## ✓ Object Modeling Technique

To design a software, obejct modeling technique (OMT) methodology is used, which combines the three views of modeling system.

### 1. Object Modeling

The first step is analyzing the requirements is to construct an object model. It describes real world object classes and their relationships to each other. Information for the object model comes from the problem statements, expert knowledge of the application domain and general knowledge of the real world. If the designer is not a domain expert, the information must be obtained from the application expert and checked against the model repeatedly. The object model diagrams promote communication between computer professionals and application domain experts.

The experts for object modeling are :

**(a) Identifying Associations :** Identify association between classes. Any dependency between two or more classes is an association. A reference from one class to another is an association. Associations often correspond to stative verbs or verb phases. These include physical location (next to, part of), directed actions (drives), communication (talks to), ownership (has, part of) or satisfaction of some kind (works for). Extract all the candidates from the problem statement and get them down on to the paper first, don't try to refine things too early.

Don't spend much time trying to distinguish between association and aggregation. Use which ever seems most natural at the time and moves on.

**(b) Keeping the Right Associations :** Discard unnecessary and incorrect associations using the following criteria :

(i) **Associations between Eliminated Classes :** If one of the cases in the associations has been eliminated, then the association must be eliminated or restated in terms of other classes.

(ii) **Irrelevant or Implementation Associations :** Eliminate any association that are outside the problem domain or deal with implementation constructs.

(iii) **Actions :** An association should describe a structural property of the application domain, not a transient event.

(iv) **Ternary Association :** Most association between three or more classes can be decomposed into binary associations or phrased as qualified associations. If a term ternary associations is purely descriptive and has no features of its own, then the term is link attribute on a binary association.

# 10 Chapter Software Project Management

## ✓ Introduction

Project management is a technique used by a manager to ensure successful completion of a project. It includes the following functions :

- Estimating resource requirements
- Scheduling tasks and events
- Providing training and site preparation
- Selecting qualified staff and supervising their work
- Monitoring the project's program
- Documenting
- Periodic evaluating
- Contingency planning

Managing projects also requires the following :

(1) Top management commitment for setting project priorities and allocating resources to approved projects.

(2) Active user participation to identify information needs, evaluate proposed improvements on a cost/benefit basis, provide committed resources, and be receptive to training when scheduled.

(3) A long range plan that includes general project priorities, objectives, schedules and required resources.

Software project management means some ideas about the planning, monitoring and control of software projects. The main objective of software project management is to enable a group of software professionals to work efficiently towards successful completion of a project. In the case of small development projects, one of the software professionals also assumes the responsibility of the project manager and big project generally have full time project managers.

Many of the techniques of general project management are applicable to software project management but Fred Brooks pointed out that the products of the software projects have certain properties that mark them different. One way of perceiving software project management is as the process of making visible that which is invisible.

Software project management is the collection of techniques used to develop and deliver various types of software products. This developing discipline traditionally includes technical issues such as the choice of software development methodology, how to estimate project size and schedule how to ensure

## ✔ Project Cost Estimates

On the basis of requirements of software, one can easily continue the approximate cost involved in the software. This estimation is also necessary before start of the development. On the basis of cost estimation we can check that company is in position to take up the project. To achieve the reliable cost and effort estimation, the following options are necessary.

(a) Estimates on the basis of similar projects that have already been completed.

(b) Use relatively simple decomposition techniques to generate the project cost and effort estimates.

(c) Use one or more empirical models for software cost and effort estimation.

A typical software project comprises of the following expenditure heads :

(a) Manpower Cost

(b) Hardware Cost

(c) Software Cost

(d) Travel Cost

(e) Training Cost

(f) Administration Cost

**(a) Manpower Cost :** For estimating manpower cost, it is normal practice to categorize the manpower into three to five categories and associate a monthly rate for each category. The rate should include only costs that are directly paid towards salaries, sub-contracting fees and related perquisites.

**(b) Hardware Costs :** Hardware costs will also have to be computed on a unit based a costing basis. Let us take a typical project which uses personal computer at front end workstations and a unix server at the back end. It is possible that a unix server is shared across many projects. The organization must work out unit costs for a month for each hardware item which can be utilized for each projects.

**(c) Software Costs :** Software costs are normally assigned on number of licenses or number of users using one license of the software. Again these are easy to determine once the environmental software is decided and the project team organization is finalized. The organization must have worked out a unit costs for every license of the software on a monthly basis. The unit cost for software normally includes depreciation, funding costs and annual maintenance charges.

**(d) Travel Cost :** Travel cost must be estimated based on the requirements for travel for the project. Typically, this could include cost of travel for review meetings, requirements specifications and clarifications, implementation etc. This must be done based on best available data at this stage.

**(e) Training Cost :** Training costs will include the cost of application, technical and geneal training which the project team members will have to undergo before they start working on the project. It could also include costs relating to travel for training, faculty charges and equipment charges for training. This again has to be estimated based on best available information.

**(f) Administration Cost :** Administration cost typically includes charges related to premises utilities i.e., Communication and Convergence costs. It could also involve the cost of corporate overheads. These costs are normally worked out in most organization on a per seat costs and the project is charged on the number of seats occupied by it.