



Software Testing

University of Oslo, Department of informatics

Agenda

Introduction
Course Structure
Recap of the first week
Weekly exercises



Summary

Why is testing **necessary**?

What is **testing**?

Test **principles**

Seven test principles in total

Fundamental **test process**

Five important activities in total

Psychology of testing



Part I: Close-ended questions

Question 1

A company recently purchased a commercial **off-the-shelf** application to automate their bill-paying process. They now plan to run an **acceptance test** against the package **prior** to putting it into **production**. Which is their most likely **reason** for **testing**?

- a. To build confidence in the application
- b. To detect bugs in the application
- c. To gather evidence for a lawsuit
- d. To train the users

Question 1: Clues

Which is their most likely **reason** for **testing**?

Characteristics of **acceptance** testing

Establish **confidence** the **system** | part of system

Examine **non-functional characteristics** of the system

Verify the **fitness** for **use**

Responsibility lies with the **customers** / users

Different **types** of acceptance testing

User acceptance testing

Operational testing

Contract and **regulation** acceptance testing



Question 1: Answer

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Question 2

According to the **ISTQB Glossary**, the word 'bug' is **synonymous** with which of the following words?

- a. Incident
- b. Defect
- c. Mistake
- d. Error

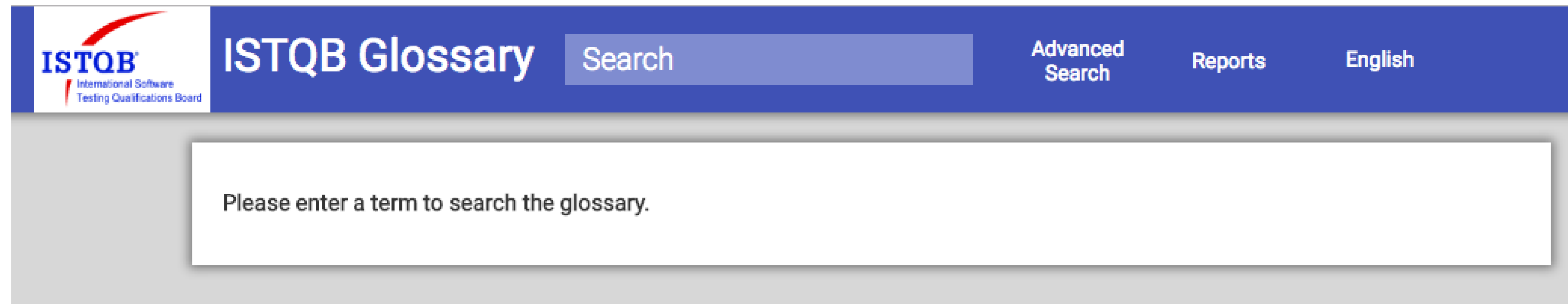


Question 2: Clues

According to the **ISTQB Glossary**, the word 'bug' is **synonymous** with which of the following words?

ISTQB Glossary

<https://glossary.istqb.org/>



Question 2: Clues

According to the [ISTQB Glossary](#), the word 'bug' is **synonymous** with which of the following words?

Incident

*“Any **event** occurring that **requires investigation**”*

Defect

*“**Flaw** in a **component** or **system** that can **cause** the component or system to **fail** to **perform its required function**, e.g. an **incorrect statement** or data definition.”*

Mistake / Error

*“A **human action** that **produces an incorrect result**”*



Question 2: Answer

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Question 3

According to the **ISTQB Glossary**, a _____ relates to **negative** consequences that **could occur**.



Question 3: Clues

According to the **ISTQB Glossary**, a _____ relates to **negative** consequences that **could occur**.

What **could** go wrong?

Estimation and **scheduling**

Sudden **changes** to **requirements**

Employees leaving, causing **delays**

Developers **showing off** skills, adding **unnecessary features**

These factors could result in “*future negative consequences*”

How to handle them? → **Risk** management



Question 3: Answer

According to the **ISTQB Glossary**, a _____ relates to **negative** consequences that **could occur**.

