

MODULE-3

Planning

- The s/w project mgmt process begins with set of activities called project planning

Basic Process of Project Planning

- s/w planning :- Specify in-scope req. for project to facilitate creating work break down structure
- Preparatⁿ of Work Breakdown Structure :- Breakdown the project into tasks & sub-tasks
- Project Schedule Development :- Listing entire schedule of activities & seq. of implementatⁿ.
- Resource Planning :- It specifies who will do what, at which time & any special skill needed.
- Budget Planning :- It specifies cost to be incurred at time of completⁿ of project.
- Procurement Planning :- It focuses on vendors outside company & sub-contracting
- Risk mgmt
- Quality planning
- Comm. "

Project Estimatiⁿ

- Following project attributes are estimated
- Cost :- How much it is going to cost to develop the s/w product?
- Effort :- " " effort would be necessary to develop the " ?
- Duration :- " long it is going to take to develop the product?

- Quality of project plan depends on accuracy of estimates
- Parameters:-
 - Project size
 - Effort required to complete the project
 - Project duration
 - Cost
- 3 techniques:
 - (i) Empirical Estimation techniques
 - (ii) Heuristic techniques
 - (iii) Analytical estimation techniques
- Cost Estimation Models
 - Broadly classified into 2:
 - (i) Algorithmic Models
 - Estimation is done with mathematical equations, based on historical data or theory.
 - 3 models are:
 - (a) COCOMO → Constructive Cost Model
 - (b) " II
 - (c) S/W equation
 - (ii) Non-Algorithmic Models
 - Estimation depends on previous experience of project managers
- COCOMO Model
 - It is used to estimate size, effort & duration based on cost of S/W
 - Size is measured in thousands of delivered lines of code (KLOC)

- It divides projects into 3 categories based on cost:

(i) Organic (2-50 KLOC)

(ii) Semi-detached (50-300 KLOC)

(iii) Embedded (Over 300 KLOC)

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- It is based on hierarchy of 3 models:

(i) Basic model

(ii) Intermediate "

(iii) Advance " (Detailed)

- Basic Model

$$E = a_b (KLOC)^{b_b}$$

$$D = c_b (E)^{d_b}$$

where $E \rightarrow$ Effort applied in Person-Months & $D \rightarrow$ development time in months.

S/N Project	a_b	b_b	c_b	d_b
Organic	2.4	1.05	2.5	0.38
Semidetached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

- ① A project of 200 KLOC is to be developed. S/N development team has avg. exp. in similar type of projects. The project schedule is not very tight. Calculate the effort, development time.

ans. $KLOC = 200 \Rightarrow$ Semidetached $\Rightarrow a_b = 3.0, b_b = 1.12, c_b = 2.5, d_b = 0.35$

Effort, $E = a_b (KLOC)^{b_b} = 3.0 (200)^{1.12} = 1133.12$ PM

$$\text{Development time, } D = c_b (E)^{d_b} = 2.5 (1133.12)^{0.35} \\ = \underline{\underline{29.305 \text{ months}}}$$

$$\text{Avg. Staff size, } (SS) = \frac{E}{D} \\ = \frac{1133.12}{29.3} = \underline{\underline{38.67 \text{ Persons}}}$$

$$\text{Productivity, } (P) = \frac{KLOC}{E} = \frac{200}{1133.12} = \underline{\underline{0.176 \text{ KLOC / PM}}}$$

② An ATC project of size 500 KLOC. Find E, D, SS, P.

ans 500 KLOC \Rightarrow Embedded $\Rightarrow a_b = 3.6, b_b = 1.20, c_b = 2.5, d_b = 0.32$

$$E = a_b (KLOC)^{b_b} = 3.6 (500)^{1.20} = \underline{\underline{6238.30 \text{ PM}}}$$

$$D = c_b (E)^{d_b} = 2.5 (6238.30)^{0.32} = \underline{\underline{152.30 \text{ months}}}$$

$$SS = \frac{E}{D} = \frac{6238.30}{152.30} = \underline{\underline{41 \text{ Persons}}}$$

$$P = \frac{KLOC}{E} = \frac{500}{6238.30} = \underline{\underline{0.080 \text{ KLOC / PM}}}$$

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• Intermediate Model

\rightarrow Here, parameters like s/w reliability & s/w complexity are also considered along with size, while estimating effort.

\rightarrow Total effort = EAF \times Ei EAF \rightarrow Effort Adjustment Factor

\rightarrow To estimate total effort, a no. of steps are followed:

(i) Calculate an initial estimate of development effort

(ii) Identify a set of 15 parameters, which are derived from attributes of current project (cost drivers)

(iii) Adjust the estimate of development effort

$$E_i = A \times (\text{size})^B \times PM$$

EAF = Product of multiplying factors

Project	A	B
Organic	3.2	1.05
Semi-detached	3.0	1.12
Embedded	2.8	1.20