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Key Concepts Learned:

- Estimation
  Algorithmic Estimation
  COCOMO: Uses mathematical formulas based on project size (LOC) and industry averages.
  Empirical Estimation - Function Point Analysis (FPA): Uses historical data to adjust estimates based on past project productivity.
  Expert Judgment-Based Estimation
  Wideband Delphi: Relies on expert opinions and team discussions to generate rough estimates.
  No Data Available: If no information about current or past projects exists, effort estimation cannot be performed.
- Major types of risks: Resource, Technology, Budget, Quality and Time
- Risks have a "repel effect". E.g. quality doesn't meet standard (quality risk) at design step, this requires rework which leads to project schedule overrun risk. Similarly, a lot of bugs were found in testing (quality risk). This can overshoot the budgeted time. Another eg. team member gets sick.
- Each information is associated with a tag for identification
- Some common tags are: Project name, year and timestamp, document name, document number, author, activity identifier, document type and version number.
- best practices: Centralized configuration management system, secured access mechanism with role-based access control, Continuous integration of software build with smoke test facility, Easy branching mechanism to branch out an entire software version and Audit facility.
- Project scheduling starts with breaking the project into small tasks (**WBS**). In **Top-Down Planning**, the total project duration is set first, then divided among tasks. In **Bottom-Up Planning**, task durations are estimated first and summed up for the overall timeline.
- The critical path is determined by adding the times for the activities in each sequence and ***determining the longest path*** in the project.
- *Milestones* are the end-point of a process activity.
- *Deliverables* are project results delivered to customers.
- Graphical notations illustrate project schedules by breaking them into tasks, which should typically take one to two weeks. **Bar charts** (calendar-based) represent activities or resources over time, while **activity networks** highlight task dependencies.

Application in Real Projects:

1. Algorithmic Estimation: COCOMO

The Constructive Cost Model (COCOMO) is widely used for estimating software project costs. For instance, in a case study involving a transaction processing system, COCOMO was applied to estimate effort and schedule. The project involved developing a client-server system to process user transactions

across a network. By analyzing factors such as system size and complexity, the model provided estimates that guided resource allocation and timeline planning.

2. Empirical Estimation: Function Point Analysis (FPA)

Function Point Analysis measures software size by quantifying its functionality. In a practical example, FPA was used to estimate the effort required for developing an academic information system. The analysis involved calculating function points based on user inputs, outputs, inquiries, internal files, and external interfaces. This approach provided a standardized measure of software size, facilitating accurate effort estimation and project planning.

3. Expert Judgment-Based Estimation: Wideband Delphi

The Wideband Delphi technique relies on expert consensus for estimation. In a software development project for a financial institution, this method was employed to estimate the effort for implementing a new online banking feature. A panel of experts participated in multiple rounds of anonymous estimation, discussing and refining their inputs until a consensus was reached. This collaborative approach leveraged collective expertise to produce reliable estimates, accommodating uncertainties inherent in innovative projects.

Peer Interactions:

Discussions with peers helped clarify different estimation techniques and when to use each. Sharing real-world project experiences provided insights into risk management strategies. Group brainstorming during Wideband Delphi estimation exercises demonstrated the importance of expert judgment in project planning.

Challenges Faced:

- Understanding the **mathematical models** behind COCOMO and FPA took extra effort.
- Differentiating **Top-Down vs. Bottom-Up Planning** in practical scenarios required deeper analysis.
- Managing **risk dependencies** and their "ripple effect" was complex in theoretical case studies.
- Identifying **critical paths** in project scheduling required practice with different project structures.

Personal development activities:

- Reviewed case studies on successful project estimations and scheduling.
- Practiced identifying risks and mitigation strategies in hypothetical project scenarios.
- Explored project management software to understand **bar chart and activity network** representations.
- Engaged in discussions to strengthen problem-solving and analytical skills.

Goals for the Next Week:

- Prepare for the Project Pitch