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ACCEPTANCE TESTING TYPES AND PROCESSES

*Tóm tắt*— Nowadays, the software is applied in all aspects in order to gain better quality of life. It is essential that a problematic programming product must not be released, especially if it is expected to work in serious work such as medical or transportation. Correspondingly, testing is upgraded continuously to detects bugs and ensure software quality. Therefore, In this paper, we are going to discuss forms, processes, participators, and tools of a significant part of testing - Acceptance testing..

*Từ khóa*— Software testing, Red box Testing, Acceptance Testing

# Introduction

In recent decades, the software industry grows rapidly, the number of products rockets up to meet social needs. Software products become an integral part of life, from electric games to business applications. Most people suffered disappointed when using a program that did not work as expected. Releasing a problematic software can lead to many problems, namely loss of money, time or business fame, and in the worst case, injury or death (ISTQB, 2018). To assess the quality of the software and reduce risk, software testing is engaged in the software development life cycle as a mandatory phase.

According to Guru99, in order to enhance testing systematic and easily identify all possible test cases at a particular level, tests are grouped based on where they are added in SDLC or by the level of detailing they contain. There are mainly four testing level: Unit Testing, Integration Testing, System Testing and Acceptance Testing.

This research aims at studying acceptance testing- one of 4 test levels, focusing on types, processes, participators, and tools.

# Overview of Testing

## Test level

According to Guru99, in order to enhance testing systematic and easily identify all possible test case at a particular level, tests are grouped together based on where they are added in SDLC or the by the level of detailing they contain. There are mainly four testing level: Component Testing, Integration Testing, System Testing and Acceptance Testing.

### Component Testing

Component Testing, also known as module or unit testing, aims to test each part of the software separately, checks whether that component is fulfilling functionalities. Developers take responsibility for this kind of testing.

### Integration Testing

Different software units are combined together and test as a whole to ensure the integrated system’s readiness for system testing. The purpose of this level is checking the data flow from one module to other modules, and this level is performed by testers.

### System Testing

On a complete, integrated system, both functional and non-functional requirements are evaluated to verify that the system meets the specification. This test is performed by testers.

### Acceptance Testing

Like system testing, acceptance testing typically focuses on the behavior and capabilities of a whole product or system to assess the system’s readiness for deployment and use by end-user, basically done by the user or customer. However, other stockholders can joint in this process.

## Testing’s contribution to success

It is popular in the program industry that delivered software and system cause failures or under stakeholders’ needs. However, using testing in the development life cycle in an appropriate way can reduce the frequency of such problematic deliveries.

### Requirement

If requirement reviews or user story refinement has testers involved in, defects in these work products can be detected effectively, helps decrease the risks incorrect or untestable features being developed (ISTQB, 2018). Therefore, cost and time will not be wasted.

### Design

If system designers and tester cooperate while design the system can increase each party’s understand of the design and how to test it, thus reduce the risks of fundamentals design fault and enable tests to be identified at an early stage.

### Development

Having testers support developers while coding can increase each party’s understanding of the code and how to test it, reduce the risk of bugs within the code and the tests.

### Verify and validate

Testers verify and validate the software before releasing can defect missed failures and support removing the defects. This increases the likelihood that the software satisfies requirements and meets stakeholder needs.

To sum up, in every phase of development life cycles, the involvement of testers also leaps the quality of the product and contributes to success. Therefore, despite acceptance testing basically done by the customer, the testing team should join acceptance testing.

# Acceptance Testing

## Definition

As assigned in ProfessionalQA, the main goal behind acceptance testing is to check whether the developed software product passes the acceptance norms defined on the basis of user and business requirements, so as to declare it acceptable or non-acceptable for its use by the users. Acceptance testing is one of the last types of software testing performed over software or application. It is conducted by a pool of targeted users to ensure the readiness and quality of the system from the user's perspective, which allows the team to meet their needs and expectations.

Acceptance testing is also referred to as red box testing. Additionally, the acceptance tests are derived from the user story and are based on the acceptance criteria.

## Types of acceptance testing

### Alpha Testing and Beta Testing

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| **Criteria** | **Alpha Testing** | **Beta Testing** |
| *Member* | Testers | Clients/ End users |
| *Test location* | Developer’s site | Clients/ End users location |
|  | Reliability and Security Testing are not performed | Reliability, Security, Robustness are checked |
| *Test techniques* | Both the white box and black box | Black Box Testing |
| *Test environment* | Lab environment/ testing environment | Real- time environment |
| *Time* | Long execution cycle | Only a few weeks of execution |
| *Fix bugs* | Immediately | In future versions of the product |
| *Objectives* | Alpha testing is to ensure the quality of the product before moving to Beta testing | Beta testing also concentrates on the quality of the product, but gathers users’ input on the product and ensures that the product is ready for real- time users. |

### User Acceptance Testing (UAT)

User acceptance testing of the system is typically focused on validating the fitness for use of the system by intended users in a real or simulated operational environment. The main objective is building confidence that the users can use the system to meet their needs, fulfill requirements, and perform business processes with minimum difficulty, cost, and risk.

