

ISTQB – Foundation Level

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CHAPTER 1: FUNDAMENTALS OF TESTING

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AGENDA

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- 1.1 Why is testing necessary? (K2)
- 1.2 What is testing? (K2)
- 1.3 Testing principles (K2)
- 1.4 Fundamental Test Process (K1)
- 1.5 The Psychology of Testing (K2)

1.1 Why is testing necessary?

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- Objectives

- LO-1.1.1 Describe, with examples, the way in which a defect in software can cause harm to a person, to the environment or to a company. (K2)
- LO-1.1.2 Distinguish between the root cause of a defect and its effects. (K2)
- LO-1.1.3 Give reasons why testing is necessary by giving examples. (K2)
- LO-1.1.4 Describe why testing is part of quality assurance and give examples of how testing contributes to higher quality. (K2)
- LO-1.1.5 Recall the terms error, defect, fault, failure and corresponding terms mistake and bug. (K1)

1.1 Why is testing necessary (K2)

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- 1.1.1 Software systems context (K1)
 - Testing Principle - Testing is context dependent
 - Testing is done differently in different contexts. For example, safety-critical software is tested differently from an e-commerce site.

1.1 Why is testing necessary (K2)

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- 1.1.2 Causes of software defects (K2)
- A human being can make an ERROR (MISTAKE), which produces a DEFECT (FAULT, BUG) in the code, in software or a system, or in a document.
- If a defect in code is executed, the system will fail to do what it should do (or do something it shouldn't), causing a FAILURE.

1.1 Why is testing necessary (K2)

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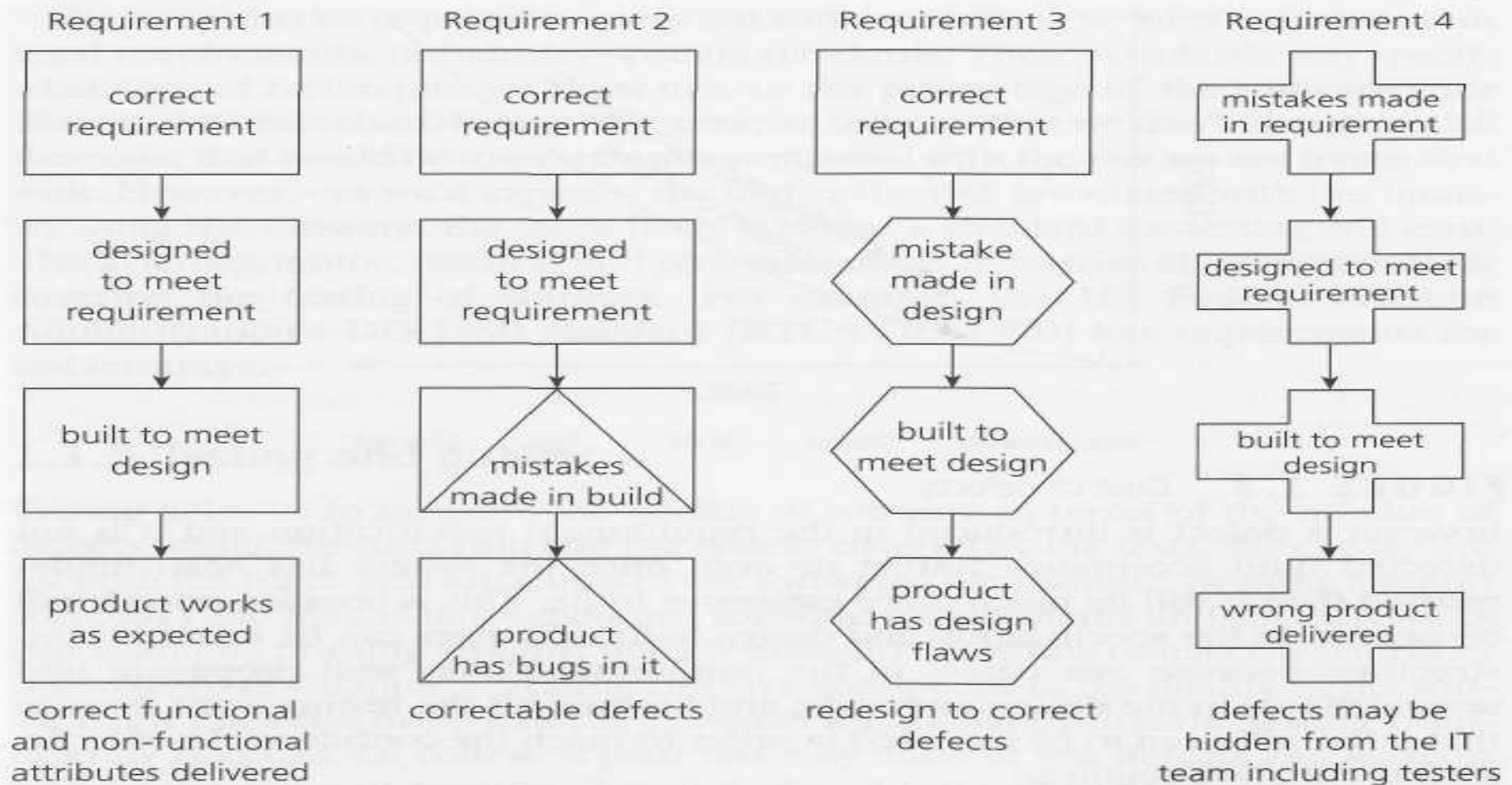
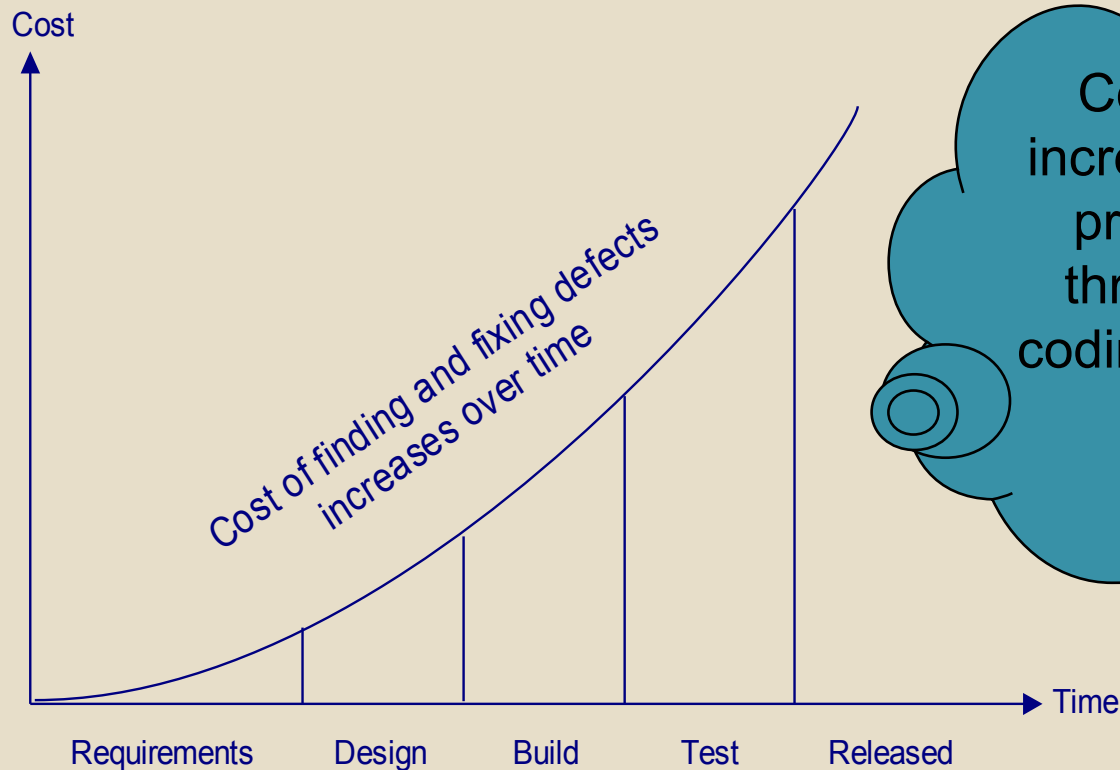


