Shift Left - Mantra for Better Testing

by

Roopa Satish, Dipti Jana and Anjana B Reddie, Principal Consultant, Tech Mahindra

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Authors

Roopa Satish
Roopa.Satish@TechMahindra.com

Dipti Jana
Dj00118037@TechMahindra.com

Anjana B Reddie
anjana.reddie@techmahindra.com

Organization

Tech Mahindra Limited

45-47, KIADB INDUSTRIAL AREA, PHASE-II,
ELECTRONIC CITY,
BANGALORE-560100,
Karnataka, India
Shift Left - Mantra for Better Testing

Abstract

“Bugs are cheap when caught young”

Defects caught post development cycle, during production deployment or in post go-live state are difficult and costly to fix.

Catching them in requirement or development stage reduces cycle time and cost to fix. Shift left practised in Tech Mahindra has benefitted in cost optimization, early product launch, reduced live defects and improved customer experience. QA focus is shifted as left as possible, engaging with the business, design and development teams at very nascent stage and weeding out design or planning dependencies, preventing them from creeping into subsequent cycles. It advocates transformation from defect detection to defect prevention - very early in the SDLC.

Key Strategies adopted as part of Shift Left are:

Demand Planning and Forecast :- Test analysts engage with business and operational stakeholders, and provide a forward view of the demand. This enables planning and finalisation of budget, resourcing, test strategies ahead of time.

Static Test Assessment: Test teams help in formulating unambiguous, testable and measurable acceptance criteria, raise static defects for non-compliance to these criteria and follow-up till defect resolution. These requirements form the basis for further design and planning.

Unified Test Strategy :- The focus is to optimise test efforts across the different test phases, without compromising on quality of testing or product. It analyses dependencies on environments, stubs, automation and test data, ensuring that these can be fulfilled by respective teams before actual commencement of execution.

Risk Based Analysis:- Using principle of “Fail Fast and Fail Early”, Test analysts, designers and development teams collaborate to assess the risks in terms of impact and likelihood of failure. Test prioritization is accordingly done, to achieve effort and schedule optimisation.

Following metrics reflect the Shift Left Benefits

1. Static Testing Effectiveness
2. Testing Effectiveness
3. Cost/Test Points
4. Business Delivery Adherence

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**Shift Left - Mantra for Better Testing**

**Business Challenge: Need to Transform & Test differently**

In today’s scenario of fierce competition and reduced margins, outsourcing companies have been compelled to think out of the box and come up with innovative solutions and ideas which are both cost effective and ensure that quality goals are upheld and exceeded. Challenges are the triggers for innovation. This paradigm shift has redefined the role of testing from pure Quality Control to Quality Assurance and set the stage for reinventing End-to-End Testing to achieve stringent cost and quality goals.

A long talked about theory in software development is the idea of “shifting left,” where software development and testing teams collaborate to bring higher degrees of quality, usually through testing, earlier in the software development life cycle.

The concept of “Shift-Left” is not new, but the extent of test team involvement at all critical stages of the project to really drive-in clear business benefits is the key differentiator. As an improvement over this normal shift-left theory, the testing team proactively interacts along with business owners and application owners during initial business requirement discussions for converged planning to build and test a solution that is required by the customers, rather than merely testing the solution built to validate the functionality. This has yielded far better results compared to conventional developer-tester collaboration approach.

This approach goes to the extent of development being driven by Test design created upfront to ensure requisite functionalities specific to customer expectations developed in strict accordance to customer experience.

