

Chapter 6 - Estimation techniques

Effort: Productive time only (strip out meetings and lunch. This would give around 12-15hw) *Measured in staffmonth*

why do we estimate in life: To have a high level of confidence that we are going to be able to deliver an acceptable product with a set of parameters and constraints (time, budget, number of employees, technology,...) Can help for **planning and control**

The project manager is the one estimating

Fundamentals of estimation

- use historical data to base your estimations with your current requirements (adjust base on differences). The adjustment factor can factor in constraint, technology debt, time constraints, complexity, ...
- Base the estimates on assumptions and constraints
- Reestimate periodically as a project change

!! when estimating, it is better to give a generous range than a super precise point. The estimation will most likely fit in the range, but not the precise estimation

!! when estimating, estimate small task instead of the whole project. The errors on every task will correct according to the law of big numbers

Two types of estimating methods:

- **Experience-based**
 - **Estimation by analogy:** estimate a new project by analyzing past projects that are similar. Find a size ratio (new/old) using the number of systems and subsystems. Use the old values * ratio to estimate the values of the new project. This could be used for size, effort, ...
 - **Expert estimation:**
 - **Delphi:** Multiple experts are asked to do an estimation. They all submit their report. Once we have everything, we make an anonymous document combining all of them. We ask them to read it and redo the estimation. After 3 of 4 rounds, the estimation will stabilize.
 - **PERT:** estimate the best and worst case of every task then do (Best case + median case * 4 + Worst case) / 6

- **Parametric estimation:** use mathematical equations and parameters from local circumstances to define the level of effort.
 - Ex: $E = a * SIZE^b + c$
 - Small project $E = a * SIZE + c$
 - Large project $E = a * SIZE^b$

Cocomo is a family of estimation models. Take into account cost driver (adjustment factor) that are called effort multipliers. You need to do $a * SIZE^b * \text{all the effort multipliers}$

Cocomo accounts for personal, hardware, software and project characteristics and reuse factor.

Size estimation

why is size estimation important. Because it has a strong link to effort and duration. It can be measure objectively.

We don't use line of code as we don't want to make line = effort. it's hard to evaluate requirement change solely on line count.

Function point: Input, output, interfaces, queries and files. Add them all up and multiply by adjustment factor

Cosmic: Cosmic function point. It is the sum of **E**ntry, e**X**it, **R**ead and **W**rite