FIGURE 1.1 Types of error and defect

1.1 Why is testing necessary (K2)

- Cost of Defects



Cost becomes increasingly as the product moves through design, coding, testing, and to the field

1.1 Why is testing necessary (K2)

- 1.1.3 Role of testing in software development, maintenance and operations(K2)
 - Reduce failures in the operational environment and increase the quality of the operational system.
 - To meet contractual or legal requirements, or industry-specific standards.

1.1 Why is testing necessary (K2)

1.1.4 Testing and quality (K2)

- Validation: This the right specification?
- Verification: Is the system correct to specification?
- Testing to measure the quality of software in terms of defects found, for both functional and non-functional software requirements and characteristics.

1.1 Why is testing necessary (K2)

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1.1.5 How much testing is enough? (K2)

- Testing Principle - Exhaustive testing is impossible
- It should relate to the risks:
 - Technical vs. Business
 - Product vs. Project risks
 - Project constraints (schedule, people, budget)

1.2 What is testing? (K2)

- Objectives
 - LO-1.2.1 Recall the common objectives of testing. (K1)
 - LO-1.2.2 Describe the purpose of testing in software development, maintenance and operations as a means to find defects, provide confidence and information, and prevent defects. (K2)

1.2 What is testing?

- Testing is a Process with a series of activities:
 - Planning & control
 - Analysis and Design (choosing test conditions, designing test cases)
 - Implementation and Execution
 - Evaluating exit criteria and reporting
 - Test closure activities

1.2 What is testing?

- Test objectives/goals:
 - Finding defects;
 - Gaining confidence about the level of quality and providing information;
 - Preventing defects
- Early tests in the life cycle can help to prevent defects from being introduced into code
 - E.g. Reviews of documents, requirements

1.2 What is Testing? - Viewpoints

- Development testing: Identify defects and fix them
- Acceptance testing: Confirm that the system works as expected, to gain confidence
- In some cases: Assess the quality of the software (no intention of fixing bugs),
- Operational testing: Assess system characteristics such as reliability or availability

