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Unit -I

Introduction to software project management

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Project Management   is the discipline of defining and achieving targets while optimizing the use of resources (time, money, people, materials, energy, space, etc) over the course of a project (a set of activities of finite duration).

Why is project management important?

- Large amounts of money are spent on ICT(*Information and communications technology)* e.g. UK government in 2003-4 spent £2.3 billions on contracts for ICT and only £1.4 billions on road building
- Project often fail – Standish Group claim only a third of ICT projects are successful. 82% were late and 43% exceeded their budget.
- Poor project management a major factor in these failures
- 1 billion = 100 crore

Software Development Life Cycle:

The software development life-cycle is a methodology that also forms the framework for planning and controlling the creation, testing, and delivery of an information system. [1]

The software development life-cycle concept acts as the foundation for multiple different development and delivery methodologies, such as the Hardware development life-cycle

and Software development life-cycle. While Hardware development life-cycles deal specifically with hardware and Software development life-cycles deal specifically with software, a Systems development life-cycle differs from each in that it can deal with any combination of hardware and software, as a system can be composed of hardware only, software only, or a combination of both. [

Four Project Dimensions

- ☐ People
- ☐ Process
- ☐ Product
- ☐ Technology

The 5 Variables of Project Control

1. Time - amount of time required to complete the project.
2. Cost - calculated from the time variable
3. Quality - The amount of time put into individual tasks determines the overall quality of the project.
4. Scope - Requirements specified for the end result.
5. Risk - Potential points of failure.

Trade – off triangle:
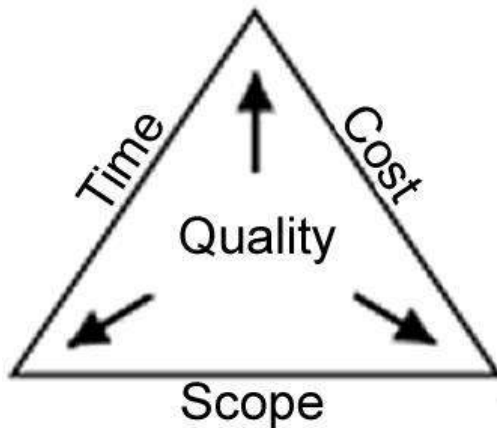
The triangle illustrates the relationship between three primary forces in a project. Time is the available time to deliver the project, cost represents the amount of money or resources available and quality represents the fit-to-purpose that the project must achieve to be a success.

The normal situation is that one of these factors is fixed and the other two will vary in inverse proportion to each other. For example time is often fixed and the quality of the end product will depend on the cost or resources available. Similarly if you are working to a fixed level of quality then the cost of the project will largely be dependent upon the time available (if you have longer you can do it with fewer people).

1.2 Project definition
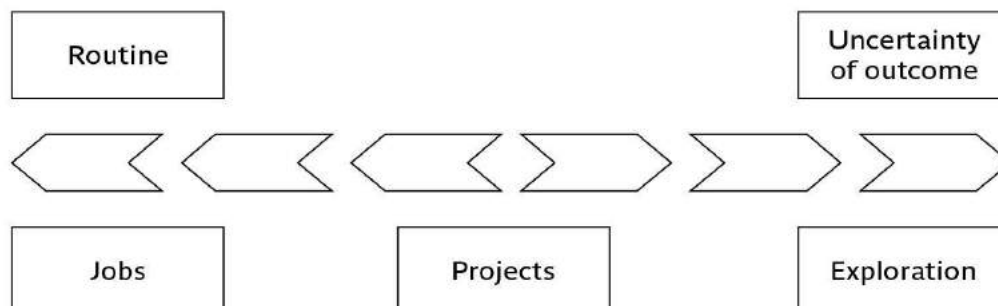
What is a project?

Some dictionary definitions:

"A specific plan or design" "A planned undertaking"
"A large undertaking e.g. a public works scheme"

Longmans dictionary

Key points above are *planning* and *size* of task

Jobs versus projects

_Jobs' – repetition of very well-defined and well understood tasks with very little uncertainty

_Exploration' – e.g. finding a cure for cancer: the outcome is very uncertain **Projects** – in the middle!

- Jobs- Very Little Uncertainty
- Task is well defined and there is little uncertainty.
- Software Process Management vs Software Project Management

Projects

- Projects seem to come somewhere between these two extremes. There are usually **well-defined hoped-for outcomes but there are risks and uncertainties** about achieving those outcomes.

- A software project can be defined as a planned activity that describes how we are going to carry out a task before we start.

- It is a planned activity about developing a software before u actually design and implement it.

Examples of Software Projects:

Putting a robot vehicle on Mars to search for signs of life.

- Relative novelty of the project
- International nature of the project
- Successful achievement of the project from engineering point of view is the safe landing of the robot, not the discovery of signs of life.

Writing an Operating System

Characteristics of projects

A task is more _project-like' if it is:

- Non-routine
- Planned
- Aiming at a specific target
- Carried out for a customer
- Carried out by a temporary work group
- Involving several specialisms
- Made up of several different phases
- Constrained by time and resources
- Large and/or complex

Are *software* projects really different from other projects?

