CS 430 - Lecture 22 - Planning and Estimation III - Project Management

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Outline

1. Components of a SPMP
2. SPMP Framework
3. IEEE SPMP
4. Planning Testing
5. Planning OO Projects
6. Training Requirements
7. Documentation Standards
8. CASE Tools for Planning and Estimating
9. Testing the SPMP

Three main components

1. the work to be done
   1. **project functions** continue throughout the project, not related to any workflow (e.g. project management).
   2. **activities/tasks** are related to a particular workflow.
      1. **Activities:** major units of work.
      2. **Tasks:** minor units of work.

Three main components
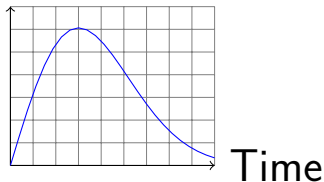
2. the resources with which to do the work, e.g.
   1. people
   2. hardware
   3. software

   Include the timing of when those resources should be consumed.

Three main components

This is a summarized Figure 9.8 from the text. It is a Raleigh curve, showing typical resource consumption with respect to time.

Resource consumption

Time

While this is cute, it will **not** appear on the final exam. In my experience, I have never seen the Raleigh distribution used in reality.

Three main components

3. money to pay for it all
   1. Detail the money to be spent, and when it will be spent.

SPMP Framework

1. SPMPs come in many forms. Each organization has a template that it prefers to use (level of detail depends on the organization's size and culture).

2. §9.5 of the text gives full details of the IEEE version, which could be used in the rare case where an organization needed to create its own template.

3. This plan covers projects of all sizes, so some of its pieces do not apply to smaller projects.

IEEE SPMP

The following template would be appropriate for a large project. For a small or medium-sized project, some parts could be omitted to make it suitable to the project.

1. Overview

1. **Project summary.**
   1. **Purpose, scope and objectives.** A brief description is given of the purpose and scope of the software product to be delivered, as well as project objectives. Business needs are included in this subsection.
   2. **Assumptions and constraints.** Any assumptions underlying the project are stated here, together with constraints, such as the delivery date, budget, resources, and artifacts to be reused.
   3. **Project deliverables.** All the items to be delivered to the client are listed here, together with the delivery dates.
   4. **Schedule and budget summary.** The overall schedule is presented here, together with the overall budget.

1. Overview

- **② Evolution of the project management plan.**
  - No plan can be cast in concrete.
  - The project management plan, like any other plan, requires continual updating in the light of experience and change within both the client organization and the software development organization.
  - In this section, the formal procedures and mechanisms for changing the plan are described, including the mechanism for placing the project management plan itself under configuration control.

2. Reference materials

All documents referenced in the project management plan are listed here.

3. Definitions and acronyms

This information ensures that the project management plan will be understood the same way by everyone.

4. Project organization

1. **External interfaces.**
   - No project is constructed in a vacuum.
   - The project members have to interact with the client organization and other members of their own organization.
   - In addition, subcontractors may be involved in a large project.
   - Administrative and managerial boundaries between the project and these other entities must be laid down.

4. Project organization

2. Internal structure.

- In this section, the structure of the development organization itself is described.
- For example, many software development organizations are divided into two types of groups: development groups that work on a single project and support groups that provide support functions, such as configuration management and quality assurance, on an organization-wide basis.
- Administrative and managerial boundaries between the project group and the support group also must be defined clearly.

4. Project organization

3. **Roles and responsibilities.**
   - For each project function, such as quality assurance, and for each activity, such as product testing, the individual responsible must be identified.

5. Managerial process plans

- ## Start-up plan.
  1. **Estimation plan.** The techniques used to estimate project duration and cost are listed here, as well as the way these estimates are tracked and, if necessary, modified while the project is in progress.
  2. **Staffing plan.** The numbers and types of personnel required are listed, together with the durations for which they are needed.
  3. **Resource acquisition plan.** The way of acquiring the necessary resources, including hardware, software, service contracts, and administrative services, is given here.
  4. **Project staff training plan.** All training needed for successful completion of the project is listed in this subsection.

5. Managerial process plans

- **②** **Work plan.**
  - **①** **Work activities.** In this subsection, the work activities are specified, down to the task level if appropriate.
  - **②** **Schedule allocation.** In general, the work packages are interdependent and further dependent on external events. For example, the implementation workflow follows the design workflow and precedes product testing. In this subsection, the relevant dependencies are specified.
  - **③** **Resource allocation.** The various resources previously listed are allocated to the appropriate project functions, activities, and tasks.
  - **④** **Budget allocation.** In this subsection, the overall budget is broken down at the project function, activity, and task levels.

5. Managerial process plans

- **Control plan.**
  - **Requirements control plan.** As described in Part B of the text, while a software product is being developed, the requirements frequently change. The mechanisms used to monitor and control the changes to the requirements are given in this section.
  - **Schedule control plan.** In this subsection, mechanisms for measuring progress are listed, together with a description of the actions to be taken if actual progress lags behind planned progress.