1.3 Testing principles

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- Objectives
 - LO-1.3.1 Explain the fundamental principles in testing. (K2)

1.3 Testing Principles

- Principle 1: Testing shows presence of defects
- Principle 2: Exhaustive testing is impossible
- Principle 3: Early testing
- Principle 4: Defect clustering
- Principle 5: Pesticide paradox
- Principle 6: Testing is context dependent
- Principle 7: Absence-of-errors fallacy

1.4 Fundamental Test Process

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- Objectives
 - LO-1.4.1 Recall the fundamental test activities from planning to test closure activities and the main tasks of each test activity. (K1)

1.4 Fundamental Test Process

- Fundamental test process is divided into the following basic steps:
 - Planning and control
 - Analysis and design
 - Implementation and execution
 - Evaluating exit criteria and reporting
 - Test closure activities

1.4 Fundamental Test Process

- Test planning
 - Determine the scope and risks and identify the objectives of testing
 - Implement the test policy and/or the test strategy
 - Determine the test approach
 - Determine the required test resources
 - Schedule test analysis and design tasks, test implementation, execution and evaluation
 - Determine the exit criteria

1.4 Fundamental Test Process

- Test control
 - Measure and analyze the results of reviews and testing
 - Monitor and document progress, test coverage & exit criteria
 - Provide information on testing
 - Initiate corrective actions
 - Make decisions

1.4 Fundamental Test Process

- Test analysis and design:
 - ✦ Review the test basis
 - ✦ Identify test conditions
 - ✦ Design the tests
 - ✦ Evaluate testability of the requirements and system
 - ✦ Design test environment set-up and identify any required infrastructure & tools

1.4 Fundamental Test Process

- Test implementation and execution
 - Implementation:
 - ✦ Develop and prioritize test cases
 - ✦ Create test suites
 - ✦ Implement and verify the environment

1.4 Fundamental Test Process

- Test implementation and execution
 - Execution:
 - ✦ Execute the test suites and individual test cases
 - ✦ Log the outcome of test execution
 - ✦ Compare actual results with expected results
 - ✦ Report incidents
 - ✦ Repeat test activities: confirmation testing or re-testing

1.4 Fundamental Test Process

- Evaluating exit criteria and reporting:
 - ✦ Check test logs against the exit criteria specified in test planning
 - ✦ Assess if more tests are needed
 - ✦ Write a test summary report

1.4 Fundamental Test Process

- Test closure activities:
 - ✦ Check planned deliverables and ensure all incident reports have been resolved
 - ✦ Finalize and archive testware
 - ✦ Hand over testware to the maintenance organization
 - ✦ Evaluate how the testing went and analyze lessons learned for future releases and projects

1.5 The Psychology of Testing

- Objectives
- LO-1.5.1 Recall that the success of testing is influenced by psychological factors (K1)
- LO-1.5.2 Contrast the mindset of a tester and of a developer. (K2)

1.5 The psychology of testing

- Independent testing – who is a tester?
 - Tests by the person who wrote the item under test;
 - Tests by another person within the same team
 - Tests by a person from a different organizational group, such as an independent test team;
 - Tests designed by a person from a different-organization or company, such as outsourced testing or certification by an external body.

1.5 The psychology of testing

- Communicate findings on the product in a neutral, fact-focused way without criticizing the person who created it.
- Explain that by knowing about this now we can work round it or fix it so the delivered system is better for the customer.
- Start with collaboration rather than battles. Remind everyone of the common goal of better quality systems.

References

- Rex Black, Foundations of Software Testing
- ISTQB Foundation Syllabus.pdf

Q & A

Glossary

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- **Test approach:** The implementation of the test strategy for a specific project. It typically includes the decisions made that follow based on the (test) project's goal and the risk assessment carried out, starting points regarding the test process, the test design techniques to be applied, exit criteria and test types to be performed.
- **Test basis:** All documents from which the requirements of a component or system can be inferred. The documentation on which the test cases are based. If a document can be amended only by way of formal amendment procedure, then the test basis is called a frozen test basis.

Glossary

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- Test condition: An item or event of a component or system that could be verified by one or more test cases, e.g. a function, transaction, feature, quality attribute, or structural element.
- Test design specification: A document specifying the test conditions (coverage items) for a test item, the detailed test approach and identifying the associated high level test cases.
- Test design technique: Procedure used to derive and/or select test cases.

Glossary

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- Test objective: A reason or purpose for designing and executing a test.
- Test policy: A high level document describing the principles, approach and major objectives of the organization regarding testing.
- Test strategy: A high-level description of the test levels to be performed and the testing within those levels for an organization or programme (one or more projects).

Glossary

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- Test plan: A document describing the scope, approach, resources and schedule of intended test activities. It identifies amongst others test items, the features to be tested, the testing tasks, who will do each task, degree of tester independence, the test environment, the test design techniques and entry and exit criteria to be used, and the rationale for their choice, and any risks requiring contingency planning. It is a record of the test planning process.