

A decorative graphic consisting of two concentric white circles. Ten white lines radiate from the center to the outer circle, spaced evenly around the perimeter. The background is a vertical gradient from light orange at the top to light blue at the bottom.

# **LECTURE 12**

## **REVIEW**

**Software project management**

# Content

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Software Project Management

# Software project types

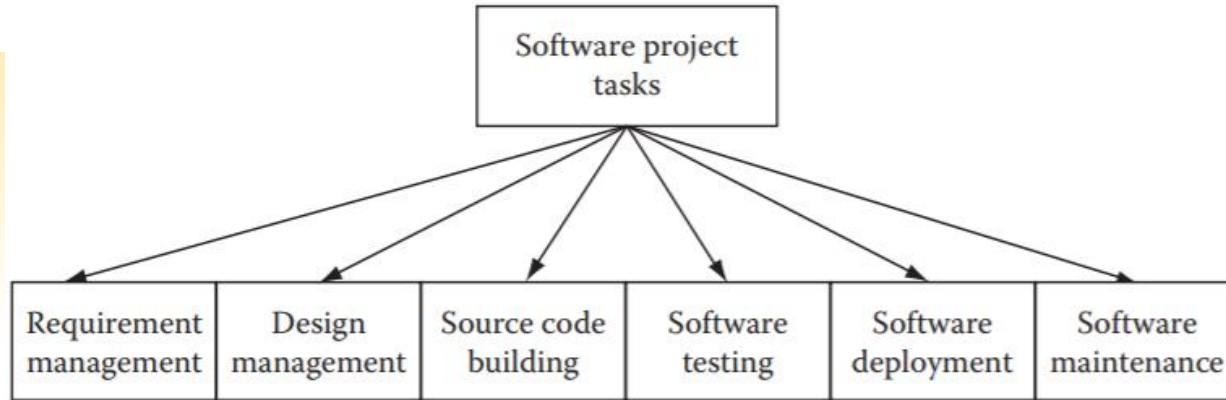
- There are five categories of software projects.
- These categories are not intended to be discrete and you may well find that your own project falls into two or even more of these classes (or it perhaps falls distinctly into one category but draws on approaches that are identified in others).
  - Research-based
  - Development
  - Evaluation
  - Industry-based
  - Problem solving

# Introduction

- A good process model also allows measuring both project processes and the work products.
- Measuring project processes and comparing them with those from best practices will provide information about productivity, costs and schedule, and where the project is heading.
- Measuring the quality of product/work product and comparing them against those achieved with best practices will provide information about the quality of the work products developed as compared to what could be achieved using best practices.
- When you have a good project plan in hand, you can execute your project with much ease

# What Is Software Project Management?

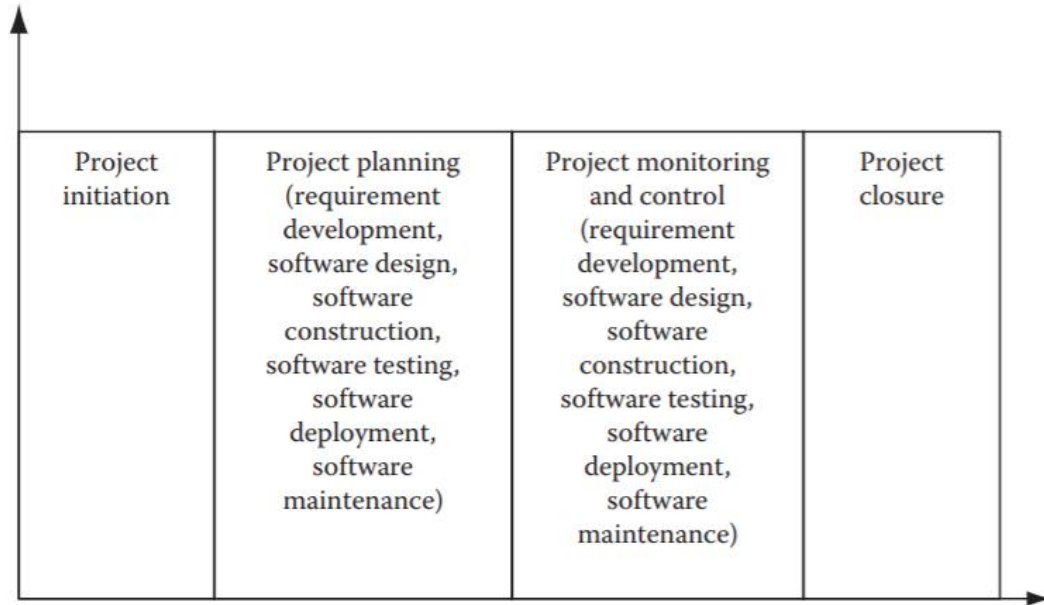
- A project manager responsible for managing a software project must have knowledge and experience in software engineering.