Not really …but

- Invisibility
    - Bridge construction
- Complexity
- Conformity (Cement & steel physical law vs conform to human mind)

- Flexibility(Easy to change is strength)

make software more problematic to build than other engineered artefacts.

1.3 Contract management

Some ways of categorizing projects

Distinguishing different types of project is important as different types of task need different project approaches e.g.

- **Voluntary systems** (such as computer games –what game will do?) versus **compulsory systems** e.g. the order processing system in an organization(recording a sale)

- **Information systems**(Enable staff to carry out office processes) versus **embedded systems**(process control-which controls machine)

- **Objective-based versus product-based**

  - With **objective-based projects**, a general objective or problem is defined, and there are several different ways in which that objective could be reached. The project team have freedom to select what appears to be the most appropriate approach.
  - With product-based projects, the product is already **very strictly defined and the development team's job is to implement the specification** with which they have been presented.

Contract management versus technical project management

Projects can be:

- **In-house**: clients and developers are employed by the same organization

- **Out-sourced:** clients and developers employed by different organizations

- _Project manager' could be:
  - a _contract manager' in the client organization
 - a technical project manager in the supplier/services organization

Brainstorming

- Read the News article and find the Client's consideration /requirement before outsourcing a project.

What is management?

This involves the following activities:

- Planning – deciding what is to be done
- Organizing – making arrangements
- Staffing – selecting the right people for the job
- Directing – giving instructions
- Monitoring – checking on progress
- Controlling – taking action to remedy hold-ups
- Innovating – coming up with solutions when problems emerge
- Representing – liaising with clients, users, developers and other stakeholders

Management control- Project Control Cycle
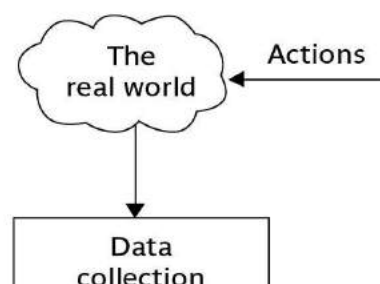
Modelling – working out the probable outcomes of various decisions

  e.g. if we employ two more staff at location X how quickly can we get the documents processed?

Implementation – carrying out the remedial actions that have been decided upon

1.4 Activities covered by project management

A software project is not only concerned with the actual writing of software. Usually there are three successive processes that bring a new system into being.
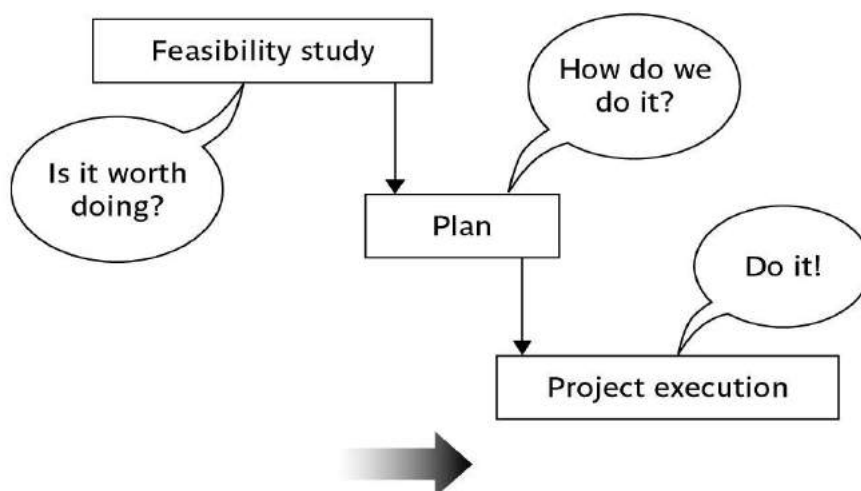
Feasibility study

Is project technically feasible and worthwhile from a business point of view?(recommendation of the feasibility study might be not to carry out the proposed project)

Planning

Only done if project is feasible - evolving plan allows us to *control* the project.

Execution

Implement plan, but plan may be changed as we go along

The software development life-cycle (ISO 12207)

The software development life cycle is a *technical* model. It identifies the technical constraints on the order activities are done. This does NOT imply that a ‗waterfall‘ approach is the only way to organize projects. The technical model could be implemented as increments or in an evolutionary manner.

ISO 12207 life-cycles are:

