Software Project Planning

Contents



* Need of Software Project Management
* Software Project Manager
* Software Cost Estimation
* COCOMO Model
* Staffing and Personnel Planning



* A Software Project is the complete methodology of programming advancement from requirement gathering to testing and support, completed by the execution procedures, in a specified period to achieve intended software product.

## Need of Software Project Management:

* Software development is a sort of all new streams in world business, and there's next to no involvement in structure programming items. Most programming items are customized to accommodate customer's necessities. The most significant is that the underlying technology changes and advances so generally and rapidly that experience of one element may not be connected to the other one. All such business and ecological imperatives bring risk in software development; hence, it is fundamental to manage software projects efficiently.

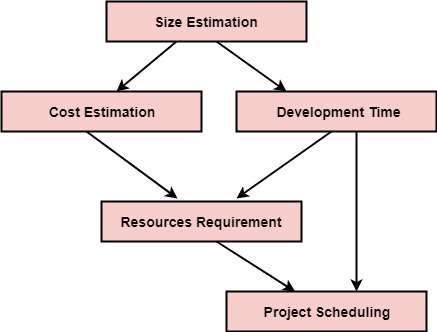
# Software Project Manager

Software manager is responsible for planning and scheduling project development. They manage the work to ensure that it is completed to the required standard. They monitor the progress to check that the event is on time and within budget. The project planning must incorporate the major issues like size & cost estimation scheduling, project monitoring, personnel selection evaluation & risk management. To plan a successful software project, we must understand:

* Scope of work to be completed
* Risk analysis
* The resources mandatory
* The project to be accomplished
* Record of being followed
* Software Project planning starts before technical work start.



* The various steps of planning activities are:



**Software Cost Estimation**

For any new software project, it is necessary to know how much it will cost to develop and how much development time will it take. These estimates are needed before development is initiated, but how is this done? Several estimation procedures have been developed and are having the following attributes in common.

* Project scope must be established in advanced.
* Software metrics are used as a support from which evaluation is

made.

* The project is broken into small PCs which are estimated individually.

To achieve true cost & schedule estimate, several option arise.

* Used symbol decomposition techniques to generate project cost and

schedule estimates.

* Acquire one or more automated estimation tools.

# COCOMO Model:Boehm proposed COCOMO (Constructive Cost Estimation Model) in 1981.COCOMO is one of the most generally used software estimation models in the world. COCOMO predicts the efforts and schedule of a software product based on the size of the software.

**The necessary steps in this model are:**

* Get an initial estimate of the development effort from evaluation of

thousands of delivered lines of source code (KDLOC).

* Determine a set of 15 multiplying factors from various attributes of the project.
* Calculate the effort estimate by multiplying the initial estimate with

all the multiplying factors i.e., multiply the values in step1 and step2.

* The initial estimate (also called nominal estimate) is determined by an equation of the form used in the static single variable models, using KDLOC as the measure of the size. To determine the initial effort Ei in person-months the equation used is of the type is shown below

**Ei=a\*(KDLOC)b**

* The value of the constant a and b are depends on the project type.
* **In COCOMO, projects are categorized into three types:**

Organic Semidetached Embedded

* **1.Organic:** A development project can be treated of the organic type, if the project deals with developing a well-understood application program, the size of the development team is reasonably small, and the team members are experienced in developing similar methods of projects. **Examples of this type of projects are simple business systems, simple inventory management systems, and data processing systems.**
* **2. Semidetached:** A development project can be treated with semidetached type if the development consists of a mixture of experienced and inexperienced staff. Team members may have finite experience in related systems but may be unfamiliar with some aspects of the order being developed. **Example of Semidetached system includes developing a new operating system (OS), a Database Management System (DBMS), and complex inventory management system.**



* **3. Embedded:** A development project is treated to be of an embedded type, if the software being developed is strongly coupled to complex hardware, or if the stringent regulations on the operational method exist. **For Example:** ATM, Air Traffic control.

For three product categories, Bohem provides a different set of expression to predict effort (in a unit of person month)and development time from the size of estimation in KLOC(Kilo Line of code) efforts estimation takes into account the productivity loss due to holidays, weekly off, coffee breaks, etc.