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**Tasks in software projects.**

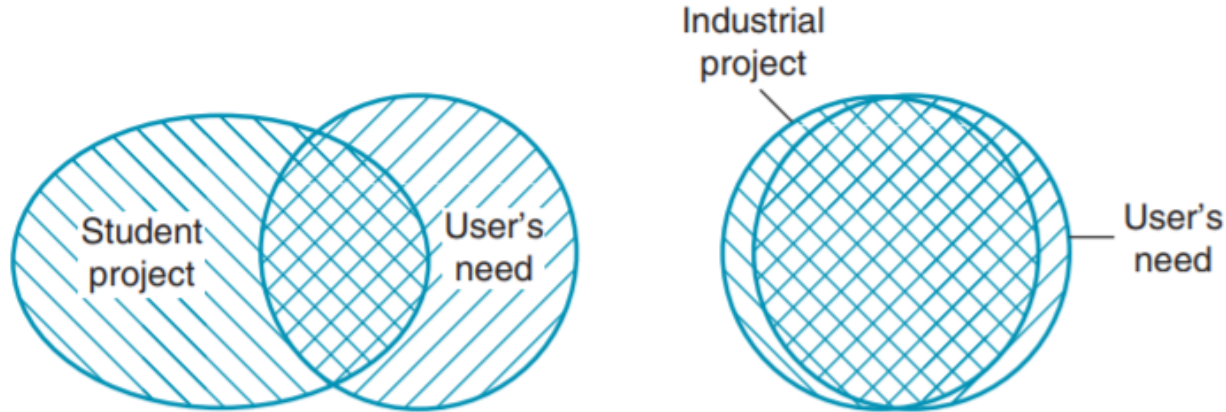
# What Is Software Project Management?



Software project management processes with software engineering processes.

# What Is Software Project Management?

- ***Student Project vs Industrial Project.***



Comparison of student development project and industrial development project

# Advantages of Project Management

## ❖ **Benefits of project management:**

- Improve your chances of achieving the desired result.
- Prioritise your business' resources and ensure their efficient use.
- Set the scope, schedule and budget accurately from the start.
- Stay on schedule and keep costs and resources to budget
- Improve productivity and quality of work



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Selection of software development lifecycle model

# Software Development Lifecycle

- The Software Development Life-Cycle (SDLC) represents a generic model for software development and consists of a number of stages including requirements analysis, design, development, testing and implementation.



# Type of Software Development Lifecycle

- Build and Fix Model
- Waterfall Model
- Incremental Model
- Prototyping Model
- Agile Methods

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Project cost estimation

# The Importance of Project Cost Management (PCM)

- Software projects have a poor track record for meeting budget goals.
- Average cost overrun from 1995 CHAOS study was 189% of the original estimates; improved to 145% in the 2001 study.
- The 2003 CHAOS studies showed the average cost **overrun** (the additional percentage or dollar amount by which actual costs exceed estimates) was 43 percent.
- In 1995, cancelled software projects cost the U.S. over \$81 billion
- U.S. lost \$55 billion in software projects in 2002 from cancelled projects and overruns compared to \$140 billion in 1994.

# What is Cost and PCM?

- Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange.
- Costs are usually measured in monetary units like dollars.
- Project Cost Management includes the processes required to ensure that the project is completed within an approved budget.
- Project managers must make sure their projects are well defined, have accurate time and cost estimates and have a realistic budget that they were involved in approving.

# Project Cost Management Processes

## Cost Control

Controlling changes to the project budget

## Resource Planning

Determine the resources (people, equipment, materials) needed for project completion

Cost Estimating

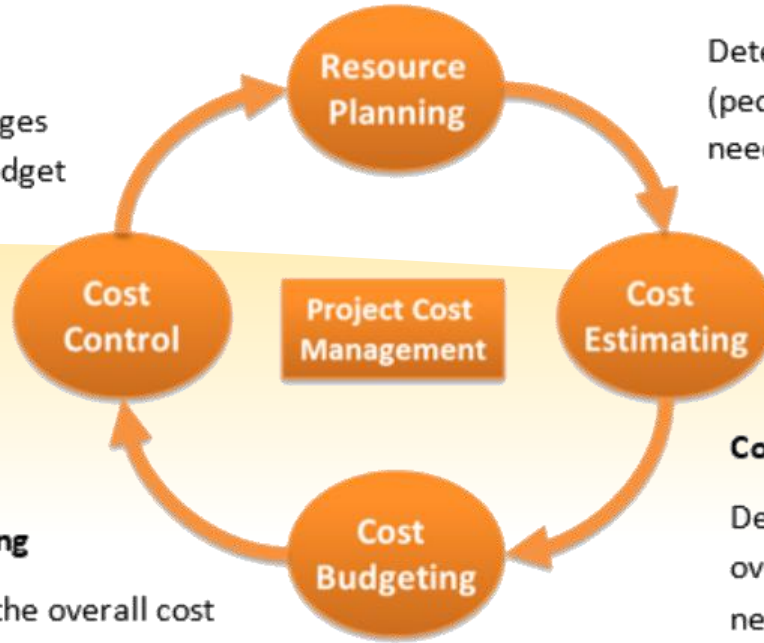
## Cost Estimating

Develop an approximation of overall cost of resources needed to complete the project

