Project Quality Management

The Importance of Project Quality Management

- Many people joke about the poor quality of IT products
- People seem to accept systems being down occasionally or needing to reboot their PCs.
- But quality is very important in many IT projects.

What Is Quality?

- The International Organization for Standardization (ISO) defines **quality** as “the degree to which a set of inherent characteristics fulfils requirements” (ISO9000:2000).
- Other experts define quality based on:
  - **Conformance to requirements**: The project’s processes and products meet written specifications.
  - **Fitness for use**: A product can be used as it was intended.

What Is Project Quality Management?

- Project quality management ensures that the project will satisfy the needs for which it was undertaken.
- Processes include:

  1. Quality planning: Identifying which quality standards are relevant to the project and how to satisfy them.

  2. Quality assurance: Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards.

  3. Quality control: Monitoring specific project results to ensure that they comply with the relevant quality standards.

1. Quality Planning

- Impliesthe ability to anticipate situations and prepare actions to bring about the desired outcome.
- Important to prevent defects by:
  - Selecting proper materials.
  - Training and indoctrinating people in quality.
  - Planning a process that ensures the appropriate outcome.

Design of Experiments

- **Design of experiments** is a quality planning technique that helps identify which variables have the most influence on the overall outcome of a process.
- Also applies to project management issues, such as cost and schedule trade-offs.
- Involves documenting important factors that directly contribute to meeting customer requirements.

Scope Aspects of IT Projects

- **Functionality** is the degree to which a system performs its intended function.
- **Features** are the system's special characteristics that appeal to users.
- **System outputs** are the screens and reports the system generates.
- **Performance** addresses how well a product or service performs the customer's intended use.
- **Reliability** is the ability of a product or service to perform as expected under normal conditions.
- **Maintainability** addresses the ease of performing maintenance on a product.

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Exam Hint !!

Who's Responsible for the Quality of Projects?

- Project managers are ultimately responsible for quality management on their projects.
- Several organizations and references can help project managers and their teams understand quality.
  - International Organization for Standardization (www.iso.org)
  - IEEE (www.ieee.org)

2. Quality Assurance

- Quality assurance includes all the activities related to satisfying the relevant quality standards for a project.
- Another goal of quality assurance is continuous quality improvement.
- **Benchmarking** generates ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organization.
- A **quality audit** is a structured review of specific quality management activities that help identify lessons learned that could improve performance on current or future projects.

Table of Contents for a Quality Assurance Plan

3. Quality Control

- The main outputs of quality control are:
  - Acceptance decisions
  - Rework
  - Process adjustments
- Some tools and techniques include:
  - Pareto analysis
  - Statistical sampling
  - Six Sigma
  - Quality control charts

Pareto Analysis

- **Pareto analysis** involves identifying the vital few contributors that account for the most quality problems in a system.

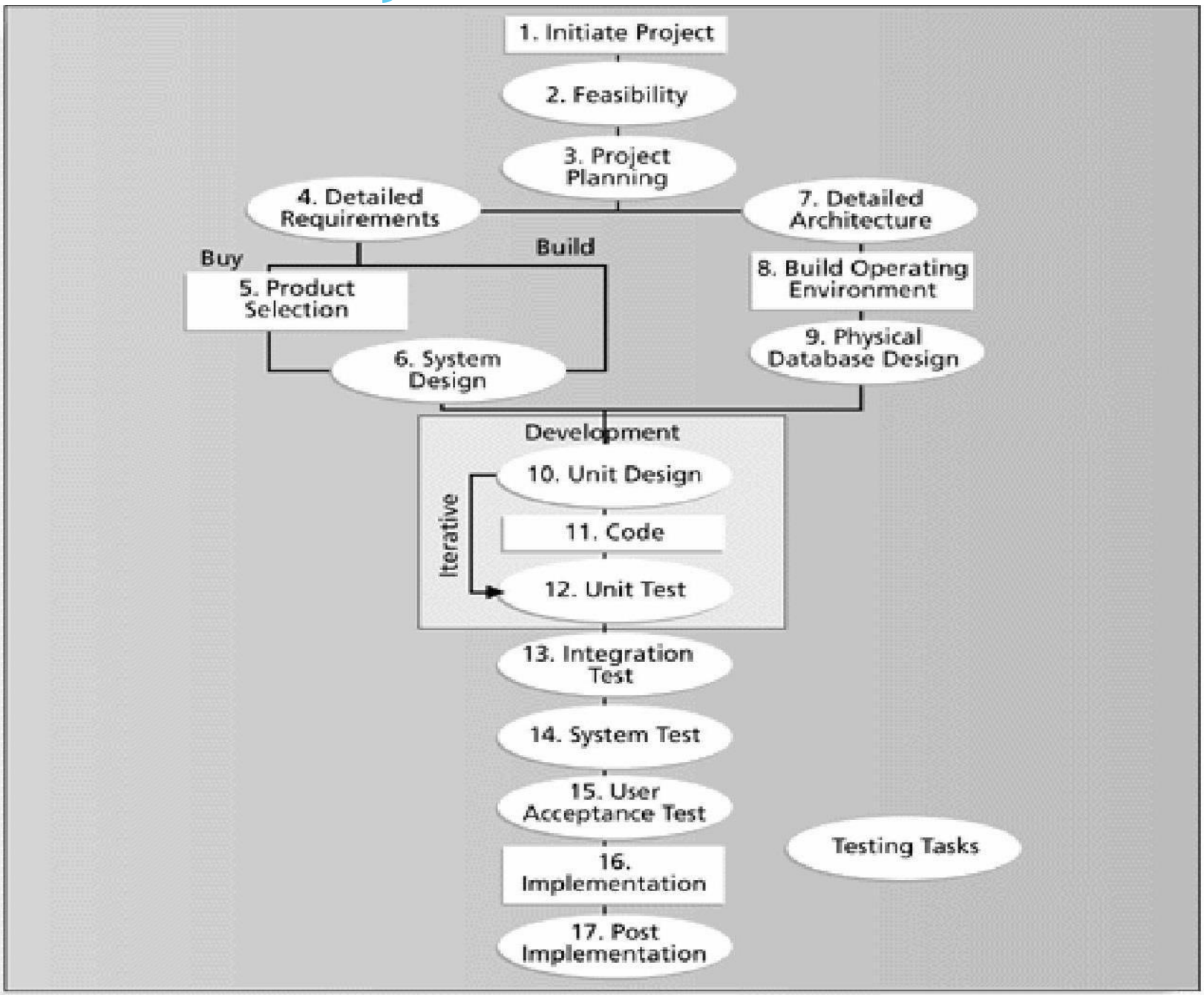
- Also called the 80-20 rule, meaning that 80 percent of problems are often due to 20 percent of the causes.

