Fundamental Test Process

September 2014, 2018

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Agenda

- What is testing? Why is testing necessary?
- Main testing principles
- Key phases of Fundamental Test Process according to ISTQB standard

What is testing?

Why testing is necessary

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What is Testing?

When we are testing something

we are checking whether it is OK

Why testing is necessary

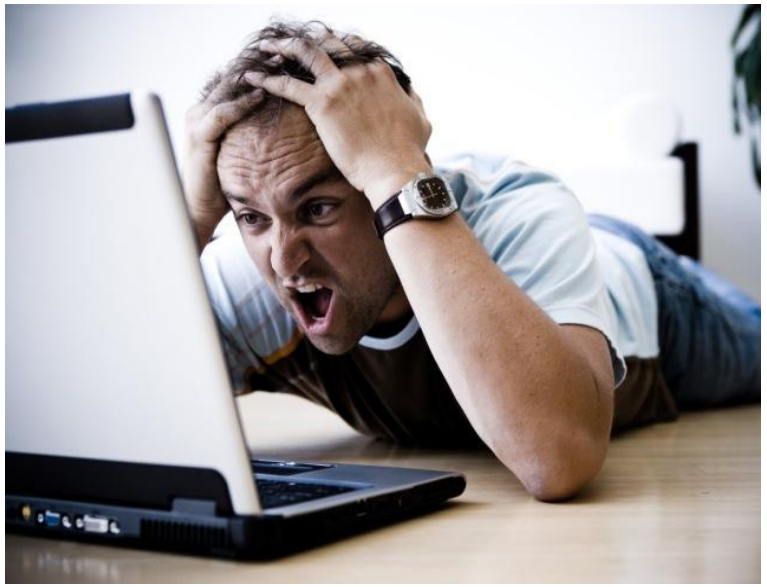
People make mistakes

Why testing is necessary

We ***should assume*** our work contains mistakes

Why testing is necessary

Software is part of our life



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Why testing is necessary

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Some of the problems might be trivial, but others can be costly and damaging - with loss of money, time or business reputation - and even may result in injury or death

Why testing is necessary

Not all software systems carry the same level of risk and not all problems have the same impact when they occur

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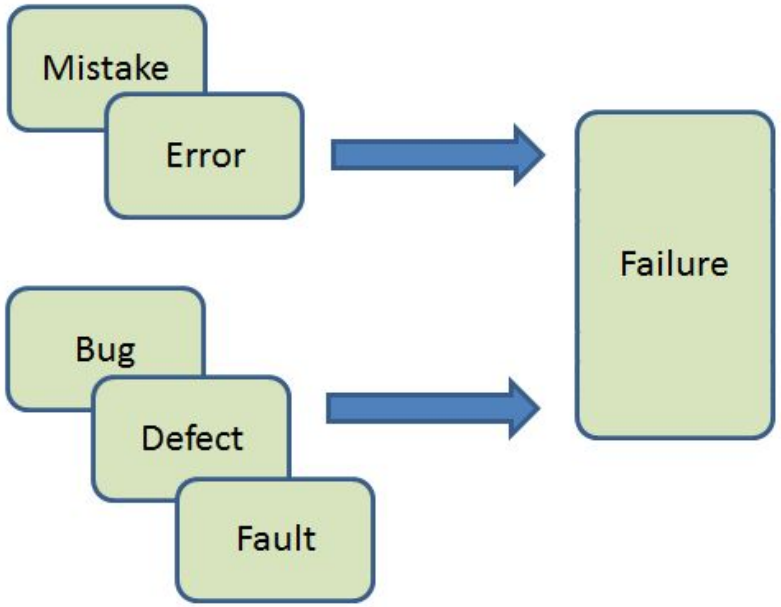
Typical Objective of Testing

For any given project, the objectives of testing may include:

- To evaluate work products such as requirements, user stories, design, and code
- To verify whether all specified requirements have been fulfilled
- To validate whether the test object is complete and works as the users and other stakeholders expect
- To build confidence in the level of quality of the test object
- To prevent defects
- To find failures and defects
- To provide sufficient information to stakeholders
- To reduce the level of risk of inadequate software quality
- To comply with contractual, legal, or regulatory requirements or standards, and/or to verify the test object's compliance with such requirements or standards

Causes of software defects

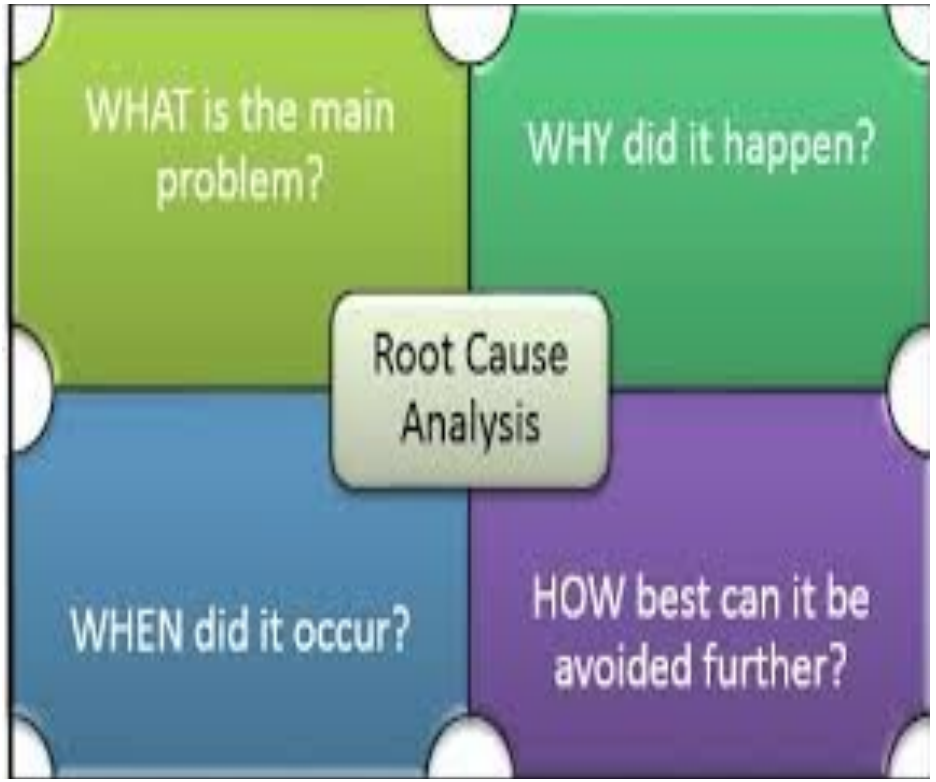
Human action that produces incorrect result