Cost Budgeting

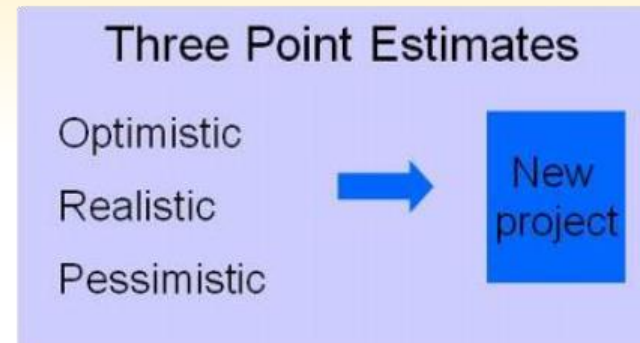
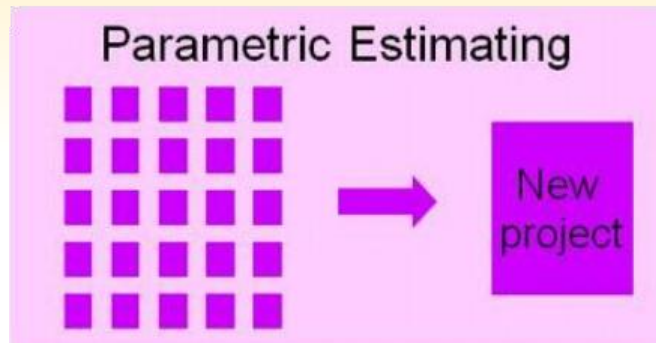
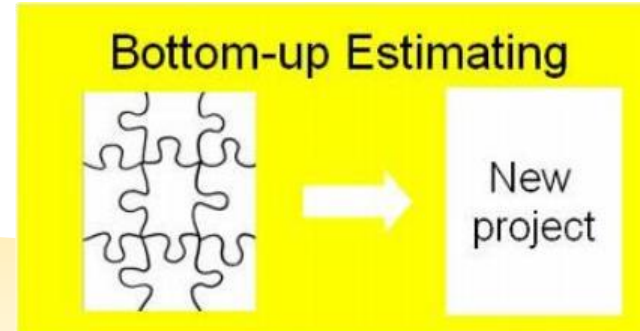
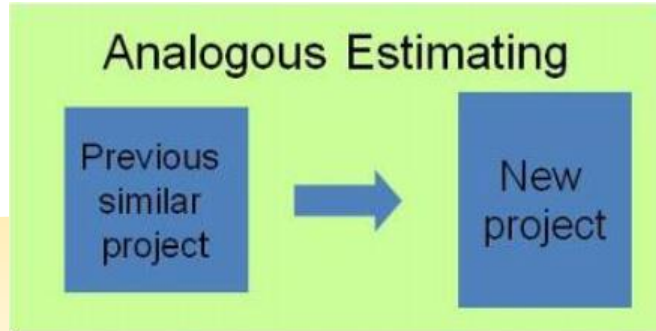
## Cost Budgeting

Allocation of the overall cost estimate to the project budget



# Cost Estimation Techniques

- There are 4 basic techniques for cost estimates.





# Earned Value Management (EVM)

- Earned Value Management Terms:
  - The **planned value (PV)**, formerly called the budgeted cost of work scheduled (BCWS), also called the budget, is that portion of the approved total cost estimate planned to be spent on an activity during a given period.
  - **Actual cost (AC)**, formerly called actual cost of work performed (ACWP), is the total of direct and indirect costs incurred in accomplishing work on an activity during a given period.
  - The **earned value (EV)**, formerly called the budgeted cost of work performed (BCWP), is an estimate of the value of the physical work actually completed.
  - **Rate of performance (RP)** is the ratio of actual work completed to the percentage of work planned to have been completed at a given time during the life of the project or activity.

# Earned Value Management (EVM)

- Earned Value Formulas:

Earned value formulas

Term	Formula
Earned value (EV)	$EV = PV \text{ to date} \times RP$
Cost variance (CV)	$CV = EV - AC$
Schedule variance (SV)	$SV = EV - PV$
Cost performance index (CPI)	$CPI = EV/AC$
Schedule performance index (SPI)	$SPI = EV/PV$
Estimate at completion (EAC)	$EAC = BAC/CPI$
Estimated time to complete	Original time estimate/SPI

# Earned Value Management (EVM)

- Rules of Thumb for Earned Value Numbers:
  - **CPI** can be used to estimate the projected cost of completing the project based on performance to date (EAC)
    - $= 1$ : the planned and actual costs are the same.
    - $< 1$ : over budget.
    - $> 1$ : under budget.

