Learning Journal – Week 2

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Course: Software Project Management

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Dates Rage of activities: 23rd January 2025 – 29th January 2025

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Key Concepts Learned:

This week, I explored effort estimation, cost estimation, and risk management, which are essential in planning and executing software projects. Highlights included the following:

- **Effort Estimation & Its Importance:** I learned how estimating effort correctly helps in resource planning, budgeting, and setting realistic deadlines. Underestimation can lead to project failure, while overestimation wastes resources.
- **Effort Estimation Techniques:** Different scenarios require different approach of effort estimation, which helps us in choosing the right technique.
    - **Estimation by Analogy:** Compares effort with similar past projects by analyzing the number of elements and their complexity. This technique involves 4 steps:
      Step 1: Gathering the results of a similar previous project.
      Step 2: Finding the multiplication factor:
      MF = No. of Elements in new project / No. of Elements in old project
      Step 3: Calculate the size of the project:
      Size of new sub system = sub system * MF
      Size of the new project = sum of the above sizes of sub systems
      Step 4: Size ratio: size of the new project / Size of the old project.
      Estimated Effort = Effort of old project * size ratio.
    - **Estimation by Expert judgement:**
        - **Function Point Analysis (FPA):** Measures software functionality rather than code size, making it technology independent.
            - **Establishing boundary:** This is done by identifying the scope of the project and required external integrations.
            - **Calculation of UFP:** The unadjusted Function Points are calculated based on evaluating the 6 Function Count types.
            - **Calculating VAF:** The value adjustment factor is calculated by choosing the 14 most important characteristics of the project.
            - **FP:** The final FP is the product of UFP and VAF.
        - **Wide Band Delphi Method:** This is another method of Effort Estimation where each team member's opinion is mattered to refine effort estimates. I found this method interesting because it reduces individual bias.
        - **Cost Estimation:** Cost estimation is done using a mathematical function which relies on the product, project and process attributes:

    - **Algorithmic Cost Modelling:** Effort = A * Size^{B} * M.
    - **COCOMO Cost Modelling:** A mathematical model to estimate effort based on project size. **COCOMO 2** is now being used as it is an advanced and improved version of COCOMO that considers different stages of software development and adjusts estimates accordingly.
- **Risk Management & Its Importance:** Risks can be related to technology failures, budget overruns, schedule delays, resource shortages, or legal compliance. Understanding risks early helps in preventing major project failures.
- **Risk Identification & Assessment:** Assign risks a Low, Medium, or High impact rating. It uses probability calculations to assess financial and operational impact.
- **Risk Response Strategies:**
    - **Avoidance:** Eliminating risks by modifying the project plan.
    - **Mitigation:** Reducing the risk's probability or impact (e.g., adding extra testing)
    - **Transference:** Passing the risk to another party.
    - **Acceptance:** Acknowledging a risk without taking preventive action.
- **Risk Control Strategies:** Using schedule buffers, quality gates, and knowledge management systems to reduce project uncertainties.

Application in Real Projects:

- The learned concepts can be applied to our project Intelligent Tutoring System (ITS), the **Wide Band Delphi** technique for initial effort estimation and **COCOMO II model for** Cost Estimation to determine budget feasibility.
- In my group project, I identified major risks such as unclear requirements, dependency on external APIs, and team availability conflicts.

Peer Interactions:

- I collaborated with my peers on discussing whether FPA or COCOMO II would be a better estimation approach. Some suggested FPA for measuring modular functionalities, while others believed COCOMO II would be more suitable for effort and cost estimation.
- We discussed whether technology risks (e.g., AI model failures) or resource risks (e.g., team availability) pose a bigger threat.

Challenges Faced:

- While discussing about project, I realized that estimating effort is difficult when project requirements are not fully defined. To overcome this, I planned to first finalize core functionalities before applying estimation techniques.

Personal development activities:

- I reviewed open source ITS platforms to understand how their development effort was estimated.
- I experimented with JIRA's effort estimation and risk-tracking features to see how professional teams handle estimation in Agile workflows.

Goals for the Next Week:

- Analyze real-world project failures to see how poor risk management led to costly mistakes.
- Finalize our approach for effort estimation in the ITS project.
- Focus on time management to ensure better tracking of progress within our team.