### Operational Acceptance Testing (OAT)

The acceptance testing of the system by operations or systems administration staff is usually performed in a (simulated) production environment. The tests focus on operational aspects, and may include:

* Testing of backup and restore
* Installing, uninstalling and upgrading
* Disaster recovery
* User management
* Maintenance tasks

## Testing in processes

### Activities

TEST CASEPREPARATION

ACCEPTANCE/ REJECTION BASED ON TEST RESULTS EVALUATION

TEST EXECUTION

RECORDING & EVALUATING RESULTS

* Test case preparation: Preparation of test cases, on the basis of combined requirements of both business and end-users.
* Execution: These test cases are executed on the software product.
* Documentation: Results are recorded and compared with the expected results, in accordance to specified acceptance criteria, for meeting the requirements.
* Evaluation: The number of pass or fail of these test cases decides the software suitability for getting accepted or rejected.

### Acceptance Testing Criteria

There are three criteria:

* Functional Criteria.
* Non- functional Criteria.
* Performance Criteria.

## Participators

### The Users

#### Active Users

Active Users are the people who interact directly with the system, so they would have been key sources not only of functional requirements but also of performance, usability and other non-functional requirements as well. Much of what is built into the system is intended to meet these people’s needs, so some (or many) of them should definitely be testers.

#### Passive Users

Passive users don’t interact with the system directly but are impacted by the system none-the-less. For example, they may receive reports (e-mails or notifications from the system), or their jobs may include using the information the system produces, or they may supervise Active or Passive Users. The acceptability of the system for these people’s purposes is no less important than for the Active Users, so some of these people should be testers as well.

### Business Analyst

* BA responsibilities in acceptance testing are:
* Identifying Testers: Users (Active users/ Passive users), stakeholders…
* Planning Tests: Major focus of acceptance testing is to check how the system will actually be used in practice instead of finding bugs. Because of different purpose, planning for acceptance testing is significantly different from planning the other types of testing.
* Determining when to do acceptance testing: There is a mindset that acceptance testing must be performed at the end of the project, but doing this crucial evaluation too late might land up in significant risks. Issues found in acceptance testing can cause time delays or forcibly accepted products.
* Delivering business value through acceptance testing: Actively participating in UAT planning and execution is an important way for the BA to ensure that value is indeed delivered.

### Quality analysis

* Review of acceptance criteria: The acceptance criteria must be clear, consistent, comprehensive, covers non-functional characteristics and provides measurable pass/fail criteria.
* Review of acceptance test cases: Previously defined acceptance criteria should be covered in the acceptance test cases.
* Traceability: Traceability between requirements/ user stories, acceptance criteria, test cases, and defects facilitates acceptance testing as it clarifies dependencies and provides simple access to related information.
* Coverage analysis based on traceability: If bi-directional traceability is established, it is possible to perform a systematic coverage analysis.
* Review of test report: Test reports should be clear, consistent and comprehensive. They should contain all information provided by the tester to support decisions about the release.

## Tool support

From both software testing domains and the business analysis, these tools for acceptance testing are derived (ISQTB, 2019).

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| **Tool Type Usage for Acceptance Testing** | **Requirements** |
| Requirements management tool | Description of acceptance criteria  Traceability between tests and requirements  Coverage analysis |
| Agile project management tool | Description of acceptance criteria  Traceability between tests and user stories  Coverage analysis |
| Business process management tool | Model business process and rules  Analyze defect impact on business processes |
| Test management and automation tool | Manage acceptance tests and test execution campaign  Manage test execution results |
| Model-based testing tool | Generate test cases from business process  models  Manage traceability between business process  models, business rules, requirements and test  cases |
| Defect / Incident management tool | Manage defect / incident lifecycle |

# Conclusion

In conclusion, there are 4 levels of testing: Component, Integration, System and Acceptance Testing. Testing involvement in every phase all contributes to success of the application or system. This paper discusses 3 types of acceptance testing: alpha and beta testing, user acceptance testing (UAT) and operational acceptance testing (OAT). Testing process with activities, acceptance testing criteria, and participators also are studied. Finally, tools are reviewed. This research paper supply understandings that can be learned to upgrade acceptance testing.

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