# Earned Value Management (EVM)

- Rules of Thumb for Earned Value Numbers:
  - **SPI** can be used to estimate the projected time to complete the project
    - = 1: on schedule.
    - < 1: behind schedule.
    - > 1: ahead of schedule.

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Project Planning

# Types of Project Planning

- Top – down plan
- Bottom – up Plan

# Techniques of Project Planning

- Project planning is performed through a series of six steps that utilize a number of project management techniques:
  - Work breakdown
  - Time estimates
  - Milestone identification
  - Activity sequencing (Activity networks)
  - Scheduling (Gantt chart)
  - Re-planning
- Three techniques that are suitable for this stage are Work Breakdown Structures, Activity Networks and Gantt Charts.

# Techniques of Project Planning

- **Activity sequencing:**
  - The date, which is noted at the top left-hand corner of each activity, represents the time at which that activity can start.
  - The final additional marking to this network diagram is the ***critical path*** which is represented in example by the bolder arrowed lines.
  - To identify the critical path you work backwards through the network diagram from the project's final milestone.



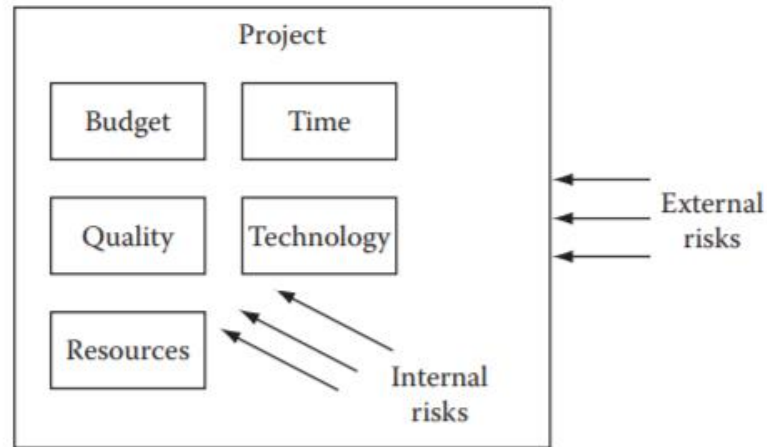
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Risk management

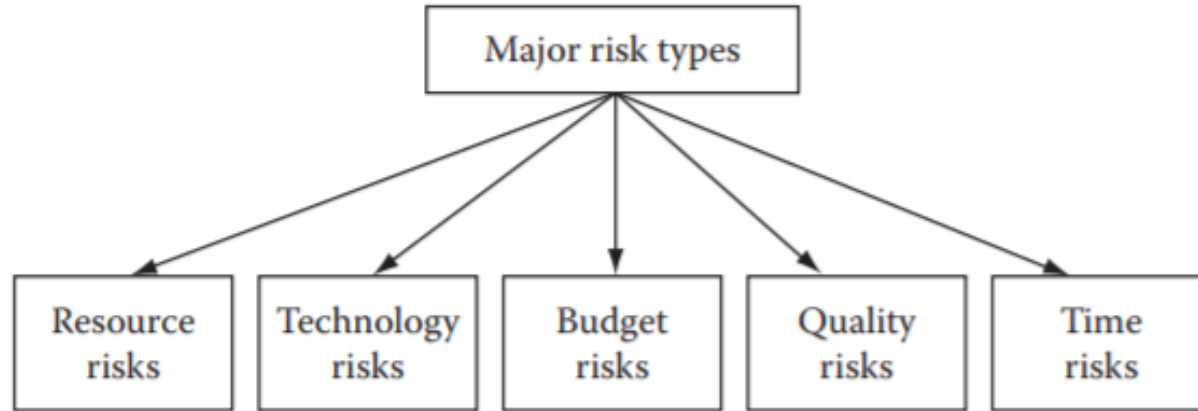
# Introduction to Risk Management

- Risks can be categorized as external and internal. If a risk to the project arises due to an aspect being dealt with by the project team, then it is an internal risk. All other risks are external risks.



