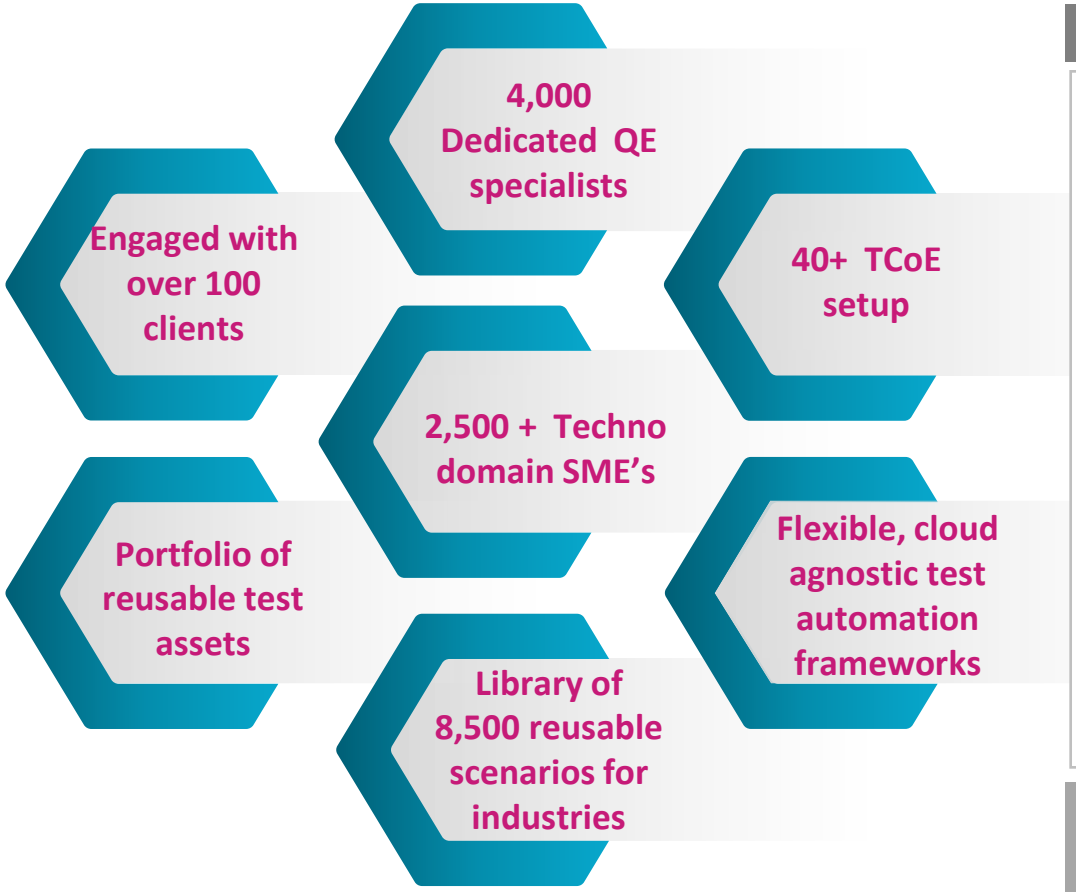
Mphasis
The Next Applied

Mphasis Quality Engineering Services

January 18, 2024

Our differentiating ‘Cognitive’ Quality Engineering services are enabling clients achieve ‘Quality at Speed’



Quality Engineering Services

Test Automation	API Testing	Native Mobile App Testing	Performance Engineering	Exploratory Testing
End to End Testing	Security Testing	AI Augmented Testing	Devices Testing	Usability & Accessibility Testing
Hardware Certification Testing	Test Data Management	Cognitive QA	Compliance Testing	Cloud Migration Testing

Partners

IPs & Innovations

- DevOps Analyzer
- Enterprise Dashboard
- Test Assessment: TAF
- Agile Engineering: ATDD
- Test Execution Automation: MAF, MSAFE, CQE, MSTF, MTAPE, UTAF
- Data Mgt: MDGEN, MDCERT
- Performance Engineering: PARGen, NFR Smart Analyzer

Shift from QA to QE focuses on ‘Building Quality In’ and Accelerating Delivery

Shift from QA to QE

Build quality in rather than test it in. Integrate Quality Engineering practices across the entire SDLC from requirements to production.

Shift Left / Shift Right

Move testing as early in the process as possible. Implement proactive production monitoring to ensure that escaped defects are detected as quickly as possible. Code is delivered set testable.

Automate Testing

Automate all forms of test targeting 95% test automation. Utilize the pipeline to orchestrate this automation. Automate UI, Acceptance, API, Performance, Security and other test types.