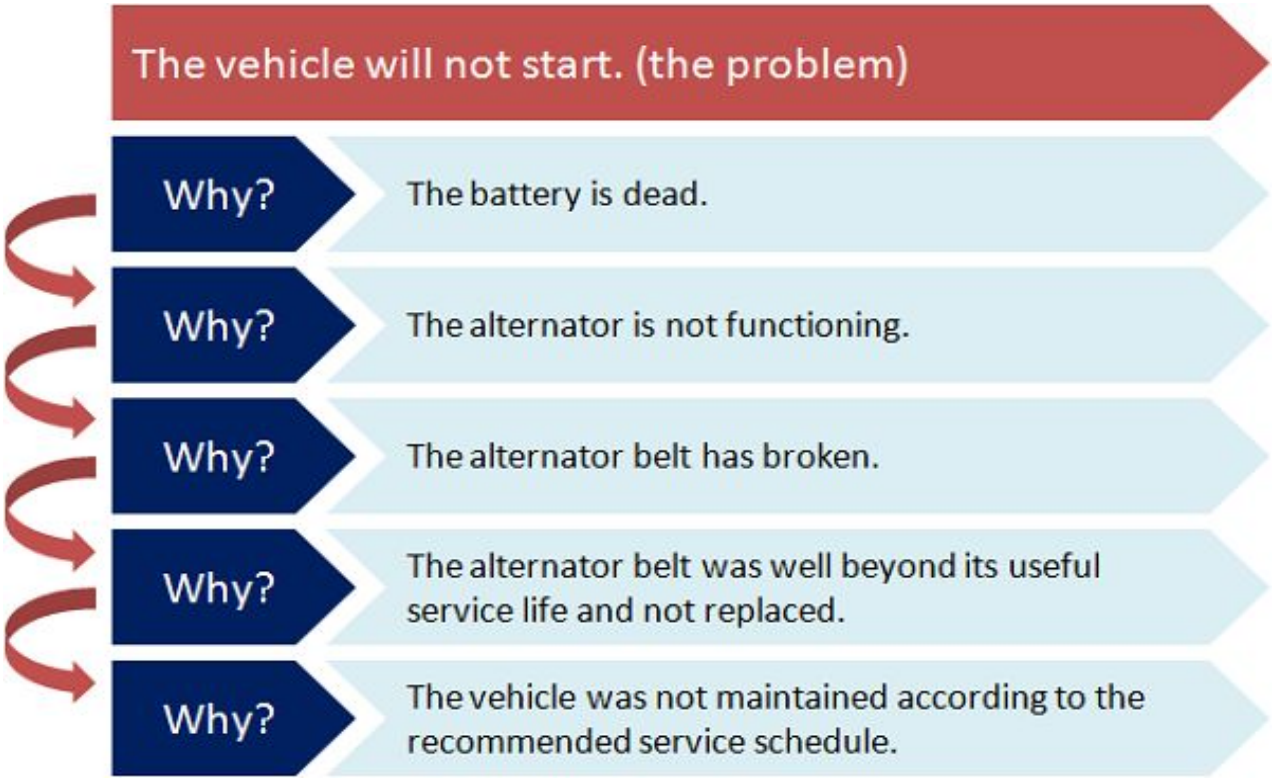


Deviation from expected result

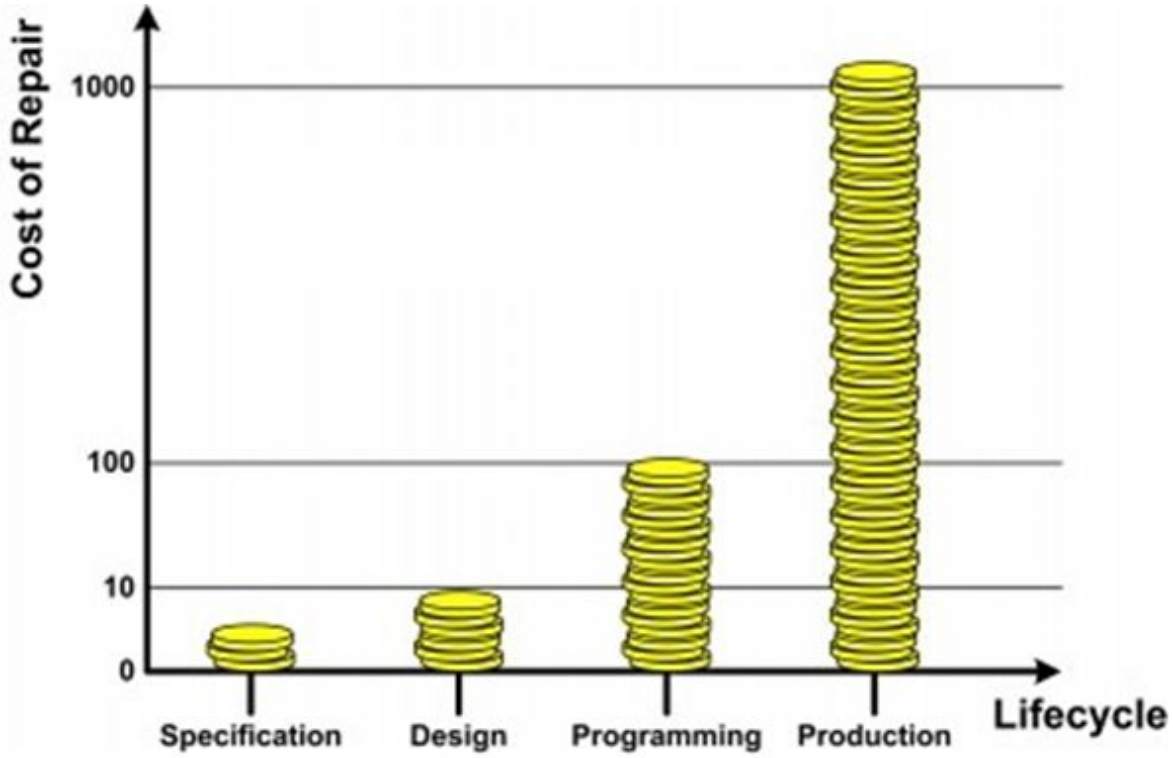
A flaw in a component or system that can cause the component or system to fail to perform its required function