At the ground level, change in process was needed, which could address the challenges of:

- Controlling costs
- Varying demand
- Test Prioritisation based on business risks
- Measuring Test Performance and Benefits

Tech Mahindra has delivered Testing Services to a Tier 1 Telecom Operator in UK through an innovative Test Factory Model. This was a Managed Services engagement with a team size of 500+ and delivering a gamut of testing services and value-adds through continuous innovation and transformation. Through this innovative model, Tech Mahindra has delivered several key benefits to the customer such as:

- Cost reduction
- Improvement in Delivery Adherence
- Reduction in Faults Passed to Live

This could only be achieved by embedding best industry practices, efficiency, services sharing, continuous innovation and stringent KPIs in the design itself, rather than as add-ons.
Test expertise was separated into layers, which perform specialised services for the test lifecycle in order to make sure that Shift-Left approach is adopted in true sense to get the real benefits from Business users till application users perspective.

Leadership is designed to exist in both the horizontal Layers and the vertical Lines of Businesses. Each layer has clearly defined roles and responsibilities, which enable smooth functioning within the layer, and proper traction between layers crucial for Factory Operations. Each layer was resourced with the relevant skill levels, thus enabling them to deliver the specialised services defined for each of them.

**The Solution – Shift Left approach for Test Factory Operating Model**

One of the key functions of the Test Design Centre in the factory was adopting the shift-left strategy and engaging with the different stakeholders to enable an effective and efficient test design or solution.
Core-Activities Of Shift Left:

- **Demand Management**
- **Requirement Quality Assurance**
- **Test Efficiency - Risk Based Testing**

**Demand Management:** It is an integral part of Shift Left approach and a starting point for all the other activities in the test lifecycle

- Early visibility of new Products to devise early Product Test Strategy
- Rough Order Magnitude Effort Estimation for budgeting and control
- Early Engagement (Shift-Left) to enable closer cohesion between Business and
- Early visibility of Test Requirements to compute New Test environment requirements
- Resource Ramp Up Needs
- Training needs
Requirement Quality Assurance:

Static Testing – Design Validation Testing:

Static testing is carried out in the early cycles of the project and includes validation of requirements and design. The static testing is done with the purpose of finding defects early in the life cycle and thus prevents defect seepage into the later stages of the project, which can prove to be very expensive.

Requirement and Design verification and validation is done during design collaboration calls using the checklists developed for this purpose. Defects found during static testing are logged into defect management tool and is tracked till closure.
Unified Test Strategy

It is an overall, high level strategy for testing end-to-end (from unit test through UAT, ORT and post deployment testing). The critical coverage will be all phases of testing/quality control with clear responsibilities and hand-offs between them (e.g., expectations and high level focus for each phase). A converged test planning is built upon this strategy, by identifying dependencies of data and environment for an end to end test phase.

This helps in:

- Removal of duplication across test phases, thus optimizing test efforts
- Increased Trust – reduced extra ‘confidence’ testing in each phase
- Fail Fast
- Plugging gaps in coverage
- Building to customer experience and Right First Time Focus
- Traceable flow through from requirements through to delivery

Figure 4: Design Validation process & related stakeholders
Test Efficiency - Risk Based Testing

Risk based analysis is carried out to determine the impact of failure and likelihood of failure for each test scenario/test case.

Risk based testing approach is used for functional, non-functional and regression types of testing. Once the test scenarios/test cases are established, then the priority for the test cases is decided on the basis of the risk analysis done.

The impact of failure, wherever possible, will be discussed with the business analyst/CE lead/designer while the likelihood of failure will be discussed with the development team. Based on this analysis, the values for the two parameters will be assigned. The results of the RBT analysis will be used to determine the priority of test cases. Tests with higher risks will be executed first while those with lower priorities will be executed later in the cycle or may not be executed at all.

During course of test execution, RBT discussion will be initiated again with the customer delivery leads based on the Pass/Fail percentage to evaluate on the product quality to decide whether to continue with testing and release with a caveat or to have a hard stop for further notice.
**Likelihood Of Failure** → In live operation, if no testing was undertaken in an area

**Impact of Failure** → In live operation, as experienced by a customer

**Challenges in Implementation**

Main challenge was to align with different processes, testing cycles and customer mappings of various programmes to a new test factory operating model – Shift Left processes and measurements, while separating expertise into different layers performing specialized functions without deviating from quality deliverables.