RISK



Question 4

Ensuring that **test design** starts during the **requirements** definition **phase** is **important** to enable which of the following test **objectives**?

- a. Preventing defects in the system
- b. Finding defects through dynamic testing
- c. Gaining confidence in the system
- d. Finishing the project on time



Question 4: Clues

Why is it important to start **test design** during the **requirements definition phase**?

What is the **purpose** of testing?

Finding defects

Reduce probability of undiscovered defects

Preventing defects

Ensure, as far as possible, that defects are not introduced

Gaining **confidence** in the level of quality

Presence / Absence of defects to indicate SW system quality

Provide **information** for **decisions-making**

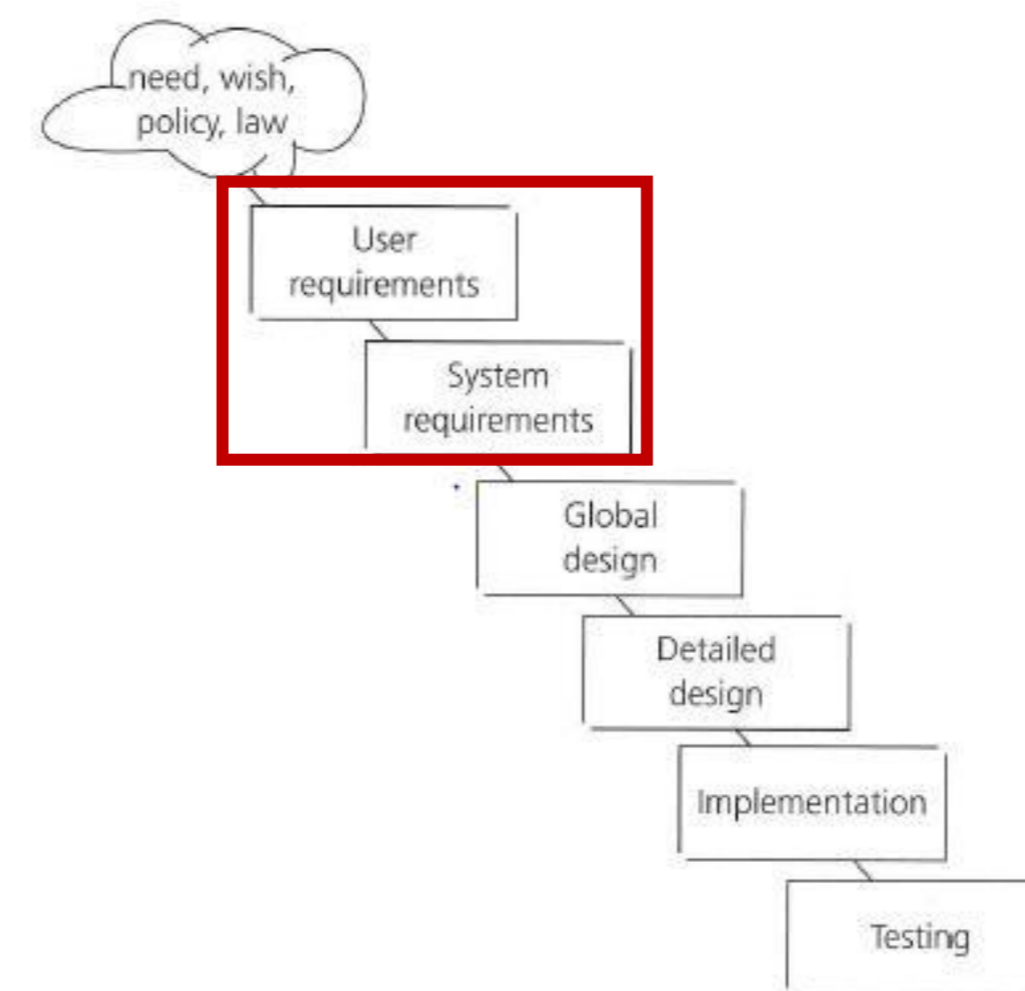
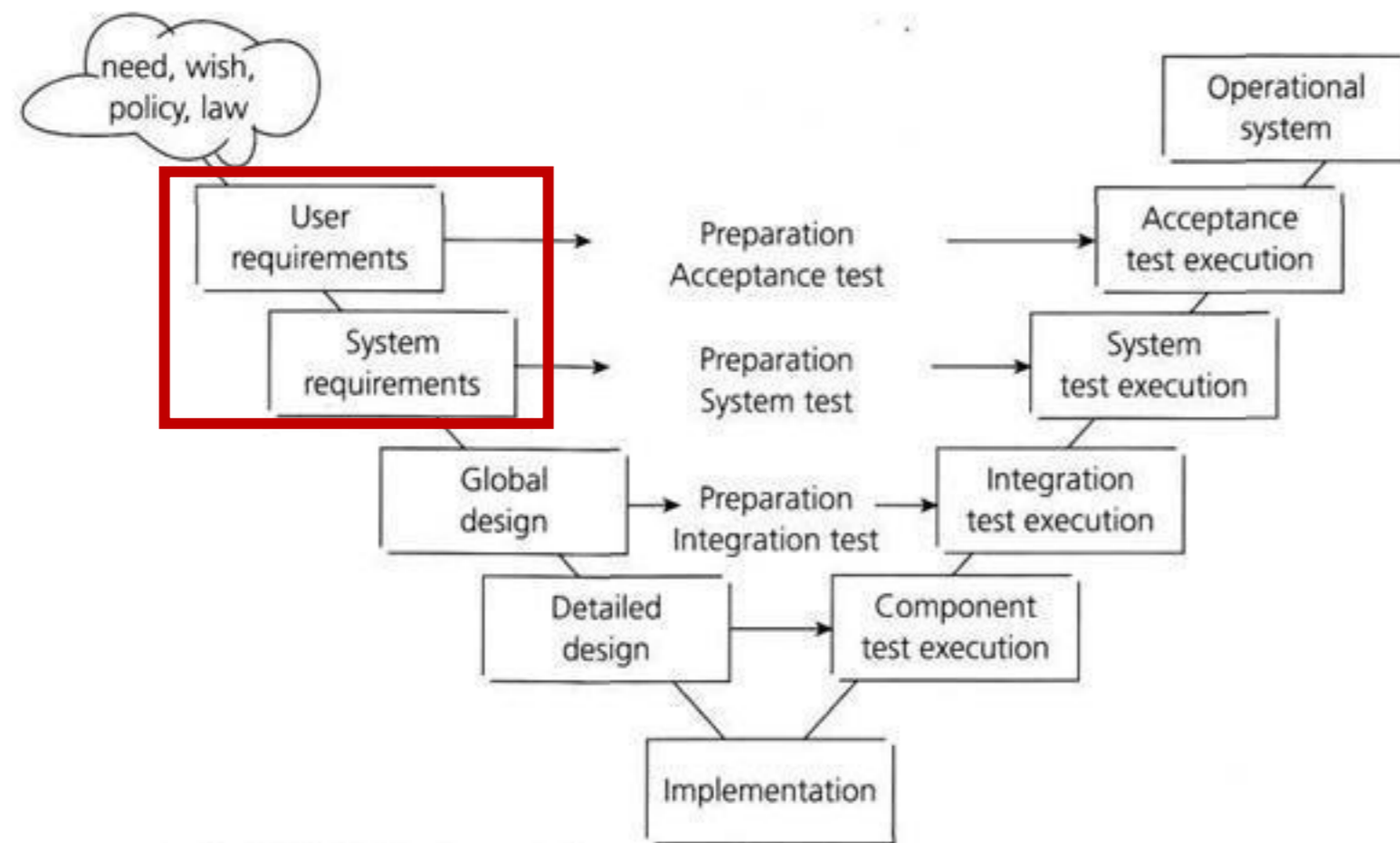
Testing grants different *insight* into various aspects of software



Question 4: Clues

Why is it important to start **test design** during the **requirements definition phase**?

Why start during the **requirements** definition phase?