Defects, Root Causes and Effects





Cost of defect



The cost of finding and fixing defects rises considerably across the life cycle

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Testing and Quality

Testing helps us to measure the quality of software in terms of:

- the number of defects found,
- the tests run,
- and the system covered by the tests.

Software Quality – ISTQB definition

Quality: the degree to which a system, component, or process meets:

- specified requirements
- customer or user needs or expectations

Software Testing - ISTQB definition

Testing is the process consisting of:

- all lifecycle activities,
- both static and dynamic,
- concerned with planning, preparation and evaluation of software products and related work products

Description of testing as a process

- to determine that software products satisfies specified requirements,
- to demonstrate that they are fit for purpose,
- and to detect defects.

Objectives of the test process

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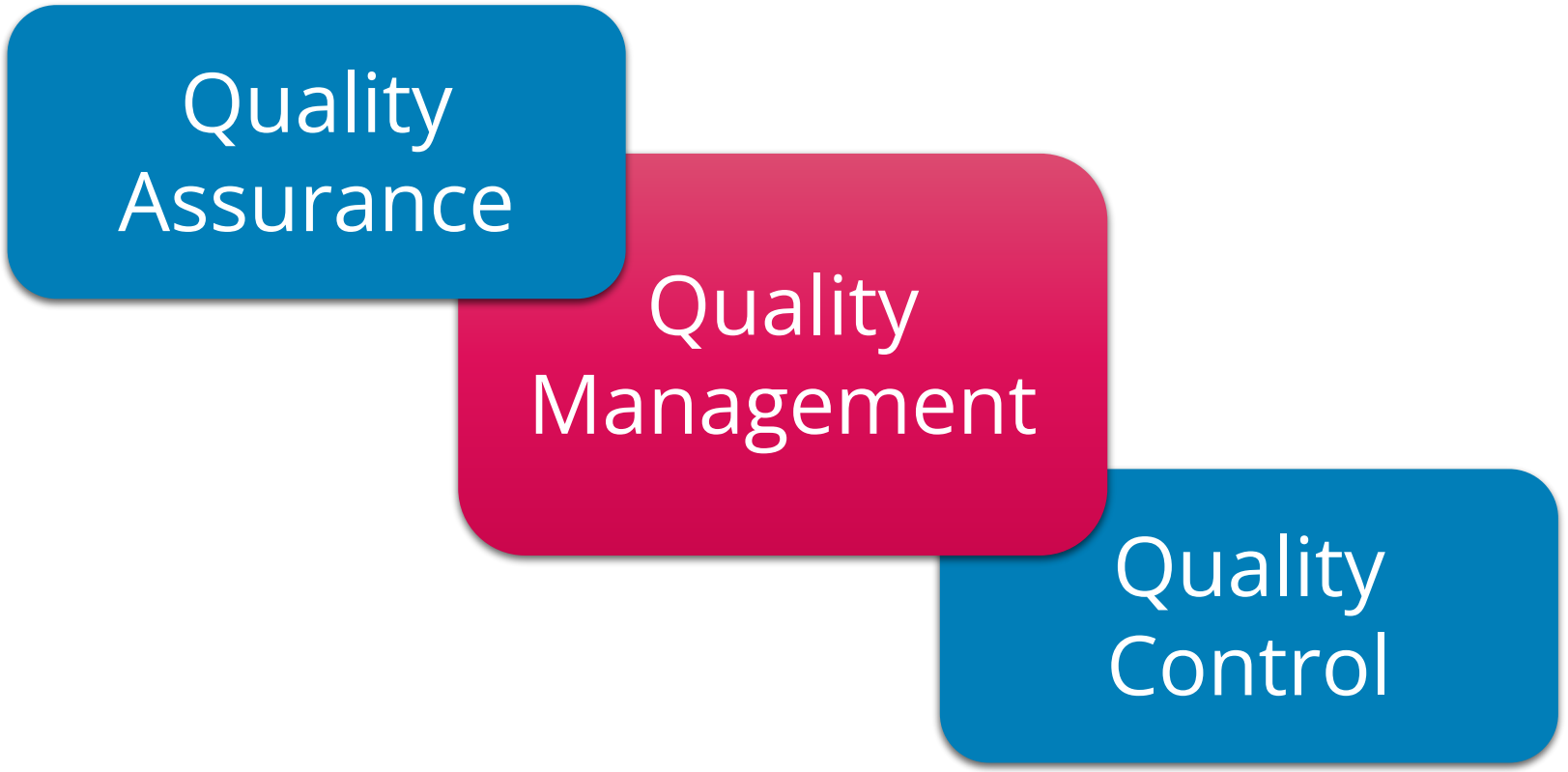
Quality assurance- ISTQB definition