These were addressed through clearly defined governance structures in the form of identifying Critical Success Factors, Communication channels like Management Reviews, inter and intra layer interfaces and governance framework, RACIs.

![Figure 6: Risk Based Testing Matrix](image-url)
Success Factors

Some of the Key Engagement Achievements are summarized below:

- Business Assurance - Consistent Delivery Adherence and Test Effectiveness exceeding customer targets and improved Business Assurance
- Step Change in Cost - Significant year-on-year reduction in test costs given to client. 45 - 50% Savings to client upfront along with Year on Year rate reduction by leveraging economies of scale and maximizing resource utilization
- Operating Model Improvement - Improvements in Operational Readiness and test throughput in targeted areas enabling shorter Concept-To-Market
- Value Via Efficiency - Measured extra value and efficiency savings delivered via our value initiatives such as Dynamic Risk-Based-Testing, Shift Left and Shift Right Effectiveness. The advanced Risk Based Testing approach helps to take informed decisions and supports in increasing the risk appetite

By realigning the operations to support Test Factory Shift Left approach, there have been considerable achievements in the following dimensions:
Test Effectiveness – Quarterly: Defect Percolation in Live should be minimum – Consistently achieved at 100%

![Test Effectiveness: Factory](image)

*Figure 8: Customer Centric KPI - Test Effectiveness*

Static Test Effectiveness – Release wise:

![Static Testing Effectiveness](image)

*Figure 9: Test Factory - Internal KPI – Static Test Effectiveness*
Delivery Adherence – Quarterly: Is consistently achieved at 100%

![Delivery Adherence - Factory](image)

*Figure 10: Customer Centric KPI – Delivery Adherence*

Cost/ Test Points – Release Wise: Downward trend maintained

![Cost/Test Point](image)

*Figure 11: Customer & Test Factory Centric Internal KPI – Cost / Test Points*
Authors’ Biographies

1. **Roopa Satish** is having 16+ years of experience, seasoned in Global delivery, Programme Governance, outsourcing, Test consultancy, Transition, Transformation and Test Factory & TMMi Implementation. She has set up accounts and teams from scratch and managed large scale & complex transitions, programs with delivery teams of 175+. Responsible for writing and developing Test Factory Processes and related handbook on which TMMi certification assessment was based and evaluated for Test Level 5 at one go.

2. **Dipti Jana** is a Certified Test Manager with 18 years of experience in Web Applications Development, PMO and BI, Testing and Test Management, Knowledge Management, Vendor Management, and Pre-sales. She has worked with Corporate, Government and Academic Organizations. She has worked extensively in auditing projects for test quality, setting processes, monitoring KPIs and TMMi implementation, setting up and publishing dashboard reporting for Test Factory.

3. **Anjana B Reddie** – is a Delivery Manager with 20+ years of experience in managing complete lifecycle in several development and testing projects in Telecom, Embedded and ERP domain. She has managed complex delivery projects and was part of the core team that set-up and implemented the test factory operations. She was also a key member of the team that worked towards achieving TMMi Level 5 certification. She is a certified CSQA professional has been a keen quality practioner.

Appendix

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<thead>
<tr>
<th>Acronym</th>
<th>Expansion</th>
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<tbody>
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<td>TechM</td>
<td>Tech Mahindra Ltd.</td>
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<tr>
<td>TMMi</td>
<td>Test Maturity Model Integration</td>
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<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
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<tr>
<td>TQC</td>
<td>Technical Quality Control</td>
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<tr>
<td>PDT</td>
<td>Post Deployment Testing</td>
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<td>ROM</td>
<td>Rough Order Magnitude</td>
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<td>IOF</td>
<td>Impact Of Failure</td>
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<tr>
<td>LOF</td>
<td>Likelihood Of Failure</td>
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<tr>
<td>RBT</td>
<td>Risk Based Technology</td>
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