1. Requirements analysis
2. Architecture Design
3. Code and test
4. Installation \ Acceptance support
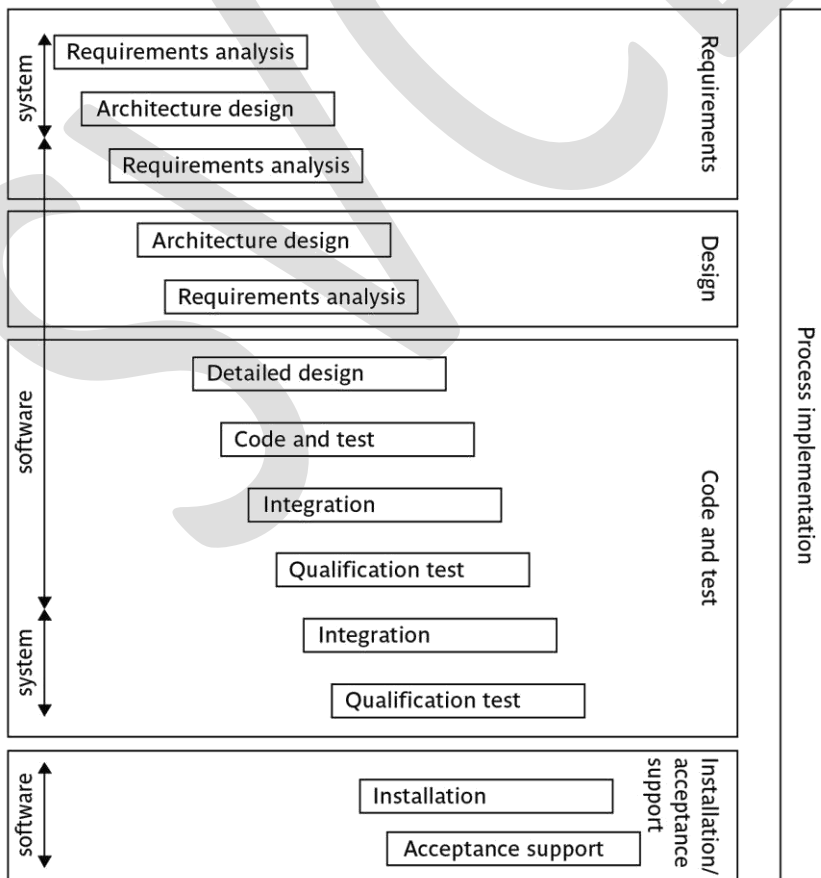
Requirements analysis
- Requirements eli-ci-tation(kindle): what does the client need?
- Analysis: converting ‗customer-facing' requirements into equivalents that developers can understand
- Requirements will cover
    - Functions
    - Quality
    - Resource constraints i.e. costs

Requirement analysis has to face in (at least) two different directions. It needs to communicate and elicit the requirements of the users, speaking in their language. It needs to organize and translate those requirements into a form that developers can understand and relate to.

Architecture Design
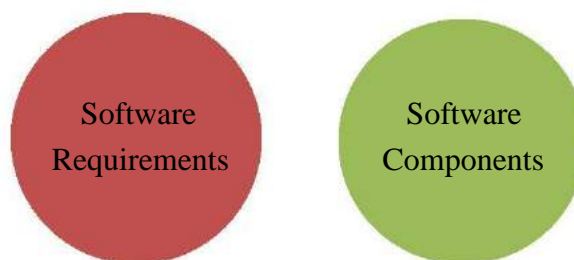
- Based on *system requirements*
- Defines components of system: hardware, software, organizational
- *Software requirements* will come out of this

Code and test
- Of individual components (separately coded and tested)
- **Integration**
    - Putting the components together
- **Qualification testing(the whole system)**
    - Testing the *system* (not just the *software*)
- **Installation(meaning most like implementation) Install –Complete System**
    - The process of making the system operational
    - Includes setting up standing data, setting system parameters, installing on operational hardware platforms, user training etc
- **Acceptance support**
    - Including maintenance and enhancement

1.5 Plans, methods and methodologies
- A plan of an activity must be based on some idea of a method of work. While a method relates to a type of activity in general, a plan takes one or more methods and converts them into real activities by identifying:
    - Start and end dates
    - Who will carry it out
    - What tools and materials would be needed.
- A methodology is a set of related methods. Strictly speaking ‗methodology' *ought* to mean the study of methods!

Plans, methods and methodologies

Methodology = a set of methods

Context

Plan

Methods

+ start and end dates for each
activity, A way of working staffing, tools and materials
etc
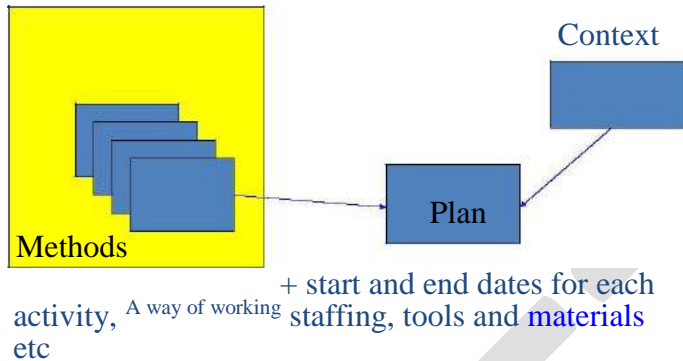
Stakeholders

These are people who have a stake or interest in the project In
general, they could be *users/clients* or *developers/implementers*
They could be:

- Within the project team
- Outside the project team, but within the same organization
- Outside both the project team and the organization

Different stakeholders may have different objectives – need to define common project objectives

Project Leader is to recognize these different interests (good
Communicator/Negotiator)

Boehm & Ross – ⌐Theory W' Win-Win

Setting objectives

- ⌐What do we have to do to have a success?'
- Need for a ***project authority***
  – Sets the project scope
  – Allocates/approves costs

- **Could be one person - or a group (Project Authority-most important-control-finance-monitor-modify objectives)**
  – Project Board
  – Project Management Board
  – Steering committee

