COMP 3111
SOFTWARE ENGINEERING

LECTURE 5
SOFTWARE DEVELOPMENT EXERCISE

EXERCISE: A BUDGET CONTROL SYSTEM

Problem Statement

We want to build a budget control system, for internal use, for a small (~30 person), high-tech software consulting and development company to monitor the expenses against the budget of individual contract software projects so that corrective action can be taken if the actual budget of a project is not proceeding according to the planned budget (e.g., over or under spending on the project).

Background Information

In general, the budget control activity often needs to be customized to the particular activities of an organization. While budget control is related to other administrative activities, (e.g., payroll processing, income and expense monitoring, etc.), unlike these, budget control is based both on objective data, such as actual time and costs expended, and on subjective data, such as estimates of the value of the "work in progress". As staff may be involved in several projects concurrently, and no log is kept about their contribution to each project, it is hard to estimate “work in progress” costs for each project.

EXERCISE: A BUDGET CONTROL SYSTEM

Some Initial Findings

- Some, but not all, data needed for budget control (e.g., salary paid to each employee) is available from the administrative system.
- Since employees work on many projects concurrently, allocation of salary to each project is not available (no data is kept).
- Estimating the amount of work completed/remaining on each project is currently not done.
- Both actual and estimated expenditures are needed to monitor expenses against budget.

EXERCISE: A BUDGET CONTROL SYSTEM

Answer the following questions for the case study.

1. As project manager:
   a. What is the first task you would perform and why?
   b. How many people would you need for the first task and what skills should each have?
   c. How long will this task take?

2. Which of the following software development processes, or combinations of processes, would you use to develop the Budget Control System?

   __ Waterfall __ Code-and-Fix __ Prototyping

   __ Phased-release __ Agile

3. What are your reasons for the choice(s) you made in question 2?

EXERCISE: WHAT ACTUALLY HAPPENED

- Because of the nature of the business, a precise statement of the requirements for an automated budget control system could only be formulated after some experience and trial and error.
- A team consisting of a software engineer with business administration background and an administrative manager was formed to capture and analyze requirements.
- The team decided to initially focus on organizational rather than on technical aspects:
  - identified and classified information relevant to budget control, its source, its relationships and its likelihood of being changed;
  - defined procedures for collecting budget control information (e.g., staff were asked to record the time they spent on each project);
  - data from the administrative system was duplicated for the budget control system;
  - initially supported only predefined queries.

EXERCISE: WHAT ACTUALLY HAPPENED (CONT'D)

- Two months were needed to understand the budget control process to a stage where something could be implemented.

1st prototype: (1/2 day to set up) A spreadsheet which was manually filled in and provided limited querying capabilities.

- The first prototype was in operation for 4 months during which time it was utilized to understand the problems of budget control and design solutions that would yield better support tools.

- Once the procedures—and ***risks***—of budget control were better understood, a second prototype was built that supported high-level querying facilities, flexible data formats and simple computation.

2nd prototype: Used high-level development tools to create reports and a database to store the data.

EXERCISE: WHAT ACTUALLY HAPPENED (CONT'D)

- Eventually it was decided to integrate budget control into the administrative system.
- A batch translator was built that allowed the administrative system to supply partial information to the budget control system.
- Part of the prototype budget control system was reused since efficiency was not a major issue.

Why did this approach work in this case?