Early testing

Testing should start **as soon as possible**



Question 4: Answer

Ensuring that **test design** starts during the **requirements** definition **phase** is **important** to enable which of the following test **objectives**?

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Question 5

An **exhaustive test suite** would include:

- a. All combinations of input values and preconditions
- b. All combinations of input values and output values
- c. All pairs of input values and preconditions
- d. All states and state transitions



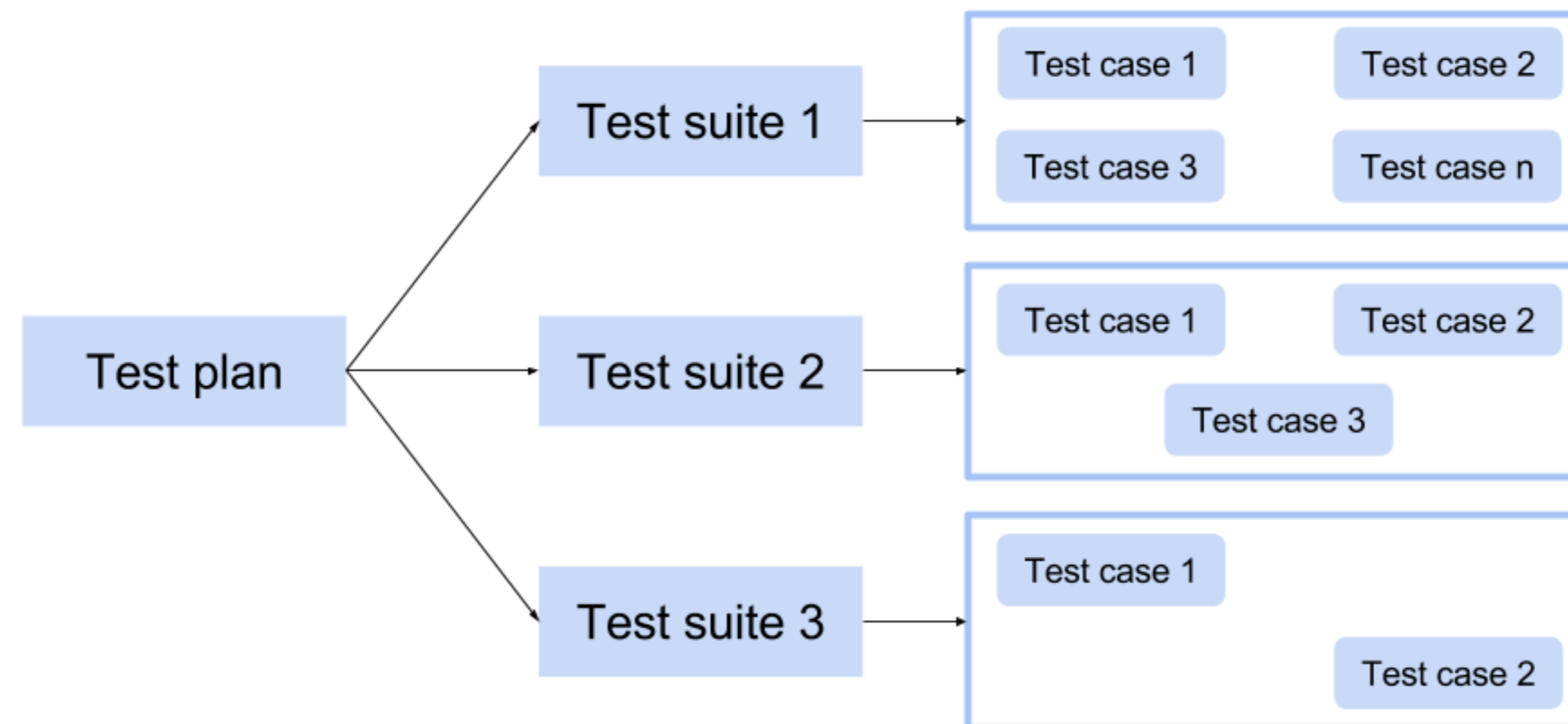
Question 5: Clues

An **exhaustive test suite** would include:

Test **suite**

Logical **collection** of several test **cases**

Test software program to show **specified** set of **behaviours**



Question 5: Answer

An **exhaustive test suite** would include:

- a. **All combinations of input values and preconditions**
- b. All combinations of input values and output values
- c. All pairs of input values and preconditions
- d. All states and state transitions



Question 6

According to the ISTQB Glossary, **regression testing** is required for what **purpose**?