- **Pareto diagrams** are histograms, or column charts representing a frequency distribution, that help identify and prioritize problem areas.

Testing

- Many IT professionals think of testing as a stage that comes near the end of IT product development.
- Testing should be done during almost every phase of the IT product development life cycle.

Testing Tasks in the Software Development Life Cycle



Types of Tests

Exam Hint !!

- **Unit testing** tests each individual component (often a program) to ensure it is as defect-free as possible.
- **Integration testing** occurs between unit and system testing to test functionally grouped components.
- **System testing** tests the entire system as one entity.
- **User acceptance testing** is an independent test performed by end users prior to accepting the delivered system.

Testing Alone Is Not Enough

- Watts S. Humphrey, a renowned expert on software quality, defines a **software defect** as anything that must be changed before delivery of the program.

- Testing does not sufficiently prevent software defects because:
  - The number of ways to test a complex system is huge.
  - Users will continue to invent new ways to use a system that its developers never considered.

- Humphrey suggests that people rethink the software development process to provide *no* potential defects when you enter system testing; developers must be responsible for providing error-free code at each stage of testing.

Modern Quality Management

- Modern quality management:
  - Requires customer satisfaction.
  - Prefers prevention to inspection.
  - Recognizes management responsibility for quality.
- Noteworthy quality experts include Deming, Juran, Crosby, Ishikawa, Taguchi, and Feigenbaum.

ISO Standards

- **ISO 9000** is a quality system standard that:
  - Is a three-part, continuous cycle of planning, controlling, and documenting quality in an organization.
  - Provides minimum requirements needed for an organization to meet its quality certification standards.
  - Helps organizations around the world reduce costs and improve customer satisfaction.
- **ISO 15504**, sometimes known as SPICE (Software Process Improvement and Capability dEtermination), is a framework for the assessment of software processes.

Improving Information Technology Project Quality

- Several suggestions for improving quality for IT projects include:
  - Establish leadership that promotes quality.
  - Understand the cost of quality.
  - Focus on organizational influences and workplace factors that affect quality.
  - Follow maturity models.

7.5 The Cost of Quality

- The **cost of quality** is the cost of conformance plus the cost of nonconformance.
  - **Conformance** means delivering products that meet requirements and fitness for use.
  - **Cost of nonconformance** means taking responsibility for failures or not meeting quality expectations.
- A 2002 study reported that software bugs cost the U.S. economy $59.6 billion each year and that one third of the bugs could be eliminated by an improved testing infrastructure.*

*RTI International, "Software Bugs Cost U.S. Economy $59.6 Billion Annually, RTI Study Finds," July 1, 2002.

Costs Per Hour of Downtime Caused by Software Defects

Business	**Cost per Hour Downtime**
Automated teller machines (medium-sized bank)	$14,500
Package shipping service	$28,250
Telephone ticket sales	$69,000
Catalog sales center	$90,000
Airline reservation center (small airline)	$89,500

Five Cost Categories Related to Quality

Prevention Cost: Costs incurred to prevent defects in products or services. These are proactive measures to ensure quality. Examples include training programs, quality improvement initiatives, process planning, and maintenance.

Appraisal Cost: Costs associated with measuring and monitoring activities to ensure quality standards are met. These are costs for detecting defects before products reach customers. Examples include inspection, testing, quality audits, and supplier assessments.

External Failure Cost: Costs that occur when defective products or services are delivered to customers. These can include returns, warranty claims, repairs, replacements, and lost sales due to dissatisfied customers. These costs are often high because they impact customer satisfaction and the company's reputation.

Five Cost Categories Related to Quality

Measurement and Test Equipment Costs: Costs related to acquiring and maintaining equipment used for quality control and assurance. This includes the calibration, repair, and replacement of measurement devices and testing machines necessary to ensure product quality.

Internal Failure Cost: Costs incurred to rectify defects found before products or services reach the customer. These are reactive costs within the production process. Examples include scrap, rework, and downtime caused by defective products.

Summary

- Project quality management ensures that the project will satisfy the needs for which it was undertaken.

- Main processes include:

  1. Quality planning
  2. Quality assurance
  3. Quality control