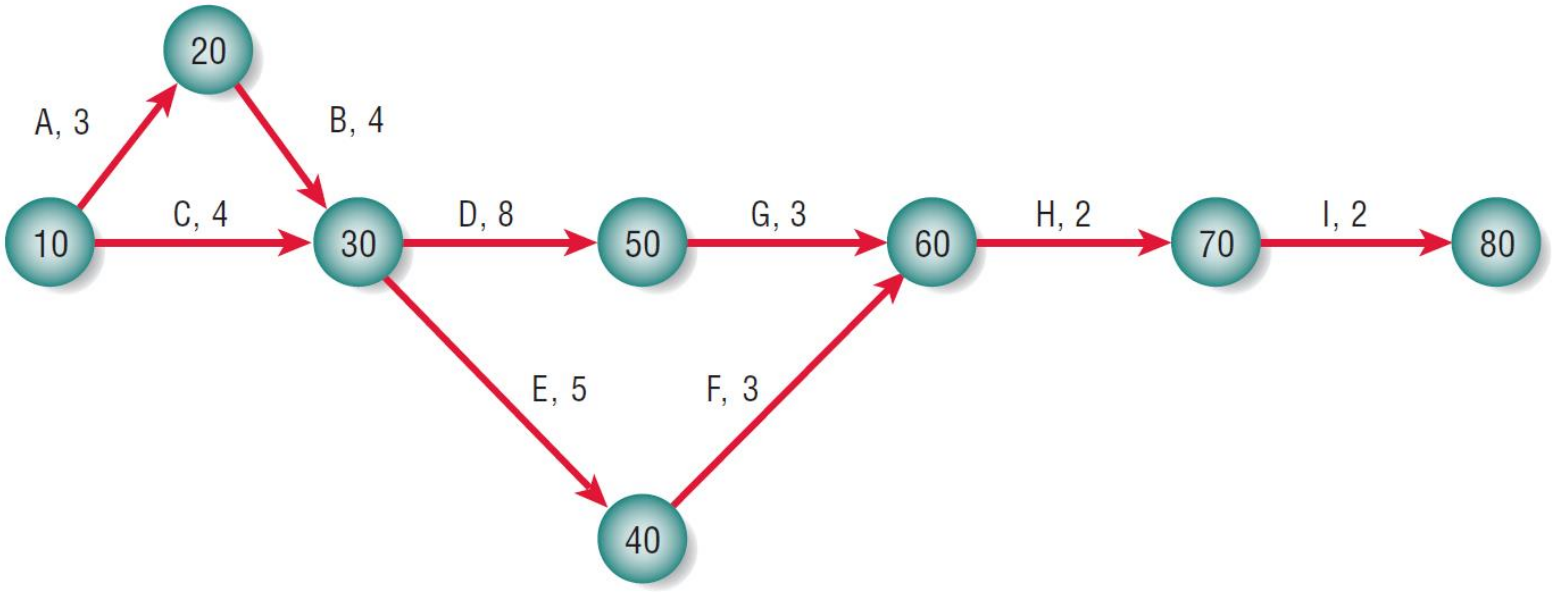
PERT

- It also allows the critical path to be defined, i.e. the path on the diagram that contain activities which define the minimum time in which the project can be completed.
  - If the delay for the project needs to be shortened, then the time that activities on the critical path have to be shortened, for example, by adding extra man power for these activities.
- An edge of the graph show the activity and the cost (e.g. time taken/duration to perform that activity).
- The node are present to:
  1. Recognise that an activity is completed, and
  2. Indicate which activities need to be completed before a new activity may be undertaken (precedence)

Schedule Feasibility

Activity	Predecessor	Duration
A Conduct Interviews	None	3
B Administer Questionnaires	A	4
C Read company reports	None	4
D Analyse Data Flow	B,C	8
E Introduce prototype	B,C	5
F Observe reactions to prototype	E	3
G Perform cost/benefit analysis	D	3
H Prepare proposal	G, F	2
I Present proposal	H	2