- a. To verify the success of corrective actions
- b. To prevent a task from being incorrectly considered completed
- c. To ensure that defects have not been introduced by a modification
- d. To motivate better unit testing by the programmers

Question 6: Clues

According to the ISTQB Glossary, **regression testing** is required for what **purpose**?

Regression testing

After fixing a **defect**; have we introduced **new defects**?

Checks **unchanged areas** of the software

Confirmation testing

Retesting of **software** after defect has been detected and **fixed**

Confirm that the original **defect** has been successfully **removed**



Question 6: Answer

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Question 7

Which of the following is most **important** to promote and maintain **good relationships** between **testers** and **developers**?

- a. Understanding what managers value about testing
- b. Explaining test results in a neutral fashion
- c. Identifying potential customer work-arounds for bugs
- d. Promoting better quality software whenever possible



Question 7: Clues

Which of the following is most **important** to promote and maintain **good relationships** between **testers** and **developers**?

Importance of good **team dynamics**

People execute the process → People **affect** the **result**

Helping **developers improve** → **Better relationship** to testers

Promote and nurture **trusting** inter-team **relationships**

Constructive feedback

Learning **opportunities**



Question 7: Answer

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- c. Identifying potential customer work-arounds for bugs
- d. Promoting better quality software whenever possible



Question 8

Which of the statements below is the best assessment of how **test principles** apply across the **test life-cycle**?

- a. Test principles only affect the preparation for testing
- b. Test principles only affect test execution activities
- c. Test principles affect the early test activities such as review
- d. Test principles affect activities throughout the test life-cycle



Question 8: Clues

Which of the statements below is the best assessment of how **test principles** apply across the **test life-cycle**?

P1: Testing shows presence of defects

- Testing can show that defects are present, but cannot prove there are no defects.
- Testing reduces the probability of undiscovered defects remaining in the software; but even if no defects are found, this is not a proof of correctness.

P2: Exhaustive testing is impossible

- Testing everything is not feasible. We use risks and priorities to focus on test effort.

P3: Early testing

- Testing should start as soon as possible in the development life-cycle and should be focused on defined objectives.

P4: Defect clustering

- A small number of modules contain most of the defects discovered during pre-release testing.

P5: Pesticide paradox

- If the same set of tests will be repeated over and over, it will no longer find new bugs.

P6: Testing is context dependent

- I.e. safety-critical SW is tested differently from an e-commerce site.

P7: Absence-of-errors fallacy

- Finding and fixing defects does not help if the SW system is unstable or does not meet the user's expectations.

Question 8: Clues

Which of the statements below is the best assessment of how **test principles** apply across the **test life-cycle**?

Test principles deal with

Good practices for software testing

Early testing

Importance of **testing** throughout the **test life-cycle**

Limitations of testing

Exhaustive testing / Presence of defects

Considerations and **challenges** of software testing



Question 8: Answer

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Question 9

Is “evaluation of exit criteria” for of the fundamental test process?

- a. True
- b. False



Question 9: Clues

Is “evaluation of exit criteria” for of the fundamental test process?

Fundamental test process

Testing is *not* a single activity

Activities for each step in the test process → From planning to test closure

Activities

- 1 Plan and Control
- 2 Analysis and Design
- 3 Implementation and Execution
- 4 Evaluate Exit Criteria and Report
- 5 Test Closure Activities



Question 9: Clues

Is “evaluation of exit criteria” for of the fundamental test process?

1. Plan and Control

What / How / When / By whom?

2. Analysis and Design

Review test basis / Analyse test objectives

Design test cases, environments, data

3. Implementation and Execution

Group, prioritise test scripts / Write automated test scenarios

Run tests / Compare results / Repeat / Log outcome

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Question 9: Clues

Is “evaluation of exit criteria” for of the fundamental test process?