**Internal and external risks for a project.**

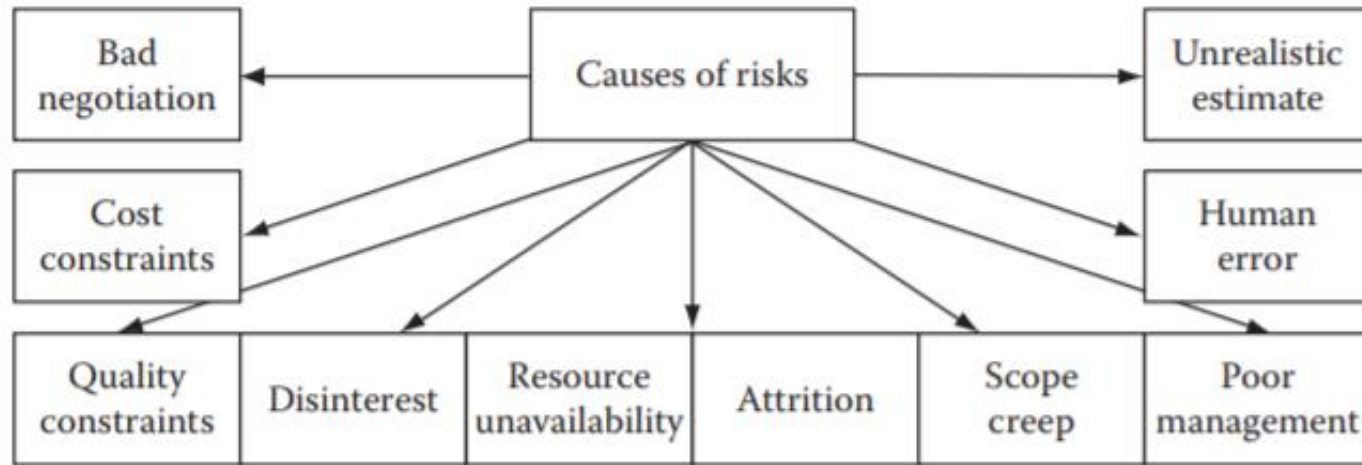
# Introduction to Risk Management



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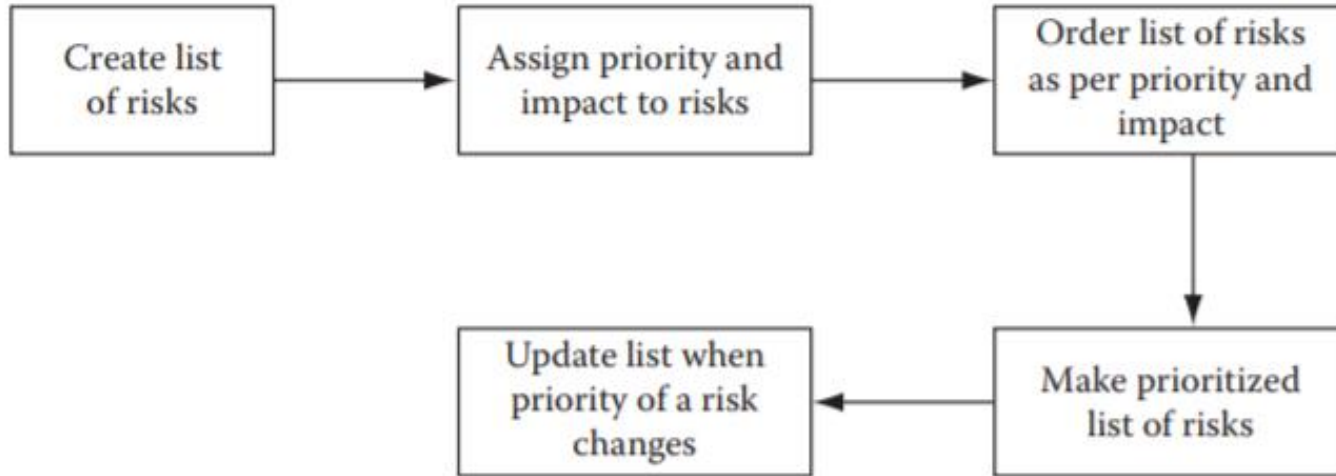
**Major risk types.**