Quality assurance: Part of quality management focused on providing confidence that quality requirements will be fulfilled



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Quality Assurance/ Quality Control

	QA	QC
What it is	Ensure quality in software **development process**	Ensure quality in software **products**
Aim	Improve development and test processes	Identify failures/ defects
Approach	Proactive	Reactive
Responsibility	Project Team	Testing Team
Lifetime	**Before** software development process	**Post** software development
Activities	Process Definition and Implementation Audits Trainings	Reviews Testing

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Testing Principles

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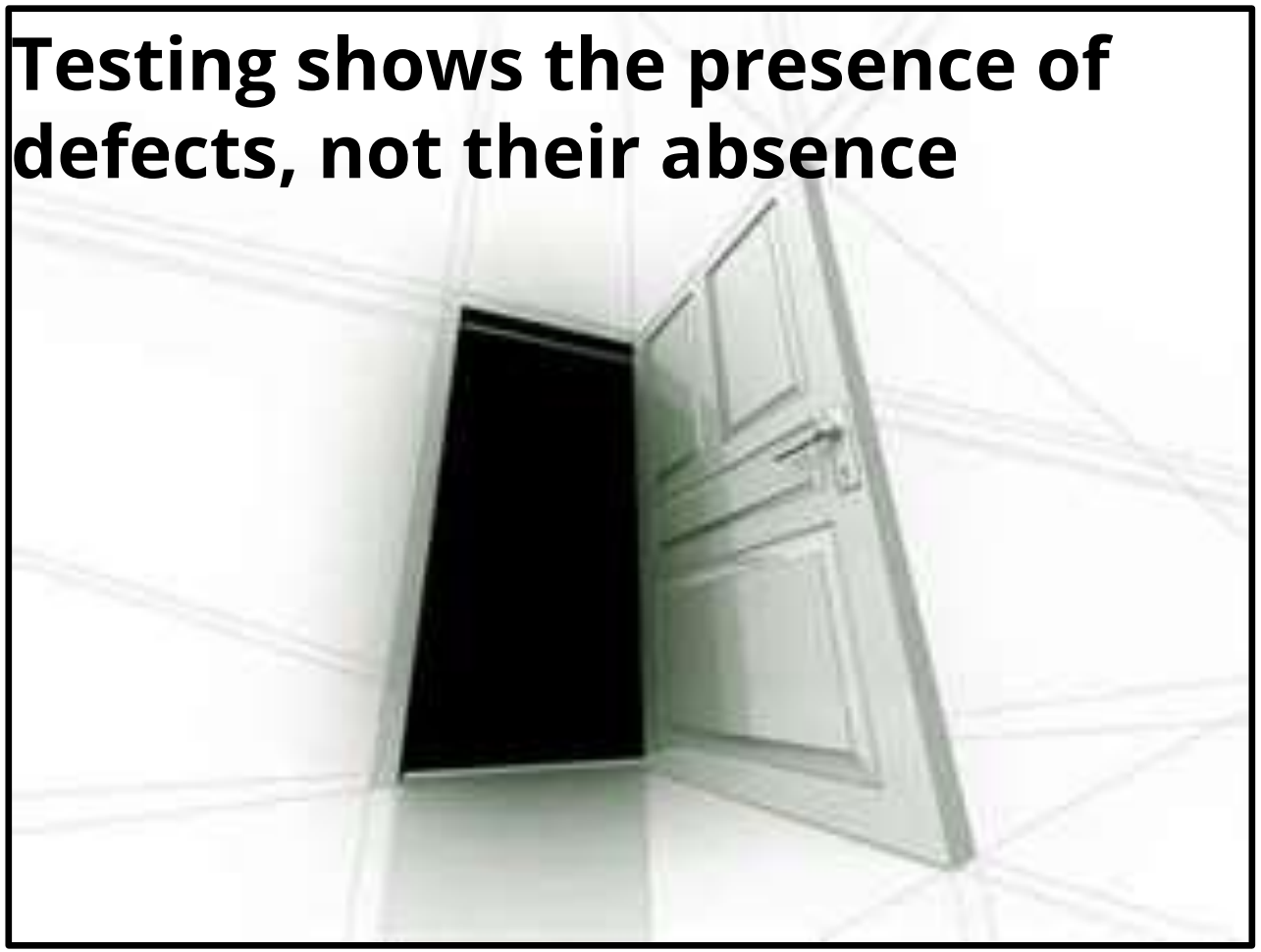
Principle 1

Testing shows the presence of defects, not their absence



Testing reduces
the probability of
undiscovered defects
remaining in the software
but, even if no defects are
found, testing
is not a proof of correctness

Principle 2

Exhaustive testing is impossible

Instead of exhaustive testing, use risks and priorities to focus testing efforts

Principle 3

Early testing saves time and money

Find defects early on when they are cheap to find and fix

Principle 4

Defects cluster together

Review defects and failures in order to improve processes

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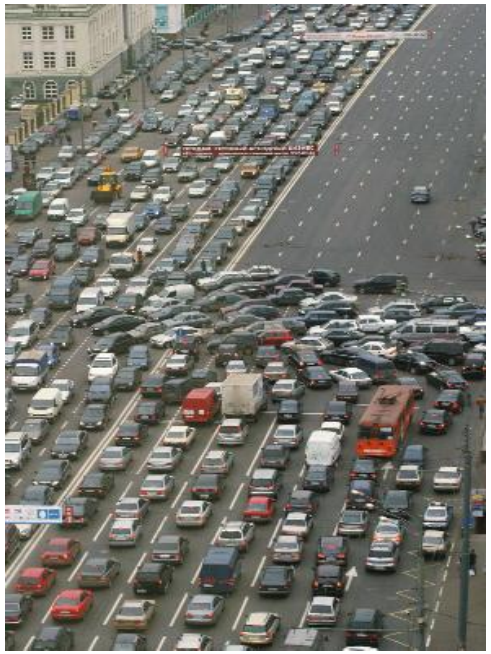
Principle 5

Beware of the pesticide paradox

Updated or NEW test cases potentially find more defects



Test cases need to be regularly revised, new and different tests need to be written