Objectives

Informally, the objective of a project can be defined by completing the statement:
    *The project will be regarded as a success if……….
    …………*

Rather like *post-conditions* for the project, Focus on *what* will be put in place, rather than
how activities will be carried out

e.g. 'a new payroll application will be operational by 4th April' *not* **'design and code a new payroll application'**

Objectives should be SMART

S – specific, that is, concrete and well-defined

M – measurable, that is, satisfaction of the objective can be objectively judged

A – achievable, that is, it is within the power of the individual or group concerned to meet the target

R – relevant/Resource Constrained, the objective must relevant to the true purpose of the project

T – time constrained: there is defined point in time by which the objective should be achieved

Goals/sub-objectives

These are **steps along the way to achieving the objective**

Informally, these can be defined by completing the sentence To reach
objective X, the following must be in place

A……………
B……………
C…………… etc

Often a goal can be allocated to an individual. Individual might have the capability of achieving goal on their own, but not the overall objective e.g.

Overall objective – **user satisfaction with software product** *Analyst goal* – **accurate requirements**

Developer goal – **reliable software**
Measures of effectiveness

How do we know that the goal or objective has been achieved? By a practical test, that can be objectively assessed.
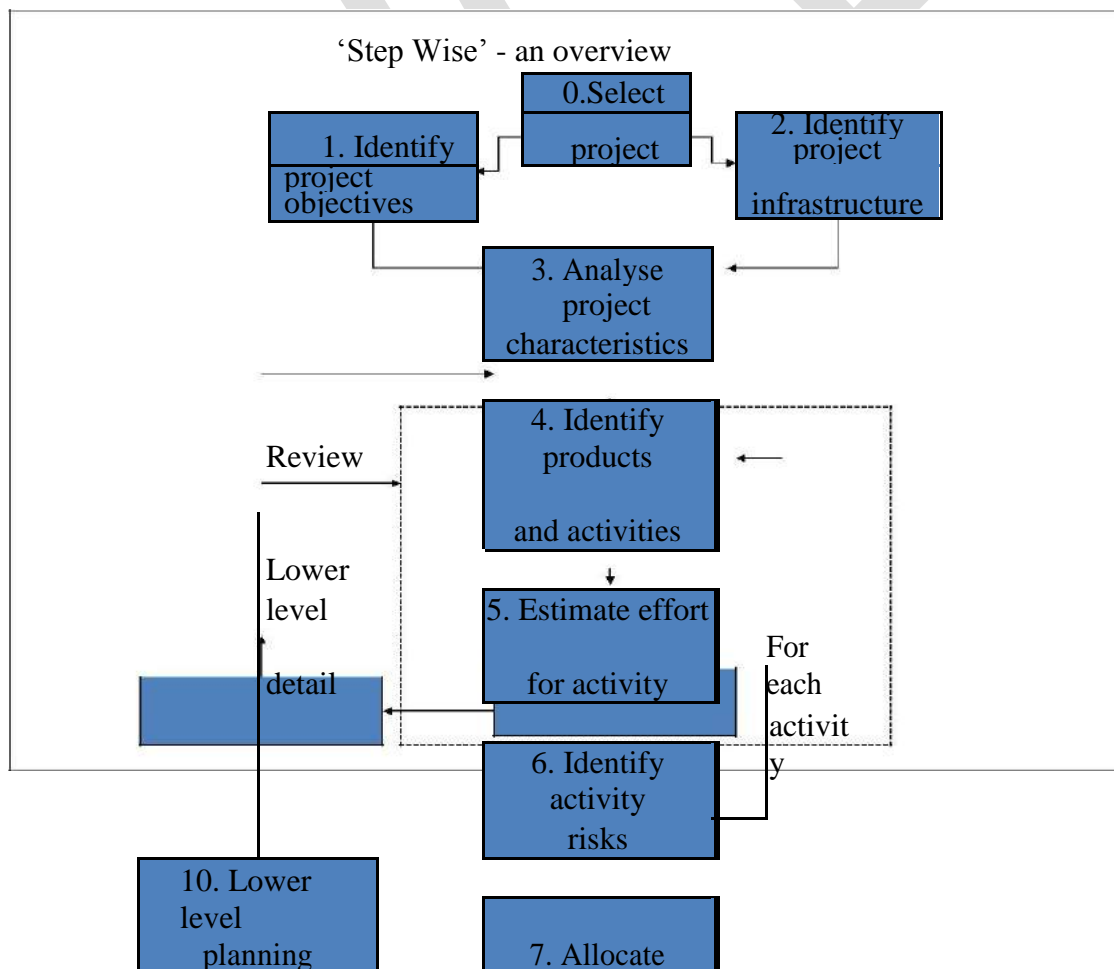
e.g. for user satisfaction with software product:
- Repeat business – they buy further products from us
- Number of complaints – if low etc etc
- Measures of effectiveness
- Performance Measurement-
    - To measure reliability – mtbf
    - Mean time between failures
    - Seek Predictive Measures
        - Large number of errors during code, inspections needed
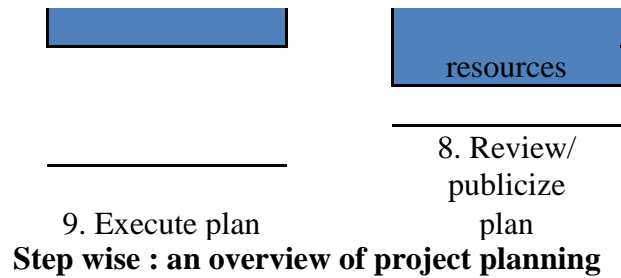
1.6 Stepwise Planning(step 0- step 3)