# Causes of Risks



**Major causes of risks.**

# Risk Analysis



**Risk analysis life cycle.**

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Quality management

# What is quality?

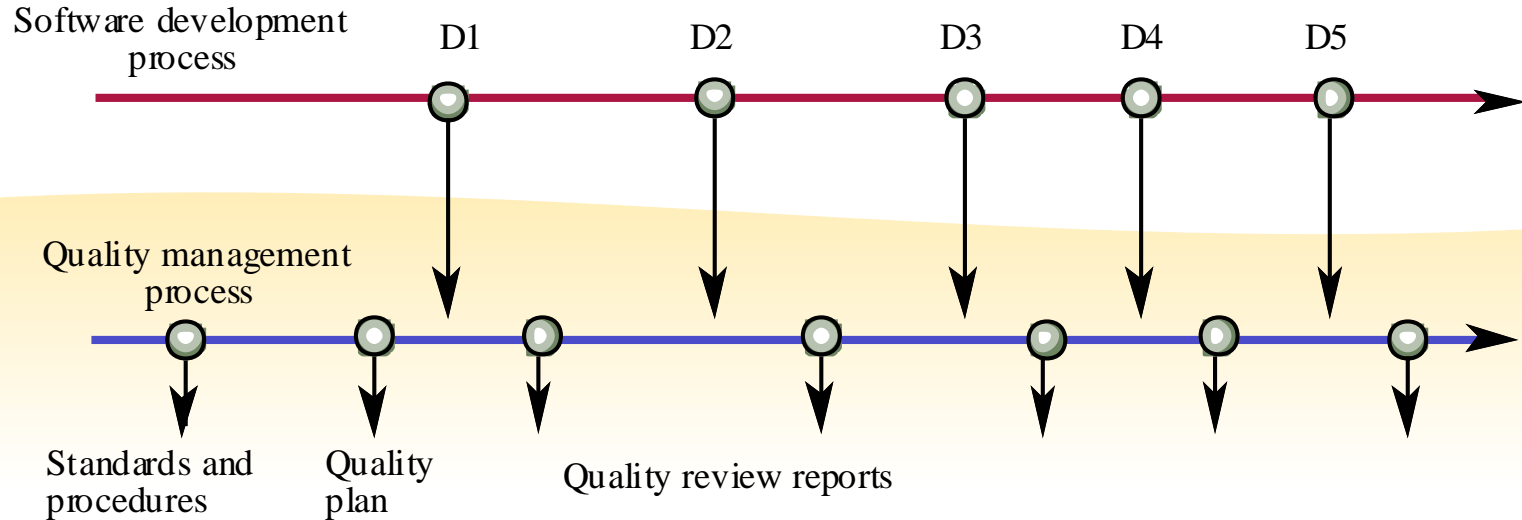
- Quality, simplistically, means that a product should meet its specification
- This is problematical for software systems
  - Tension between customer quality requirements (efficiency, reliability, etc.) and developer quality requirements (maintainability, reusability, etc.)
  - Some quality requirements are difficult to specify in an unambiguous way
  - Software specifications are usually incomplete and often inconsistent

# Software quality attributes

Safety	Understandability	Portability
Security	Testability	Usability
Reliability	Adaptability	Reusability
Resilience	Modularity	Efficiency
Robustness	Complexity	Learnability



# Quality management and software development



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Project team management

# Introduction to Teamwork

**TEAM**

**T**ogether **E**veryone **A**chieves **M**ore



# Team Roles

- O'Sullivan suggest using a SWOT analysis to identify team responsibilities. A SWOT analysis identifies everyone's strengths, weaknesses, opportunities and threats.



# Team Development

- These stages, originally identified by Tuckman in 1965, are:

## Forming

Team acquaints and establishes ground rules. Formalities are preserved and members are treated as strangers.



## Storming

Members start to communicate their feelings but still view themselves as individuals rather than part of the team. They resist control by group leaders and show hostility.



## Norming

People feel part of the team and realize that they can achieve work if they accept other viewpoints.



## Performing

The team works in an open and trusting atmosphere where flexibility is the key and hierarchy is of little importance.



## Adjourning

The team conducts an assessment of the year and implements a plan for transitioning roles and recognizing members' contributions.

