



## PRODUCT QUALITY ENGINEERING

### Abstract

The rising importance of digital transformation has impacted various facets of the product development life cycle. For example, as the focus on rapid delivery and customer satisfaction increases, it is more important than ever to ship flawless products. These market demands have pushed the boundaries of Product Quality Assurance (PQA) to consider Agile, DevOps practices and provide continuous testing with a shift left approach.

Software product development and sustenance are a highly complex ecosystem. Hence it needs a different and unique test approach to ensure completeness. Furthermore, unlike conventional application testing, where the singular focus of the tester is to meet a customer's requirement, in product testing, the tester needs to adapt and align the test strategy to the product lifecycle stage (broadly classified as a new product, product expansion, product maturity and product sustenance) and the fast-changing market needs (for example, support new features/devices/browsers/cloud platforms). In summary, a product testing strategy requires an agile, flexible and adaptive mindset.

As an industry leader in test offerings, Infosys Engineering provides a holistic product testing approach involving best practices from Agile and DevOps services across various industry segments.

## Product quality testing

Understanding the key challenges faced in software product development for a large, diversified customer base in comparison to a conventional application development for a specific customer is the first step towards arriving at a robust product testing strategy.

Conventional application	Product
Controlled and predictable environment	Environment is dynamic with many unknown variables - demographics, geographies, platforms, browsers, devices etc.
Clear business vision/objective	Evolving/changing product vision/objective based on market dynamics.
Clearly defined timeline expectation	Need for accelerated time to market to win over the competition.
Need not worry about market dynamics	Need to have the edge over competition to succeed. So, market dynamics is pivotal.
Clear understanding of customer expectations and platforms to seek direct feedback	Predict/guess market requirements and attempt to bridge the gap between end customer need and product features.

These challenges help derive the key considerations while strategizing product testing across the product life cycle (PLC):

- Understand the target audience/ segment and their environments.
- Understand their requirements and existing market gaps
- Understand the competitor's strengths and weaknesses
- Understand the short term and long-term product goals
- Adopt an execution methodology, supporting tools/technology and best practices aligned to product goals for each PLC stage and ensure faster time to market with quality.



## Adaptive Product Test Strategy

Elaborated below are the key objectives and supporting best practices which will be adapted in the product test strategy while navigating across the Product Life cycle stages:

### New product - market introduction

#### Key Objectives

- Understand and validate short term product goals
- Compare with competitor products - sentiment analysis powered by Natural Language Processing (NLP) to provide early product feedback as well as learn more about competition

- Flexibility to change and adapt to future progress
- Focus on Testing types – Unit testing, integration testing, usability testing, compatibility testing (devices/ browsers/platforms), performance testing, security testing
- Customized BOT driven testing to expedite the release certification process

#### Best Practices

- Define and implement a standardized and efficient product test lifecycle (PTLC) framework using proprietary templates, tools and accelerators, and gradually increase process and automation maturity aligned to specific PLC stages

## Product expansion – increase customer base

### Key Objectives

- Focus on long term product goals
- Adopt test strategy best suited for iterative product development approach enabling new features to be continuously introduced
- Adopt a shift left and combinatorial testing to enhance quality, reduce the cost of rework and ensure continuous deployments, thereby enabling faster time to market
- Strengthen the core automation framework to bring in more focus on testing types - integration, regression, usability, performance and security testing
- Strengthen sentiment analysis using NLP to improve the product based on customer feedback and experience continuously

### Best practices

- Test strategy tailored to the development approach (Behavior Driven Development-BDD, Test Driven Development-TDD or Combined Engineering-CE) to ensure lean testing and faster time-to-market
- Change Based Regression (CBR) for faster regressions - Automated test selection intelligence built for creating test suites that include only the subset of test cases impacted by the code changes
- Identify and deploy apt automation tools to support various stages of product development based on the technology stack. Build a test orchestration framework to ensure seamless functioning of the overall test platform
- Fully reap the benefits of Continuous Integration (CI) and Continuous Delivery (CD).

## Product Maturity – stable and scalable

### Key Objectives

- Process and quality standardization enabled by a robust process ecosystem to ensure stability and scalability.
- Extreme automation where the automation process (e.g., dynamic script generation) itself is automated
- Adoption of risk based, right and optimal testing – automate, optimize and reuse
- More focus on test types – scalability, performance, security testing, accessibility - while adding new platforms, smart devices, browsers etc.
- Data analytics of comprehensive quality metrics to predict hotspots and (potential) failure points in advance
- AI-Ops monitoring mechanism to continuously improve the product based on customer feedback and experience.

### Best practices

- Best in class tools and accelerators to ensure risk-mitigated product quality engineering with speed and agility
- Quality infrastructure-as-a-service - To create and configure test environments on the fly using cloud technologies
- Auto Test Generator - Auto generate positive and negative scenarios for API/Microservice, thereby ensuring excellent coverage
- Very large-scale performance engineering and automation framework - a framework for providing performance validation at scale
- Device test automation framework - Open-source technology-based test automation framework for verifying mobile features on multiple iOS/Android devices.

- Report analytics – Predict code hot-spots and failure areas based on signals from production
- AI-Driven defect triaging – A supervised machine-learning approach to auto-classify test defects from the automated regression runs
- DevOps platform - A centralized platform that will offer a simple interface to build CI-CD pipelines and uses a script-less approach to integrate automated build and deployments, static code analysis, compliance checks, security analysis and various types of testing.
- Cloud validation suite for precise maintenance and manageability of cloud environments.

## Product Sustenance – Future roadmap

### Key Objectives

- Think futuristic and stay aligned to product or business owners' vision
- Understand the market need and competitor approaches to adjust the future course
- Set no boundaries and recommend changes aligned to future needs
- Adapt futuristic automation roadmap aligned and scalable to new trends (Cloud platforms, CI-CD, AI, ML etc.)

### Best practices

- Well-established training academies and testing centers of excellence cater to emerging cutting-edge technologies involving cloud platforms (Azure/AWS/GCP), DevOps, DevSecOps, AI, ML, VR/AR/MR/XR etc.

## Conclusion

Infosys aspires to continue leading the market in digital product quality assurance with a focus on

- Product expertise, vision and business value
- Enhanced customer experience
- High agility - optimized cost and improved efficiency
- Staying ahead on technology transformations

Prioritizing these objectives has always helped us deliver stable and scalable products ensuring a competitive edge in the market.

Our vision is to offer an AI-enabled product quality assurance platform that can cater to various Product Life Cycle (PLC) stages and support all forms of agile execution methodologies (Scrum/Kanban/XP) powered by in-built data analytics capabilities to manage end-to-end functional and non-functional automation. This vision ensures best-in-class product testing.



## About the Authors



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He is associated with Engineering Consulting Group (ENCAS) and focused on product & platform quality engineering for multiple clients. Sai has rich experience in working with various clients across banking, retail and engineering domain. He has good command over various testing phases across agile & waterfall models leveraging CI/CD integrations, he handles multiple business proposals & test automation solutions.



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