'Step Wise' - aspirations

- Practicality
  - tries to answer the question 'what do I do now?'
- Scalability
  - useful for small project as well as large
- Range of application
- Accepted techniques
  - e.g. borrowed from PRINCE etc

2

'Step Wise' - an overview

resources

8. Review/
publicize
plan

9. Execute plan

Step wise : an overview of project planning

Planning is the most difficult process in project management This chapter describes a framework of basic steps in project planning. Many different techniques can be used but this chapter tells the overview of the steps and activities in each step of project planning .

A major step in project planning is to plan in outline first and then in more detail.

Following are the major steps in project planning

Steps in Project Planning

Step 0 : Select project

Step 1 : Identify project scope and objectives

Step 2 : Identify project infrastructure

Step 3 : Analyze project characteristics

Step 4 : Identify project products and activities

Step 5: Estimate effort for each activity.

Step 6 : Identify activity risks.

Step 7 : Allocate resources

Step 8 Review / Publicize pl\an

Step 9 & 10 : Execute plan / lower level of planning

Each step of project planning has different activities to perform. Following the description of each step with its activities

Step 0 : Select project

This is called step 0 because in a way of project planning , it is out side the main project planning process. Feasibility study suggests us that the project is worthwhile or not.

Step 1 : Identify project scope and objectives

The activities in this step ensure that all parties to the project agree on the objectives and are committed to the success of the project.

Step 1.1 : Identify objectives and practical measures of the effectiveness in meeting those objectives

Step 1.2 : Establish project authority

Step 1.3 : Stakeholders analysis – Identify all stakeholders in the project and their interest.

Step 1.4 : Modify objectives in the light of stakeholder anaylsis.

Step 1.5 : Establish method of communication

Step 2 : Identify project infrastructure

Projects are rarely carried out in a vacuum. There is usually some kind of infrastructure into which the project must fit. Where the project manager are new to the organization , they must find out the precise nature of this infrastructure.

Step 2.1: Identify relationship between the project and strategic planning

Step 2.2 : Identify installation standards and procedures.

Step 2.3 : Identify project team organization.

Step 3 : Analyze project characteristics.

The general purpose of this part of planning operation is to ensure that the appropriate methods are used for the project.

Step 3.1 : Distinguish the project as either objective- product driven

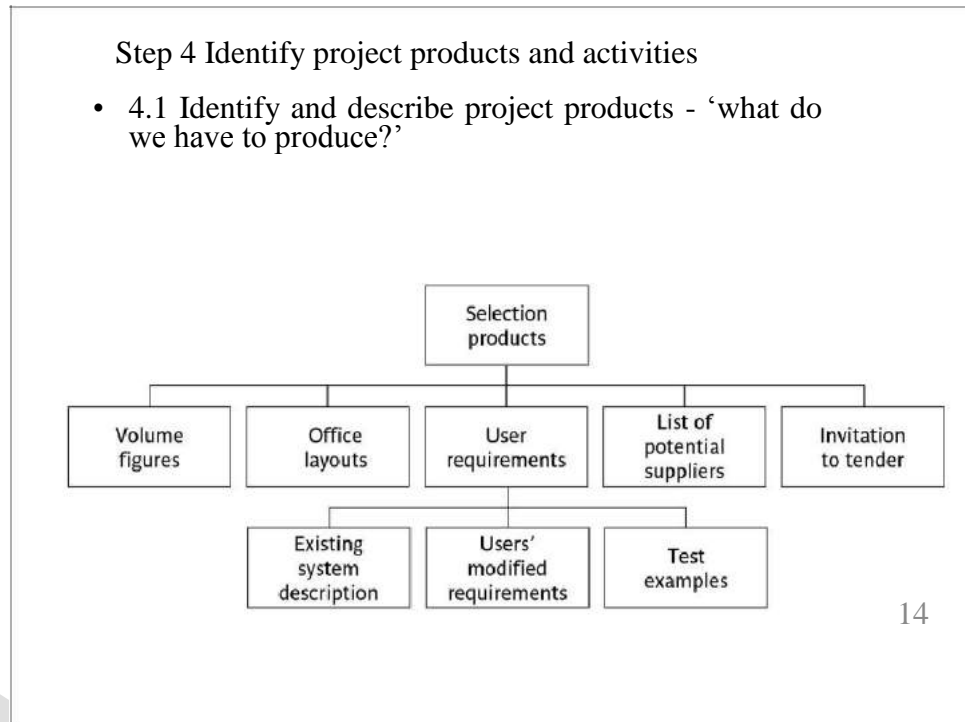**Step 3.2** : Analyze other project characteristics (including quality –based ones)

Step 3.3 : Identify high level project risks

Step 3.3 : Take into account user requirement concerning implementation.