According to Boehm, software cost estimation should be done

through three stages:

Basic Model Intermediate Model Detailed Model

* **1. Basic COCOMO Model:** The basic COCOMO model provide an accurate size of the project parameters. The following expressions give the basic COCOMO estimation model:

**Effort=a1\*(KLOC) a2 PM Tdev=b1\*(efforts)b2 Months**

Where

**KLOC** is the estimated size of the software product indicate in Kilo Lines of Code, a1,a2,b1,b2 are constants for each group of software products,



**Tdev** is the estimated time to develop the software, expressed in months,

**Effort** is the total effort required to develop the software product, expressed in **person**

**months (PMs)**.

**Estimation of development effort**

For the three classes of software products, the formulas for estimating the effort based on the code size are shown below:

**Organic:** Effort = 2.4(KLOC) 1.05 PM

**Semi-detached:** Effort = 3.0(KLOC) 1.12 PM

**Embedded:** Effort = 3.6(KLOC) 1.20 PM

Estimation of development time

* For the three classes of software products, the formulas for estimating the development time based on the effort are given below:

**Organic:** Tdev = 2.5(Effort) 0.38 Months

**Semi-detached:** Tdev = 2.5(Effort) 0.35 Months

**Embedded:** Tdev = 2.5(Effort) 0.32 Months

.

2. Intermediate Model: The basic Cocomo model considers that the effort is only a function of the number of lines of code and some constants calculated according to the various software systems. The intermediate COCOMO model recognizes these facts and refines the initial estimates obtained through the basic COCOMO model by using a set of 15 cost drivers based on various attributes of software engineering.

Classification of Cost Drivers and their attributes:

**Product attributes -**

Required software reliability extent Size of the application database The complexity of the product

**Hardware attributes** -

Run-time performance constraints

Memory constraints

The volatility of the virtual machine environment

Required turnabout time



## Personnel attributes -

Analyst capability

Software engineering capability Applications experience

Virtual machine experience Programming language experience

## Project attributes -

Use of software tools

Application of software engineering methods

Required development schedule



* **3. Detailed COCOMO Model:**Detailed COCOMO incorporates all qualities of the standard version with an assessment of the cost drivers effect on each method of the software engineering process. The detailed model uses various effort multipliers for each cost driver property. In detailed cocomo, the whole software is differentiated into multiple modules, and then we apply COCOMO in various modules to estimate effort and then sum the effort.
* The Six phases of detailed COCOMO are:

Planning and requirements

System structure

Complete structure

Module code and test

Integration and test

Cost Constructive model

# Staffing and Personnel Planning



Personnel Planning deals with staffing. Staffing deals with the appoint personnel for the position that is identified by the organizational structure.

It involves:

1. Defining requirement for personnel
2. Recruiting (identifying, interviewing, and selecting candidates)

* Using the COCOMO model, average staff requirement for various phases can be calculated as the effort and schedule for each method are known.When the schedule and average staff level for every action are well- known, the overall personnel allocation for the project can be planned.
* This plan will indicate how many people will be required for different

activities at different times for the duration of the project.

|  |
| --- |
| Short answer type   1. What is the role of software project managers in software project planning. |
| 1. What is te concept of software cost estimation in project planning. |
| 1. What is the concept of semidetached and embedded project categories. |
| 1. What is the concept of organic and semi-detached project categories. |
| 1. How can you explain the importance of project planning in software Engineering. |
| 1. What is the use of the COCOMO Model in project planning. |
| Long answer type   1. Concept of basic, intermediate, and detailed COCOMO Model 2. Classification of cost drivers and their attributes of an intermediate COCOMO Model. 3. how the COCOMO model accounts for different project types and their characteristics. 4. Imagine you are the project manager for a software development team tasked with building a new inventory management system for a retail company. The project is expected to involve approximately 50,000 lines of code. Your team consists of 5 experienced developers and 3 junior developers, and you anticipate that the project will take about 6 months to complete. Using the COCOMO model calculate the effort and schedule of the project. 5. Imagine you are leading a team to develop a mobile application for a financial services company including features such as user authentication, transaction processing, and data analytics. The estimated size of the application is 30,000 lines of code (LOC). The team consists of 4 senior developers and 2 mid-level developers. The project is expected to have a relatively tight deadline of 4 months due to market competition. Calculate the effort and schedule using COCOMO Model. |

THANK-YOU