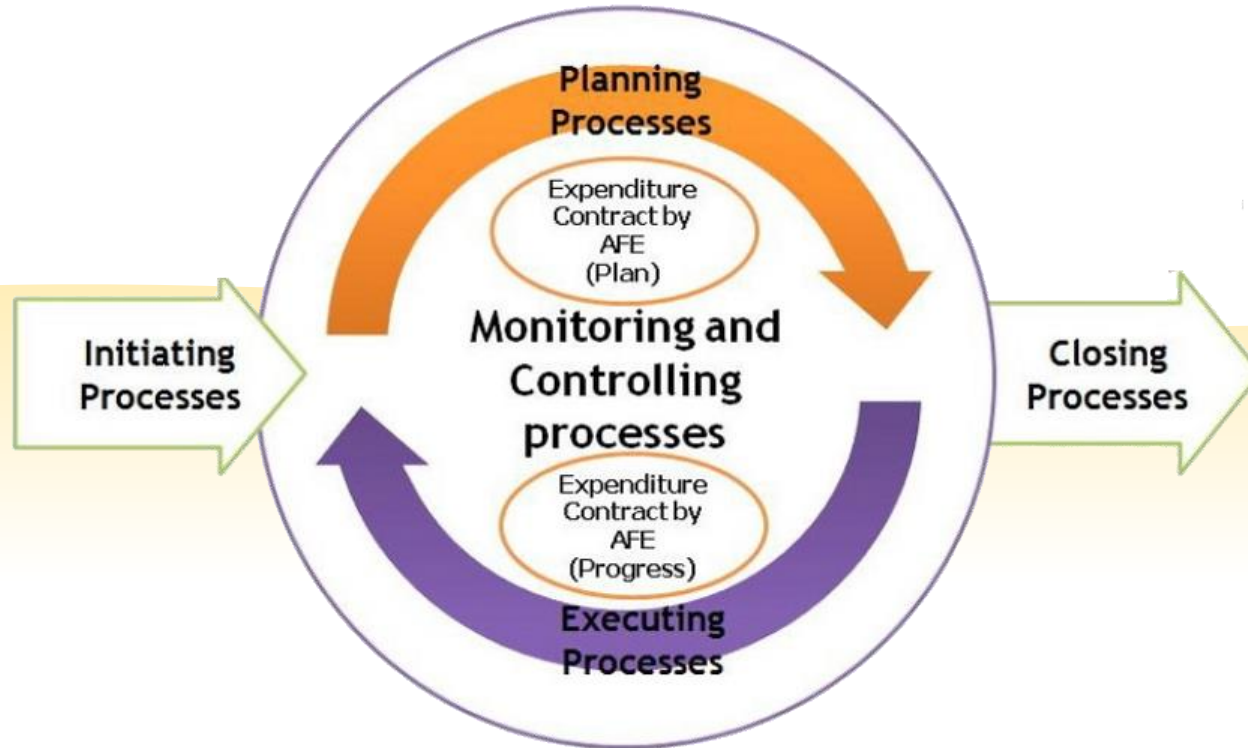


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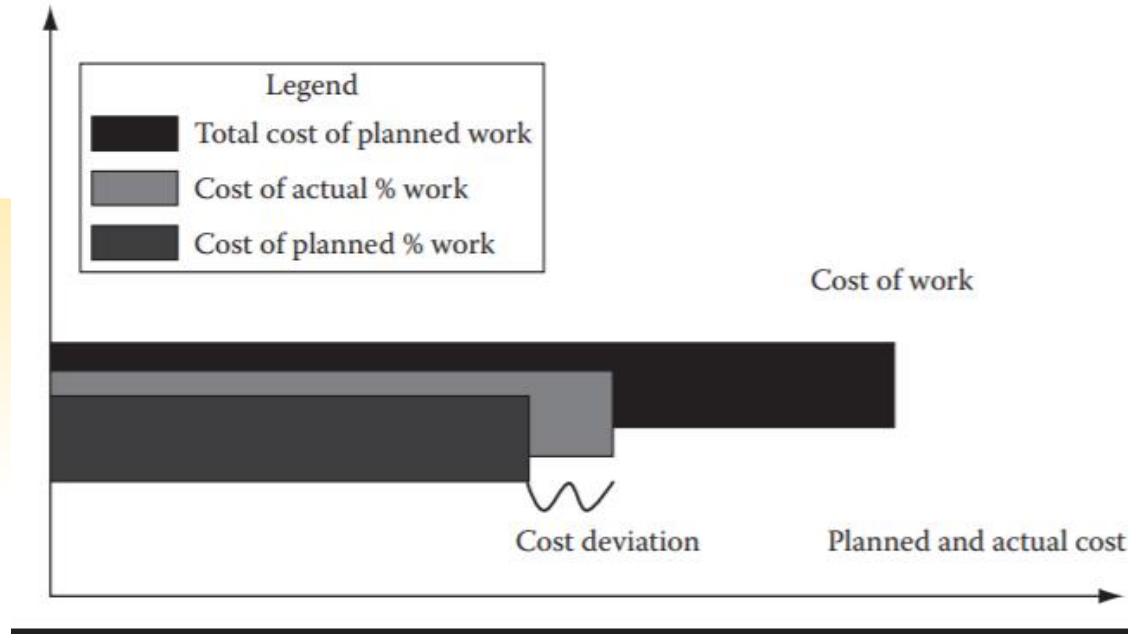
Project execution & closure

# Introduction Project Monitoring



# Project Monitoring Methodology

- Identify Deviations:



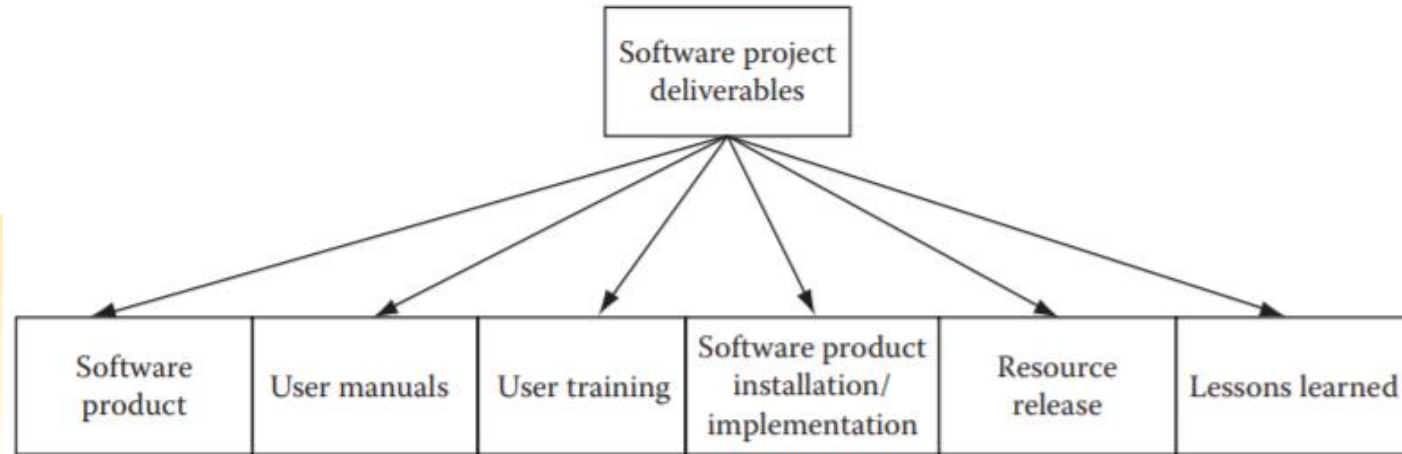
Project cost deviation.