Step 3.4 : Select development methodology and life cycle approach.

Step 3.5 : Review overall resources estimates

1.7 Stepwise Planning(step 4- step 5)

Step 4 Identify project products and activities

- 4.1 Identify and describe project products - 'what do we have to produce?'
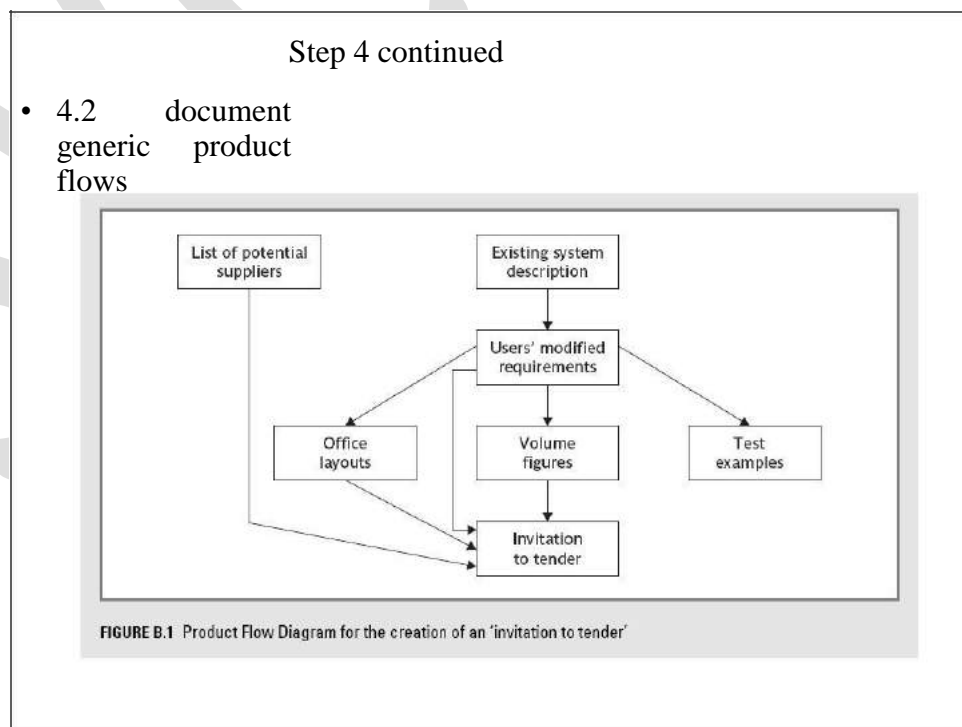

Products

- The result of an activity
- Could be (among other things)
    – physical thing ('installed pc'),
    – a document ('logical data structure')
    – a person ('trained user')
    – a new version of an old product ('updated software')
- The following are NOT normally products:
    – activities (e.g. 'training')
    – events (e.g. 'interviews completed')

-I

Product description (PD)

- Product identity
- Description - what is it?
- Derivation - what is it based on?
- Composition - what does it contain?
- Format

- Relevant standards
- Quality criteria

Create a PD for 'test data'

Step 4 continued

- 4.2 document generic product flows

FIGURE B.1 Product Flow Diagram for the creation of an 'invitation to tender'

Step 4.3 Recognize product instances

- The PBS and PFD will probably have identified generic products e.g. 'software modules'

- It might be possible to identify specific instances e.g. 'module A', 'module B' …

- But in many cases this will have to be left to later, more detailed, planning

4.4.   Produce ideal activity network

- Identify the activities needed to create each product in the PFD

- More than one activity might be needed to create a single product

- Hint: Identify activities by verb + noun but avoid 'produce…' (too vague)
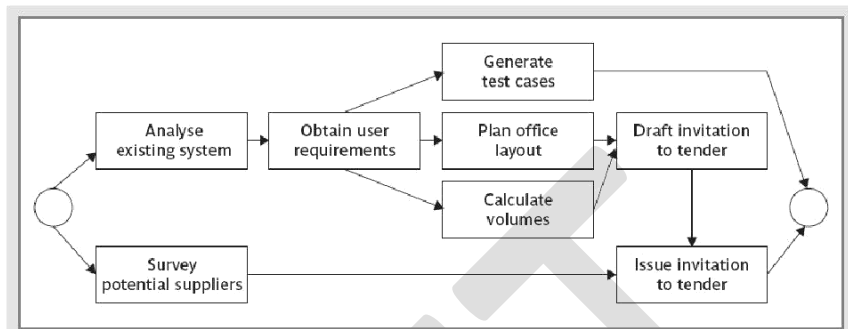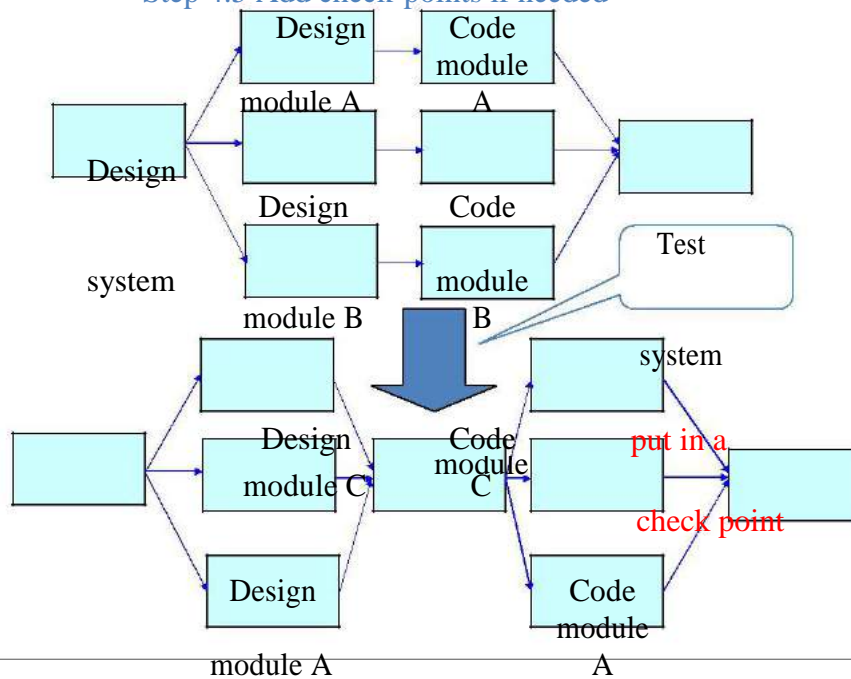
- Draw up activity network