4. Evaluate Exit Criteria and Report

Assess test execution against defined objectives

Definition of Done (DoD)

Write / Extract test summary / Produce report for stakeholders

5. Test Closure Activities

Assess test effort: What has been delivered?

Archive delivered items (SW, tests, documentation) / Analyse lessons learned



Question 9: Answer

Is “evaluation of exit criteria” for of the fundamental test process?

- a. True
- b. False



Question 10

Pair the following **processes** with their corresponding **activities**:

1. Test plan	A. Group tests into scripts
2. Test analysis	B. Write or extract a test summary report for the stakeholders
3. Test implementation	C. Transform test objectives into test conditions and test cases
4. Test reporting	D. Establish the scope, objectives, and risks of testing

Question 10: Answer

Pair the following **processes** with their corresponding **activities**:

1. Test plan	A. Group tests into scripts
2. Test analysis	B. Write or extract a test summary report for the stakeholders
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4. Test reporting	D. Establish the scope, objectives, and risks of testing

Part II: Exercises and Open-ended questions

Exercise

A test team consistently **finds** between **90** and **95%** of the **defects present** in the **system** under test. While the **test manager** understands that this is a **good defect-detection** percentage, **senior management** and executives remain **disappointed**, saying that the test team **misses too many bugs**. Given that the **users** are generally **happy** with the system and that the **failures** which have occurred have generally been **low impact**, which of the **testing principles** is most likely to help the test manager **explain** why some **defects** are **likely** to be **missed**?

Exhaustive testing is impossible

Defect clustering

Pesticide paradox

Absence-of-errors fallacy

Open-Ended Questions

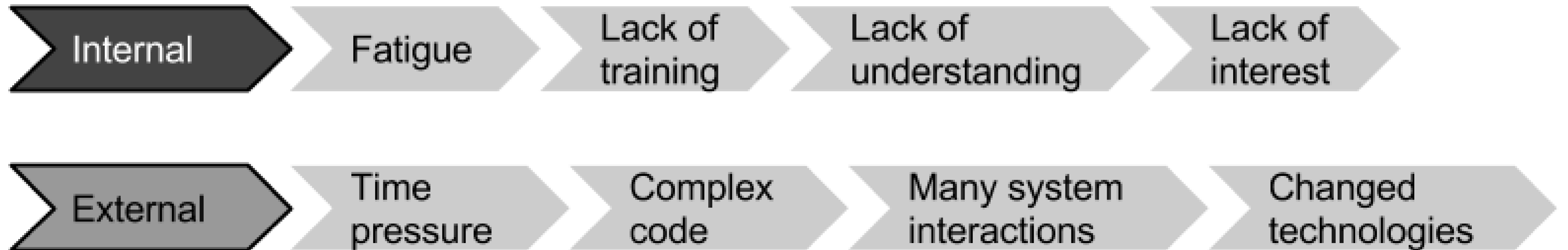
Can you give **examples** of **internal** and **external causes** of **defects**? Which one do you consider to be the most **important**?

Why is it important to **check** a software **system** if it is **fit for use**?

What **qualities** should a **tester** have, if you were to **hire** him?



Internal and External Causes



Checking if SW is Fit for Use

Fit for use → Acceptance testing

Does the software **product** meet the **customer's needs**?

Does the software **product** comply with the specified **requirements** / documentation?

Last chance of the customer to **discard** an insufficient / inadequate product

Adequate testing **protects** customer from **losses** caused by **poor software** products

Compares **results** to **expectations**

Validation

Did we build the *right thing*?

Verification

Did we build the *thing right*?



Qualities of a Tester

Problem-oriented

Desire to **find** problems / Ability to **solve** problems

Detail-oriented

Curiosity and Creativity

Approaching the test effort from new, varied **angles**

Professional pessimism

Being **realistic** about the product / **human behavioural** patterns

Good interpersonal and communication skills

Courtesy, understanding of others, good attitude, diplomatic, etc.



The seminar slides are made by

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