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Paradigm Shift in Software testing

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Paradigm Shift in Software Testing

Paradigm Shift in QA Processes

Abstract

A quality system is defined as the organizational structure, processes, procedures and resources for implementing quality management. Quality management includes quality control and quality assurance. In today’s world, with extremely high expectation from clients and customers with ever changing requirements and technologies, new innovations play a key role in testing to help business applications deliver on the demanding needs of the business.

**A Paradigm shift in QA Processes can help organizations in reducing cost and timelines while improving overall quality**

Paradigm: A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline. [Wikipedia.com]

Core Values: Core values are the fundamental beliefs of a person or organization. The core values are the guiding principles that demonstrate behaviour and action.

These Core values serve the culture of any Organization and help personnel to determine the right direction for their careers. They assist in fulfilling their personal goals as well as the business goals of the company.

In any given organization, there are many different types of core values. In the broader term, Core Values can be defined as below:

The QA methodology followed by any organization should be measured against the “process” Core Value, so that high quality deliveries may be made consistently.

1. **Revisit the QA processes in the Organization**

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An organization should measure its QA process in order to deliver a high Quality Product to the End Consumer. In order to fulfil the core values of any organization, the QA perspective becomes extremely critical and challenging.

In today’s world, with extremely high expectations from clients and customers and ever changing requirements and technologies, it has become very important to look back at our quality processes.

The cost of software bugs is high and this is applicable to the whole industry. This cost affects not only the organization which is developing the software, but their end users as well.

Early involvement of the QA team and the flexibility to absorb changes are the keys to successful quality assurance. The mindset of the organization should change and they should go beyond their traditional techniques and tailor their processes such that there is direct involvement of the QA team from the requirements phase itself.

2. Revisit the vision of organization with respect to the testing team

There was a time when there was no need for a separate testing team but with the emerging trends and technologies, it has become necessary to have a dedicated testing team with its own mature processes.

On one side we need a dedicated team, but on the other side we need to have a unified team. Collaboration between the development and QA teams is necessary to bring quality and stability through the SDLC. This really helps in enhancing the quality of test plans against business requirements.

The focus of QA team should be revisited. The QA team should focus on testing and qualifying the business processes rather than features.

The QA team should focus on criticality of each business requirement, and each corresponding scenario should be covered as a part of the test plan.

Metrics have a key role in today’s testing. There should be a set of metrics identified to be managed based on their business value.

The QA process should include a blend of manual and automation testing with a higher organizational focus on automation. This would help free up resources to manually test modules which have frequent functionality changes.

3. Revisit the vision of organization with respect to testing environment

There was a time when not only did we not need a separate QA team; we also did not need separate testing environments. But today it has become extremely important to have dedicated test environment. Test environments play an important role in achieving business values.

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- Test environment should be based on the following characteristics:
  - Should be mirror to production environment
  - Configuration should be as close to production as possible
  - Hardware/Network should be same as the live system
  - Security of the Test environment should be taken care properly
  - Dataset available for testing should be the same as that in the production environment
- The process of applying builds and patches to the test environment should be automated and Team should ensure nightly runs of the test harness suite

4. From Previous Generation to Next Generation testing

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<th>Approach Of Traditional Testing</th>
<th>Measurable Parameters</th>
<th>Approach After Paradigm Shift</th>
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<td>The focus is more on validating product and ensure there are no defects</td>
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<td>No client side testing</td>
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<tr>
<td>Business analyst had no role</td>
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5. **Framework for the new paradigm in Software Testing:**
Below is the diagram for the framework suggested after a Paradigm Shift.

![Diagram](image-url)

**Figure 1 Framework after paradigm shift**
This section explains key points which will help any organization in achieving their business goals and to implement the framework.

5.1 Team Structure: In order to deliver product with high quality, the team should consist of QAs [Quality Assurance], BAs [Business Analyst] and SMEs [Subject Matter Expert].

- The Business Analyst’s role would be to take care of defining the business requirements and helping to convert the requirements into test cases. The involvement of the BA would help in bringing extended test coverage with an optimized approach to time and cost.
- Subject Matter Experts would guide the QA team in terms of the domain, product, etc.
- Quality Assurance team would absorb the input given by BAs, SMEs and will map their testing with organization’s core value. They would focus on business processes and goals during testing.

The team structure can be shown diagrammatically as:

![Team Structure with Paradigm Shift]

5.2 Test Metrics: Traditionally, testing metrics include quality and productivity metrics captured across the testing lifecycle. They did not allow a benchmarking of the current performance of the team vis-a-vis the business processes and goals. Rather than focusing on project based metrics, the organization should define business driven testing metrics, which would help in measuring the success of the QA teams against organization goals.

Below are some key metrics which are followed aggressively after paradigm shift:

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- PRDR: Post Release Defect rate
- Patterns: Use of Test/Defect Patterns to predict the defects
- CTQ Ratio: Ratio between CTQ [Cost, Time, Quality ]

5.3 Testing Business Processes: The QA team should focus on testing against business processes. They should aim to find more bugs towards the non-compliance of business processes.
- The same approach should be mapped while writing the requirements and test plans.
- The QA team should be involved at the requirement phase of software development life cycle and should help design ‘testable’ requirements. Later, these requirements can be converted into subsystem or derived requirements.

5.4 Testing for End Consumer Experience: This will lead to a greatly enhanced understanding of the system.
- Testing any system with this approach in mind would lead to customer delight and greater usability. The QA team should apply similar patterns to testing and finding defects.
- The historical data available with the QA determines the patterns of defects which would really help in predicting the quality before the system is shipped to production.
- Client performance testing is mandatory to have quality in terms of user experience.
6. Conclusion

In conclusion, it may be noted that by changing the way an organization thinks about its QA processes, better software quality may be achieved. With the new framework in place for testing phase in SDLC, we can achieve both quantitative and qualitative benefits at organization level rather than at project level.

Quantifiable values
- Finding must-fix defects
- Finding deferrable defects
- Reducing risk by running tests
- Reducing cost and time

Qualitative values
- Improving reputation for quality
- Smoothing releases
- Increasing confidence
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7. References
   http://en.wikipedia.org/wiki/Software_testing
   http://www.rspa.com/spi/test-methods.html
About the Authors

**Preeti Arora** is working as Engineering Manager at Hughes Systique Corporation. She has about 8+ years of experience in managing and executing Manual and Automation Testing Projects from offshore. Her key strengths include Software Testing, Testing Tools, Automation, Project Management and Quality Processes. She has worked mainly on Functional and Integration testing at Production and preproduction phases of SDLC.

**Hema Ravi** Hema Ravi is the Senior Director for Product Qualification at Hughes Network Systems in Germantown, MD, USA. She has over 18 years’ experience in the software testing industry, and has worked on cellular data & wireless systems, satellite systems and OSS/BSS software. She manages the pre-alpha integration testing of the business systems for the HughesNet® range of products.
Appendix

(The links below have been checked to be working fine as on 6th Sept 2013)

SDLC = Software Development Life Cycle

RoI = Return on Investment

BA: Business Analyst

SME: Subject Matter Expert

QA: Quality Assurance