Test model

① Effort = function of size

② size = functon of feature

③ Defects = function of size & schedule

④ schedule = function of effort and Resource

Algorithmatic model

① Effort = schedule * Resource

② Effort = A * (size of program)^{B} + C

A, B, C = Emphirical derived constant

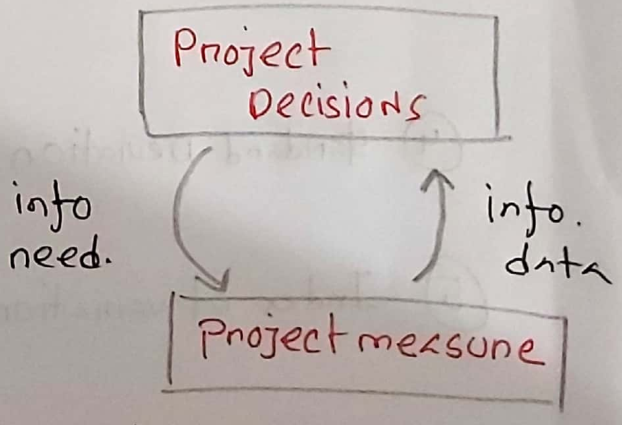
Goal
Question
Metric

Decision
maker
model

① Goal?

② Question characteristic?

③ Metrics?



Tester, Quality

central Tendency

1. mean $= \dfrac{\text{sum of all occurence}}{\text{No of occurence}} = \bar{X}$

2. median = middle occurence in ordered set

3. mode = most Frequent occurence

Variability

1. Range = Highest - lowest

2. Deviation of module $= |x_i - \bar{x}|$ ith module

3. Variance $= \dfrac{\sum(\text{Deviation of module})^2}{N}$

$$V = \frac{\sum(|x_i - \bar{x}|)^2}{N} \qquad i = 1, 2, \cdots N$$

4. Standard Deviation, SD $= \sqrt{\text{Variance}}$

5. Index of variation, ID $= \dfrac{SD}{\text{mean}}$

Find UFP

Input complexity = No of Input * FP Value based on (Simple)/(Avenage)/(complex

Output complexity = No of output * "

Data file complexity = No of Data files * "

$\therefore$ UFP = Σ all complexity Rating

= (Input + output + Data file) complexity

Find VAF

VAF = Σ(rating of ith General system characteristioc)

rating = 0 – 5

i = 1, 2, ... 14

DC = Data complexity Rating
PC = Program complexity Rating

Find AFPs

(i) $AFPs = UFPs * (0.65 + 0.01 * VAF)$

(ii) $AFPs = UFPs * (0.4 + 0.1 * (DC + PC))$

(iii) $AFPs = \text{Factors complexity} * UFPs$

LOC = NON. commented lines

= AFPs * Gearing factor

Productivity Guide line of Jones

(i) Schedule (calender month) $= FP^{0.4}$

(ii) Staff $= \dfrac{FP}{150}$

(iii) Effort (staff month) = staff * schedule

$$= \frac{FP}{150} * FP^{0.4}$$

① cyclomatic complexity , $CC = E - N + 2$

CC

if/else/for/switch/while

, $CC = \underline{\text{Binary decisions}} + 1$

② Essential CC = cyclomatic complexity after $\boxed{\text{removing structural constraints}}$

ECC

(while, if, else, switch, repeat, sequence)

③ Halsted metric :-

Length, $N = N_1 + N_2$

distinct no of operators

distinct no of operand

vocabulary $n = \boxed{n_1} + \boxed{n_2}$

Volume $V = N \log_2(n)$

Diffculty $D = (n_1/2) * (N_2/n_2)$

Effort , $E = V * D$

N_1 : Total operator

N_2 : Total operand

④ Information Flow metric :-

$IFC = (\boxed{\text{fanin}} * \text{fanout})^2$

fanin: No of flow in + no of data structure read

weighted $IFC = \text{Length} * (\text{fan in} * \boxed{\text{fanout}})^2$

fanout: no of flow out + no of data structure written

Length = LOC (without comment)

④ Maintainability Index

$$MI = 171 - 5.2\ln(a\overset{\text{volume}}{V}) - 0.23\, a\overset{\text{cyclomatic comeplexity}}{V(g')} - 16.2\ln(a\underset{\text{Lines of code}}{LOC})$$

$$+50\sin(2.4\, \underset{\text{comment per Module}}{\text{perCM}})^{\frac{1}{2}}$$

⑤ Agnesti Cand Glass : compexity Metric

$$C_t = \underbrace{S(t)}_{\text{structural complexity}} + \overbrace{D_t}^{\text{Data Module complexity}}$$

$$S_t = \Sigma\,(\underbrace{f(i)}_{\text{fanout of module i}})^2$$

$$D_t = \Sigma\,\frac{D_i}{N}$$

$$D_i = \frac{V(i)}{f(i)+1}$$

$$\underset{\text{Relative system complexity}}{\underset{\downarrow}{RSC}} = \frac{S_t}{N} + \frac{D_t}{N}$$

n = no of modules

CDF ,

commalitue distnibuted function , $F(t) = K\,(1-e^{-(t/c)^{2}})$

PDF

Pnobability distnibuted function, $f(t) = K\left(2(t/c^{2})\right)\left(e^{-(t/c)^{2}}\right)$

$\therefore\ c = \sqrt{2}\,t_m$

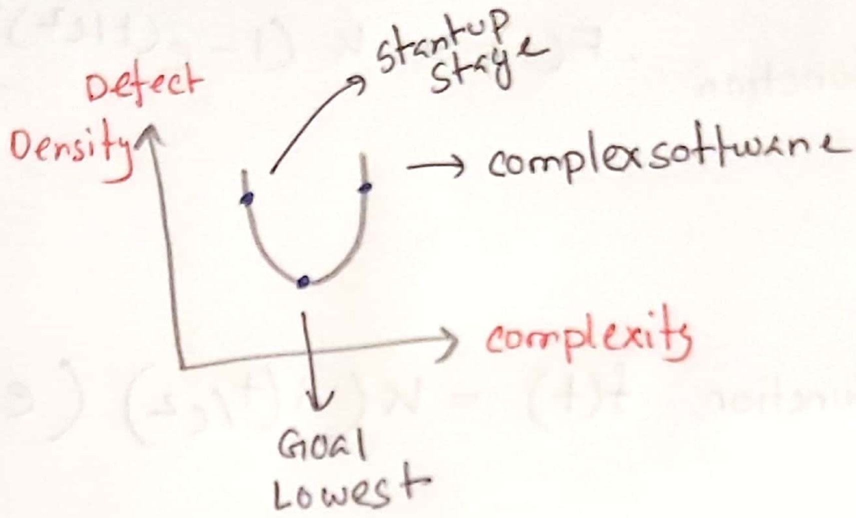
$\therefore\ t_m$ = is the time whene $f(t)$ is above 40%.

$\therefore\ K =$ Total No of defects in t_m $\therefore \times \left(\frac{100}{40}\right)$

(3) Detect Removal Efficency , DRE = $\dfrac{E}{\underbrace{E+D}_{\text{Total no defects befone and aften delivery}}}$

E → No of defects found befone delivery to end usen

Relationship between Defect Density and complexity


Defect Density
startup stage
→ complexsoftware
complexity
Goal
Lowest