1 Establishing project foundation

Project Scope Management

How to asses project scope?

Use Ratio (%) as an indicator $\frac{\sum_{f \in Feature} effort(f)}{RxT}$

Project scope $\leq$ 100% is acceptable: Budget for a project:

$Cost = \sum_{f \in B} \times salary(+overhead)$

2 Estimation techniques

Estimation by Analogy

Multiplication factor (subsystem)= (number of elements in new)/(number of elements in old)

Size (new subsystem) = Size (old subsystem) $\times$ Multiplication factor

Size (New project) = sum of the sizes of its subsystems

Size Ratio = Size(New Project)/Size (Old Project)

Estimated Effort (New Project) = Effort (Old Project) $\times$ Size Ratio

Expert judgment / Delphi estimation

ExpectedCase = [BestCase + (4 $\times$ MostLikelyCase) + WorstCase] / 6

2.1 COSMIC FSM Standard

FP Size = Sum(Ne) + Sum(Nx) + Sum(Nr) + Sum(Mw)

Where:

Ne = number of Entries

Nx = number of Exits

Nr = number of Reads

Mw = number of Writes

- there is no upper limit to the functional size of the functional requirements
- Min size: 2 CFP

2.2 Function Points

The simplest way to calculate a function point count is calculated as follows:

(No. of external inputs$\times$ 4) + (No. of external outputs$\times$ 5) + (No. of logical internal files$\times$ 10) + (No. of external interface files$\times$ 7) + (No. of external enquiries$\times$ 4)

2.3 Calculation of Functional Size of Changes to the FURs

$Size_{Cfsu}(Change) = Sum_{size}(added\_data\_movement_i) + Sum_{size}(changed\_data\_movement_i) + Sum_{size}(deleted\_data\_movement_i)$

2.4 GSC function points extension

The analyst/software engineer assigns a value between 0 and 5 to each question

- 0 = not applicable and 5 = essential The Value-Adjustment Factor (VAF) is then calculated as:

$VAF = 0.65 + 0.01 \sum_{i=1}^{14} Ci$ You then adjust the original function point count as follows: $FP = FCxVAF$

3 OO Measurement

3.1 LCOM Chidamber & Kemerer

Chidamber and Kemerer define Lack of Cohesion in Methods as the number of pairs of methods in a class that don't have at least one field in common P minus the number of pairs of methods in the class that do share at least one field Q. When this value is negative, the metric value is set to 0.

LCOM = $|P| - |Q|$, if $|P| > |Q|$; 0 otherwise.

3.2 LCOM Henderson-Sellers

Let m be the number of methods in a class.

- Let a be the number of instance variables in the class.
- Let $p(A_i)$ be the number of methods that access instance variable A_i .

$LCOM = \frac{m - \frac{\sum_{i=1}^{a} p(A_i)}{a}}{m-1}$

4 Project planning techniques

4.1 CPM

Float = LF - Duration - ES

where LF=latest finish time, ES= earliest time at which the activity can start.

The maximum possible duration is given by LF - ES.

5 Measuring and controlling work processes

5.1 Performance indicators

Cost Variance (CV): EV - AC

Schedule Variance (SV): = EV - PV

Cost Performance Index (CPI): EV / AC

Schedule Performance Index (SPI): EV / PV

where EV=earned Value, PV=planned value, and AC=actual cost

5.2 More performance indicators

Budget at completion (BAC)

$BAC = \sum_{PVk} \ for\ all\ tasks\ k$ Percent scheduled for completion = $\frac{PV(project)}{BAC}$

Percent complete = $\frac{EV}{BAC}$

Estimate at completion (EAC)= $\frac{BAC}{CPI}$

Estimate to complete (ETC)=$EAC - AC$

6 Managing Project Risk

6.1 Quantitative assessment

Risk Exposure (RE)=$Risk - Probability \times Risk - impact$

Risk Reduction Leverage = $\frac{(risk\ exp.\ RE\ before) - (risk\ exp.\ RE\ after)}{cost\ of\ reduction}$

6.2 Decision tree analysis

To determine total impact use se the Risk Exposure for each branch of the decision tree

$EMV = P \times i$