Principle 6

Testing is context dependent

The higher the possibility of losses, the more we need to invest in testing

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Principle 7

Absence-of-errors is a fallacy

The fact that no defects are outstanding is not a good reason to ship the software

Fundamental Test Process

Fundamental Test Process

A fundamental test process consists of the following main groups of activities:

- **Test planning**
- **Test monitoring and control**
- **Test analysis**
- **Test design**
- **Test implementation**
- **Test execution**
- **Test completion**

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Fundamental Test Process

Test planning

- Determining the scope, objectives, and risks of testing
- Defining the overall approach of testing
- Integrating and coordinating the test activities into the software lifecycle activities
- Making decisions about what to test, the people and other resources required to perform the various test activities, and how test activities will be carried out
- Scheduling of test analysis, design, implementation, execution, and evaluation activities, either on particular dates (e.g., in sequential development) or in the context of each iteration (e.g., in iterative development)
- Selecting metrics for test monitoring and control
- Budgeting for the test activities
- Determining the level of detail and structure for test documentation (e.g., by providing templates or example documents)

Fundamental Test Process

Test monitoring and control

- Gather information and provide feedback and visibility about test activities
- Guiding or corrective actions taken as a result of information and metrics gathered and (possibly) reported.
- Alternative version:
  - ✔ Measure / analyse results
  - ✔ Monitor / document progress
  - ✔ Provide information on testing
  - ✔ Initiate corrective actions

Fundamental Test Process

Test analysis

- Analyzing the test basis appropriate to the test level being considered
- Evaluating the test basis and test items to identify defects of various types
- Identifying features and sets of features to be tested
- Defining and prioritizing test conditions for each feature based on analysis of the test basis
- Capturing bi-directional traceability between each element of the test basis and the associated test conditions

Fundamental Test Process

Test design

- Designing and prioritizing test cases and sets of test cases
- Identifying necessary test data to support test conditions and test cases
- Designing the test environment and identifying any required infrastructure and tools
- Capturing bi-directional traceability between the test basis, test conditions, test cases, and test procedures

Fundamental Test Process

Test implementation

- Developing and prioritizing test procedures, and, potentially, creating automated test scripts
- Creating test suites from the test procedures and (if any) automated test scripts
- Arranging the test suites within a test execution schedule in a way that results in efficient test execution
- Building the test environment (including, potentially, test harnesses, service virtualization, simulators, and other infrastructure items) and verifying that everything needed has been set up correctly
- Preparing test data and ensuring it is properly loaded in the test environment
- Verifying and updating bi-directional traceability between the test basis, test conditions, test cases, test procedures, and test suites

Fundamental Test Process

Test execution

- Recording the IDs and versions of the test items or test object, test tool(s), and testware
- Executing tests either manually or by using test execution tools
- Comparing actual with expected results
- Analyzing anomalies to establish their likely causes (e.g. failures may occur due to defects in the code, but false positives also may occur)
- Reporting defects based on the failure observed
- Logging the outcome of the test execution (e.g., pass, fail, blocked)
- Repeating test activities either as a result of action taken for an anomaly, or as part of the planned testing (e.g., execution of a corrected test, confirmation testing, and/or regression testing)
- Verifying and updating bi-directional traceability between the test basis, test conditions, test cases, test procedures, and test results

Fundamental Test Process

Test completion

- Checking whether all defect reports are closed, entering change requests or product backlog items for any defects that remain unresolved at the end of test execution
- Creating a test summary report to be communicated to stakeholders
- Finalizing and archiving the test environment, the test data, the test infrastructure, and other testware for later reuse
- Handing over the testware to the maintenance teams, other project teams, and/or other stakeholders who could benefit from its use
- Analyzing lessons learned from the completed test activities to determine changes needed for future iterations, releases, and projects
- Using the information gathered to improve test process maturity

Revision History

Version	Date	Remark	Author
v.1	September, 2014		M. Harasym
v.2	October, 2018	Update according to new ISTQB Standard	V. Ryazhska

The end

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