5. Managerial process plans

- ❸ **Control plan.**
  - ❸ **Budget control plan.** It is important that spending should not exceed the budgeted amount. Control mechanisms for monitoring when actual cost exceeds budgeted cost, as well as the actions to be taken should this happen, are described in this subsection.
  - ❹ **Quality control plan.** The ways in which quality is measured and controlled are described in this subsection.

5. Managerial process plans

- **③ Control plan.**
  - **⑤ Reporting plan.** To monitor the requirements, schedule, budget, and quality, reporting mechanisms need to be in place. These mechanisms are described in this subsection.
  - **⑥ Metrics collection plan.** As explained in text §5.5, it is not possible to manage the development process without measuring relevant metrics. The metrics to be collected are listed in this subsection.

5. Managerial process plans

- ### ④ Risk management plan.
  - Risks have to be identified, prioritized, mitigated, and tracked.
  - All aspects of risk management are described in this section.
- ### ⑤ Project close-out plan.
  - The actions to be taken once the project is completed, including reassignment of staff and archiving of artifacts, are presented here.

6. Technical process plans

1. **Process model.**
   - In this section, a detailed description is given of the life-cycle model to be used.

2. **Methods, tools and techniques.**
   - The development methodologies and programming languages to be used are described here.

6. Technical process plans

● Infrastructure plan.

- Technical aspects of hardware and software are described in detail in this section.
- Items that should be covered include the computing systems (hardware, operating systems, network, and software) to be used for developing the software product, as well as the target computing systems on which the software product will be run and CASE tools to be employed.

6. Technical process plans

4. Product acceptance plan.

- To ensure that the completed software product passes its acceptance test, acceptance criteria must be drawn up, the client must agree to the criteria in writing, and the developers must then ensure that these criteria are indeed met.
- The way that these three stages of the acceptance process will be carried out is described in this section.

7. Supporting process plans

1. ## Configuration management plan.
   - In this section, a detailed description is given of the means by which all artifacts are put under configuration management.

2. ## Testing plan.
   - Testing, like all other aspects of software development, needs careful planning.

7. Supporting process plans

- ## Documentation plan.
  - A description of documentation of all kinds, whether or not to be delivered to the client at the end of the project, is included in this section.
- ## Quality assurance plan.
  - All aspects of quality assurance, including testing, standards, and reviews, are encompassed by this section.

7. Supporting process plans

⑤ **Reviews and audits plan.**
  - Details as to how reviews are conducted are presented in this section.

⑥ **Problem resolution plan.**
  - In the course of developing a software product, problems are all but certain to arise.
  - For example, a design review may bring to light a critical fault in the analysis workflow that requires major changes to almost all the artifacts already completed.
  - In this section, the way such problems are handled is described.

7. Supporting process plans

7. **Subcontractor management plan.**
   - This section is applicable when subcontractors are to supply certain work products.
   - The approach to selecting and managing subcontractors then appears here.

8. **Process improvement plan.**
   - Process improvement strategies are included in this section.

8. Additional plans

For certain projects, additional components may need to appear in the plan. In terms of the IEEE framework, the appear at the end of the plan. Additional components may include security plans, safety plans, data conversion plans, installation plans, and the software project postdelivery maintenance plan.

1. Include a detailed schedule for what testing must be done during each workflow. Potential problems if this is **not** done:

   1. Capturing traceability between workflows (which is required to test effectively) may not be done correctly.
   2. Missed opportunities to follow-up on later artifacts as suggested by unusually high numbers of faults in early artifacts of the project.
   3. Black-box test cases should be selected at the end of the analysis workflow (while details are fresh in developers'/SQA members' minds). If not, then black box test cases may be hurriedly thrown together later on (less effective).
   4. Etc.

1. Planning / estimation tools (function points, intermediate COCOMO) work as well for OO as they do for classical, **assuming no re-use**.

2. To date there is little data on how re-use affects estimation.

3. We expect that in the long run, re-use will save effort, hence reduce estimates.

4. COCOMO II is better than COCOMO for OO, but it is much more complicated.

1. Training requirements should be carefully considered for all staff, not just for the client. Reasons:

   1. Developers may need training in project management (e.g. planning and estimating)
   2. New development / testing techniques may necessitate training for all project staff.
   3. New H/W may necessitate training for all operators.
   4. Etc.

2. Training requirements must be documented in the SPMP.

1. Documentation is an integral part of any S/W project.
2. Hence it is crucial that standards be established (in the SPMP if nowhere else), understood and followed by all team members. Reasons:
   1. fewer misunderstandings between team members
   2. aids the SQA group
   3. after initial training, no additional training will be needed when staff change teams internally,
   4. etc.

1. There are many commercially available CASE tools for project management.
2. In all likelihood the organization that employs you will already have a project management suite in place for you to use.

1. As pointed out earlier, it is crucial to neither underestimate nor overestimate the cost/duration of our S/W projects.

2. Hence SQA must test the SPMP before communicating any estimates to the client.

3. This must be non-execution based testing. Best technique: **inspection**.