Learning Journal

Student Name: Manpreet Singh Rana (40227463)

Course: Software Project Management (SOEN 6841)

Journal URL: https://github.com/msrana25/SOEN-6841-Journals

Week 2: Jan 28 - Feb 3

Date: Jan 29-30, 2024

Key Concepts Learned:

New Terminologies
Multiplication Factor: - Ratio of number of elements in the new subsystem to number of elements in old subsystem.
Size (new subsystem): - Size of old subsystem * Multiplication factor
Size (new project): - Sum of sizes of all subsystems.
Size ratio: - It is the ratio of size of new project to size of old project.
Counting Boundary: - It is the border between the application or project being measured and external applications or the user domain. It establishes which functions are included in function point count.
Value Adjustment Factor: - It is product of total degree of influence * 0.01 + 0.65.

Main concepts.
Estimation techniques include experience-based techniques and algorithmic cost modeling. Both cases need the use of judgement to estimate the effort or project and product characteristics. Effort estimate techniques are not foolproof and need to be revised as the project progresses. Generally, the estimate uncertainty decreases as we advance further in the project.

Experience based Approaches:-
Estimation by Analogy This technique estimates new projects by comparing them to similar past projects. It uses analogies to determine size measure.
Below is the step-by-step guide for estimate by analogy :-
Step 1: Get detailed size results for similar past projects. This includes finding the subsystems, number of elements in subsystem and scoping the new system.
Step 2: Compare the size of new project to a similar past project using multiplication factor for each subsystem between old and new project.
Step 3: Build the estimate for the new project by adding up the size of all the new subsystems.
Step 4: Create an effort based on the size of the new project. This can be calculated using the product of old project effort and size ratio.

Estimation by Expert Judgement

1. ***Function Point Analysis*** – It measures software by quantifying the functionality software provides to user based on logical design. This means that it measures software development and maintenance independently of technology used for implementation.
Below is step by step guide for FPA:-
Step1: Calculate the counting boundary.
Step2: Determining the Unadjusted Function Point (UFP)
Step3: Assessing the environment and processing complexity of project or application as whole. This step also includes impact of 14 general characteristics on a scale from 0 to 5 in terms of their likely impact on project. Overall, Function Point is UFP x VAF.

2**. DELPHI** - Team Effort Estimate for a project
In DELPHI, the project is divided into pieces and each team member estimates the pieces. The estimates are compared and the difference between individual results is discussed. The estimates are averaged, and a consensus estimate E is decided which whole of the group agrees upon.
At the beginning of the project range is +- 25% of E. With the advancement of project, this reduces to +- 15%.

Algorithmic Modelling:-
Algorithmic Modelling calculates effort using the formula.
Effort = A * $Size^B$ * M
Where A is organization dependent, B represents disproportionate effort for large size projects, and M is a multiplier reflecting product, process and people attributes.

COCOMO Cost Modelling:
An empirical model based on project experience.
COCOMO II models include a range of sub models that produce detailed software.
Person months are calculated as:
p-m = A * $(Size)^{sf}$ * em_1 * em_2 * em_3 *.....
A is constant (2.94), size is measured in KDSI, sf is exponent scale factor and em are effort multipliers.
sf = B + 0.01 * $\sum(exponent\ driver\ ratings)$. B has constant value of 0.91.

Application in Real Projects:

Need for Effort and Cost Estimation

Resource Allocation: Effort and cost estimation help in planning and allocating resources effectively. This includes determining the number of team members needed, their skills, and the necessary equipment and infrastructure. Accurate estimation ensures that the right resources are available at the right time.
Budget Planning: Estimation is essential for budgeting purposes. It allows organizations to forecast the financial resources required for the project, including salaries, software licenses, hardware, and other expenses. A well-defined budget ensures that the project stays financially viable.
Project Scheduling: Accurate estimation is fundamental for creating realistic project schedules. Project managers use estimates to set achievable deadlines, identify critical paths, and sequence

project activities. This helps in maintaining a structured and efficient timeline for project completion.
Risk Management: Estimation provides insights into potential risks associated with the project. By identifying uncertainties early on, project teams can develop risk mitigation strategies and contingency plans. This proactive approach helps in minimizing the impact of unexpected challenges.
Stakeholder Communication and Expectation Management: Effort and cost estimates serve as a basis for communicating with stakeholders, including clients and management. Transparent communication based on realistic estimates helps manage expectations regarding project delivery timelines and costs, reducing the likelihood of misunderstandings or dissatisfaction.

Challenges in Experience Based Approaches
Irrelevancy: The biggest issue is that new software projects may not have much in common with previous projects. For instance, Machine Learning and LLM's are now used extensively in software projects whereas they were in very limited use few years back.
Subjectivity and Bias: Experience-based approaches are susceptible to individual biases and subjectivity. Estimations are influenced by the personal experiences, perspectives, and cognitive biases of the individuals providing them, leading to potential inaccuracies.
Variability Across Experts: Different experts may have varying levels of experience, knowledge, and judgment. This variability among experts can result in divergent estimations, making it challenging to achieve a consensus or a reliable average estimate.

Challenges in Algorithmic Modelling
Complexity: These models are complex and difficult to use.
Uncertainty: There are many attributes and scope for uncertainty in estimating their values.
Applicability: It is limited to relatively small number of large companies working in defense and aerospace industry.

Peer Interactions:
In our peer discussion, we explored various terminologies like the Multiplication Factor, size of project in software project management. We shared insights on the challenges and benefits of various estimation techniques, from experience-based approaches to algorithmic models like COCOMO. Real-world applications, especially in resource allocation were discussed, along with the limitations of these methods. The conversation highlighted the need for continuous improvement in effort estimation processes.

Challenges Faced:
The biggest challenge was mathematical implementation of these models. I also encountered difficulties how multiplication factors were derived in UFP.

Personal development activities:
Went through various GitHub repositories like EstimatorX to check the working of various project estimator applications.

Goals for the Next Week:
Next phases of software project management namely risk management and configuration management