# Project Control Techniques (II)

- **Resource Leveling:**
- **Schedule Optimization:**
- **Resource Optimization:**
- **Project Closure**
  - Resource leveling is one technique that is employed to resolve resource conflicts during project execution.
  - Sometimes, it so happens that a resource is to do more than one task.
  - Now it is found that one task will get delayed due to the delay in the other task.
  - If there is a slack found in the schedule, the other task that has not started yet can be taken to some other time frame so that it

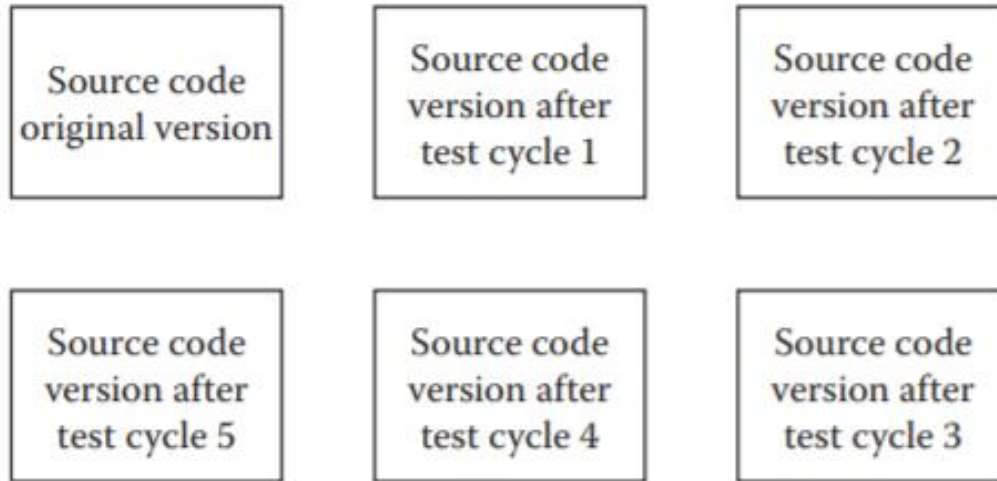
# Introduction to Project Closure



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**Software project deliverables before project closure.**

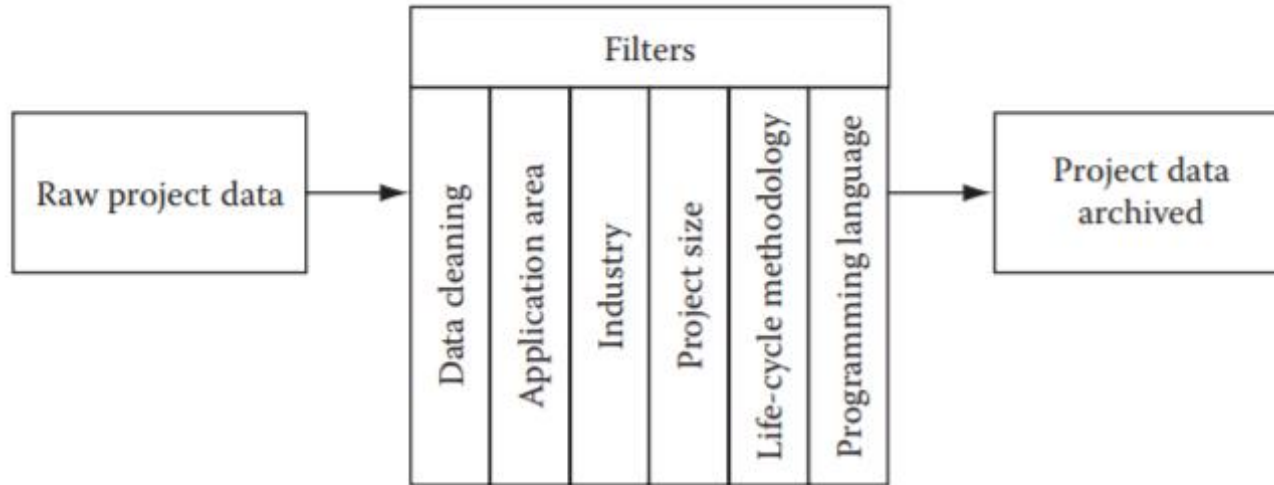
# Source Code Management



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**Many versions of source code.**

# Project Data Management



Strategy for project data archiving.

**THANK YOU !**