An 'ideal' activity

FIGURE B.2 Brightmouth College payroll project activity network fragment

Step 4.5 Add check-points if needed

Design   Code
                                module
module C   C

Step 5:Estimate effort for each activity

- 5.1 Carry out bottom-up estimates
  - distinguish carefully between *effort* and *elapsed* time
- 5.2. Revise plan to create controllable activities
  - break up very long activities into a series of smaller ones
  - bundle up very short activities (create check lists?)

1.8 Stepwise Planning(step 6- step 10)

Step 6: Identify activity risks
- 6.1.Identify and quantify risks for activities
  - damage if risk occurs (measure in time lost or money)
  - likelihood if risk occurring
- 6.2. Plan risk reduction and contingency measures
  - risk reduction: activity to stop risk occurring
  - contingency: action if risk does occur
- 6.3 Adjust overall plans and estimates to take account of risks
  - e.g. add new activities which reduce risks associated with other activities e.g. training, pilot trials, information gathering

Step 7: Allocate resources

- 7.1 Identify and allocate resources to activities

- 7.2 Revise plans and estimates to take into account resource constraints
  - e.g. staff not being available until a later date
  - non-project activities

Week commencing	Gantt charts						

LT = lead tester
TA = testing assistant

MARCH   APRIL

Survey potential suppliers

Finance assistant

Analyse existing system

Business analyst

Obtain user requirements

Business analyst

Systems assistant

Generate test cases

Premises office

Plan office layouts

Systems assistant

Business analyst

Calculate volumes

Draft and issue ITT

12   19   26   2   9   16
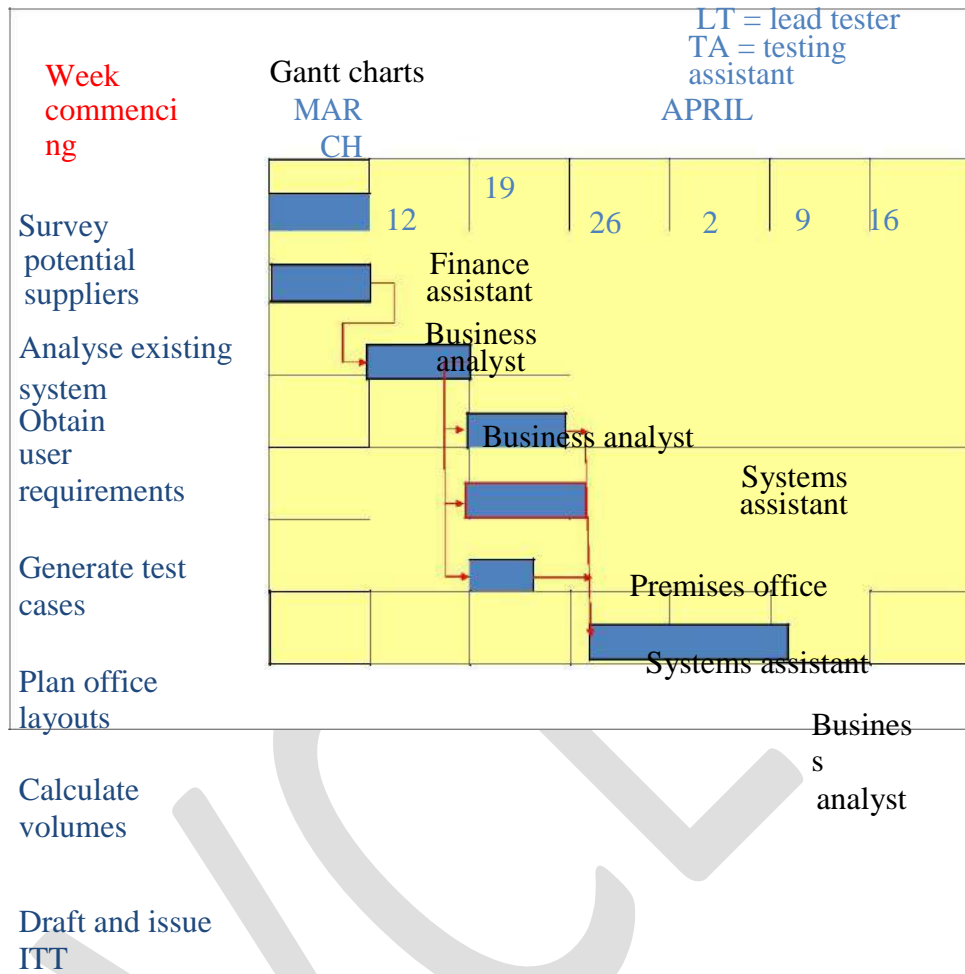
Step 8 : Review / Publicize plan