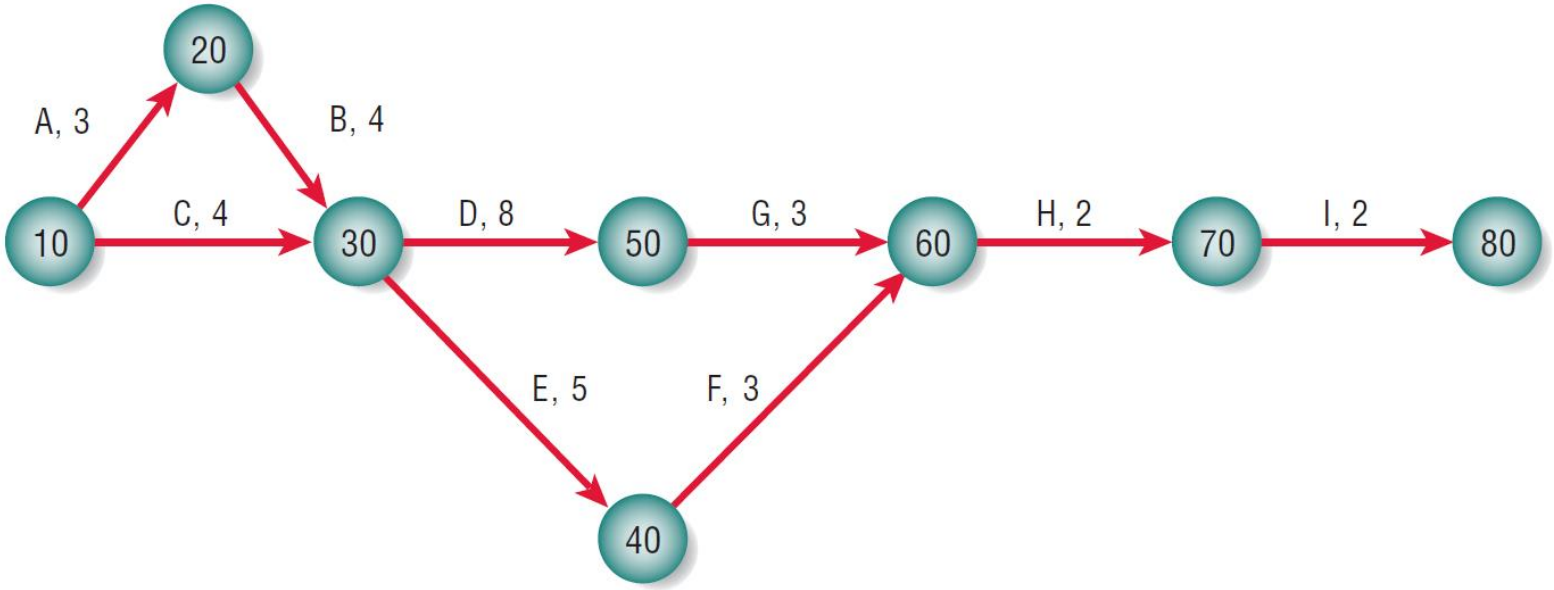
PERT



Critical path

- PERT chart also allows the critical path to be defined, the path on the diagram that contain activities which define the minimum time in which the project can be completed. If the delay for the project needs to be shortened, then the time that activities on the critical path have to be shortened, for example, by adding extra man power for these activities.
- A critical path in a PERT diagram is defined as the independent path in the graph that has the maximum cost (or delay). It is defined as the path that will cause the whole project to fall behind if even one activity along the critical path is delayed.

Find the critical path



- Critical path: 10-20-30-50-60-70-80

Part 3

Risk Management

Software Risks

• A risk is an uncertain event that could happen in the future, which would impact a project objective (i.e. scope, schedule, cost, or quality).

•Risk always involve two characteristics:

- Uncertainty – The event that characterise the risk may or may not happen.
- Loss – If the risk becomes a reality, unwanted circumstances or losses will occur

•These stem from loosely defined requirements, difficulties in estimating the time and resources required for software development, dependence on individual skills & requirements changes due to changes in customer needs.

Software Risks Categories

- **Project Risks:** risks which affect the project schedule or resources.
  - Potential budgetary, schedule, personnel, resource, stakeholder, and requirements problems

- **Product/Technical Risks:** risk which affect the quality or performance of the software.
  - Potential design, implementation, interface, verification, maintenance problems, specification ambiguity, technical uncertainty

Software Risks Categories

- **Business Risks:** which affect the organisation developing or procuring the software.
  - Market risk, Strategic risk, Sales risk, Management risk.

Software Risks

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 which is essential for the project will not be delivered on schedule
Requirements change	Project & Product	There will be a larger number of changes to the requirements than anticipated
Specification delays	Project & Product	Specifications of essential interfaces are not available on schedule
Size underestimate	Project & 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 Identification

Risk Type	Possible risk
Technology	The database used in the system cannot process as many transactions per second as expected Software components which should be reused contain defects which limit their functionality
People	It is impossible to recruit staff with the skills required Key staff are ill or unavailable at critical times
Organisational	Organisational financial problem force reduction in the project budget
Tools	The code generated by case tools is inefficient
Requirements	Changes to requirements which require major design rework are proposed
Estimation	The time required to develop the software is underestimated