Step 8.1 : Review quality aspects of the project plan.

Step 8.2 : Document plans and obtain agreement.

Step 9 & 10 : Execute plan / lower level of planning

Once the project is underway, plans will need to be drawn up in greater detail for each activity as it becomes due. Detailed and lower level of planning of the the later stages will need to be delayed because more information will be available nearer the start of the stage.

Project planning is an iterative process. As the time approaches for the particular activities to be carried out they should be re-planned in more detail.

1.9 Activity Planning

1. **IDENTIFY THE ACTIVITY**:

   Can you answer the following questions on the activity?

   a. **What is the activity?** Can you give a brief description of what it is and what will be involved?

   b. **Who is the activity designed for?** Is it for a club, a class, the whole student body?

   c. **When is the activity planned for?** Do you have a target date to plan your other deadlines around?

   d. **How much will the activity cost?** Do you have money allotted for the activity? Is it enough, and can you get more if needed? Will there be a fee charged for this activity and is there a bookkeeping system to handle that account?

2. PLANNING THE ACTIVITY

Step 1: Getting the manpower—Assemble members of your committee through asking people you know you can depend on and who are willing to work, in addition to having ―sign ups‖ or ―recruiting‖.

Step 2: Getting the advisor—In many aspects of activity planning and following through, it is highly recommended that you seek an advisor, or an adult staff member who is willing to assist you in planning and supervising the follow through of your plans.

Step 3: How should we plan the activity?

a. **Brainstorm:** After getting your committee and advisor together, ―brainstorm‖ over every possible step that would be needed to plan the activity. As a guide, prior to brainstorming, remind the committee of the following guidelines:

1. No idea is stupid, so no criticism of any suggestion is allowed. 2. Let the ideas flow freely, let everyone complete their suggestion before moving on to the next one.

3. Keep going until every thought is exhausted.

b. **Weeding out ideas:** After looking at the completed list of ideas, go over each item SEPERATELY and OBJECTIVELY to see if it is an idea that is definitely valid and essential to your planning. If not, eliminate it from the list.

c. **Prioritize the items:** After looking at the ―slimmed down‖ list, asterisk (*) or underline those planning areas that would require MAJOR attention. Have the committee keep in mind that these areas may be the basis for the formation of ―sub-committees‖, or related task groups to be responsible for these MAJOR items.

d. **Chronological listing of the planning list:** After sorting out the ―major areas‖, have the group list the items in ―chronological order‖, or list what should be completed from first to last.

Assigning people to handle specific tasks: After agreeing to the organization of the planning of the activity, asking your committee members to handle the major areas identified by the group.

e. **Giving deadlines:** Since every task was listed chronologically, now you can assign DEADLINES, or target dates by which these steps should be completed. Make sure these dates are realistic.

PRIOR TO THE ACTIVITY (Would suggest a target date of a week to 10 days prior)

a. **Check up:** Make sure everyone has their areas of responsibility properly covered. If anything is not covered, find out why then make the proper

arrangements**.**

b. Activity day plan

1. **Diagram the facilities to be used:** Get an idea of the physical area that you will be using.
2. **List the major stations/areas of responsibility for the day of**

the activity: Review stations then check manpower assignments to make sure these areas are covered.

c. **Simulation/run through:** If possible, actually run through the activity in the facility to be used. For example, have the person assigned to handle registration for the activity actually practice having the ―check in‖ table go through the simulation of collecting money and stamping hands for a dance.

The main thing to stress here is that as a chairperson, you are to supervise or ―direct traffic‖. You cannot physically do everything so make sure that those assigned know their duties well enough so that you won‗t have to worry about anything except for handling emergencies.

4. DAY OF THE ACTIVITY
a. Brief run through

b. **Make the proper acknowledgements:** If you are emceeing the activity, take time to properly acknowledge your ―crew‖ for their work and efforts.

5. AFTER THE ACTIVITY

a. **S**end out your thank you notes/letters: This is the official acknowledgement of their efforts. Take the time even before the activity to prepare these notes or letters so that you can get them out immediately after the activity date.

b. **Evaluation:** Review and analyze your efforts and keep good records to help out the next person who will be responsible for this activity. Remember to list very specific recommendations.