Frictionless E2E DevOps Pipeline

Implement an end-to-end DevOps pipeline to orchestrate all SDLC, quality, stage gates, and development related operational task.

Data Driven Continuous Improvement

Create multi-level dashboards to provide continuous visibility into the end-to-end DevOps & Quality process and progress against organizational KPIs relating to quality, agility, and the delivery of business value.

TDD, BDD, ATDD

Adoption of solid test approaches and frameworks to support all phases of testing.

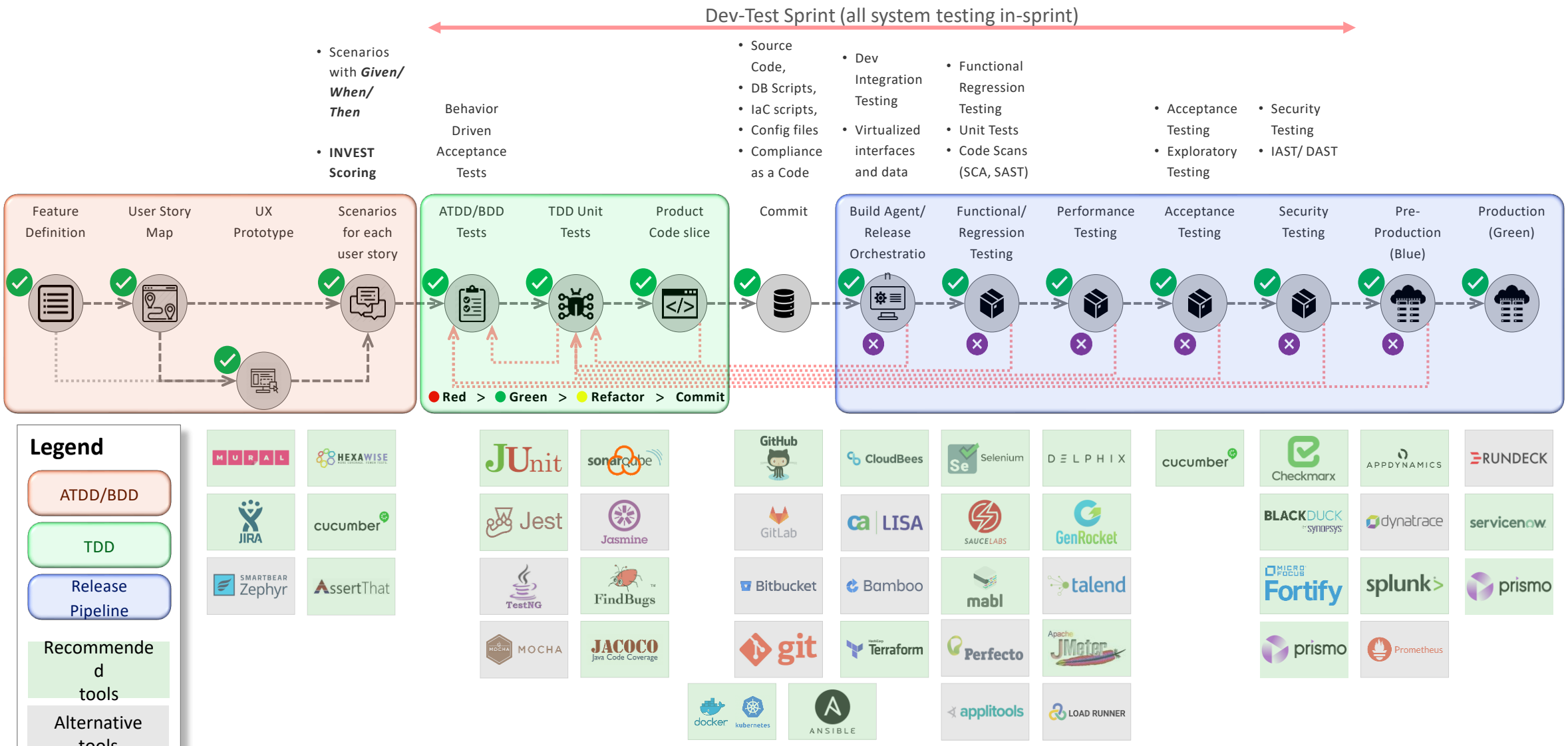
Technical Debt Identification & Reduction

Existing testing related technical debt will often need to be identified and remediate to optimize the ability to test including applications, environments, and tooling.

Cognitive QA and AI,ML based Testing

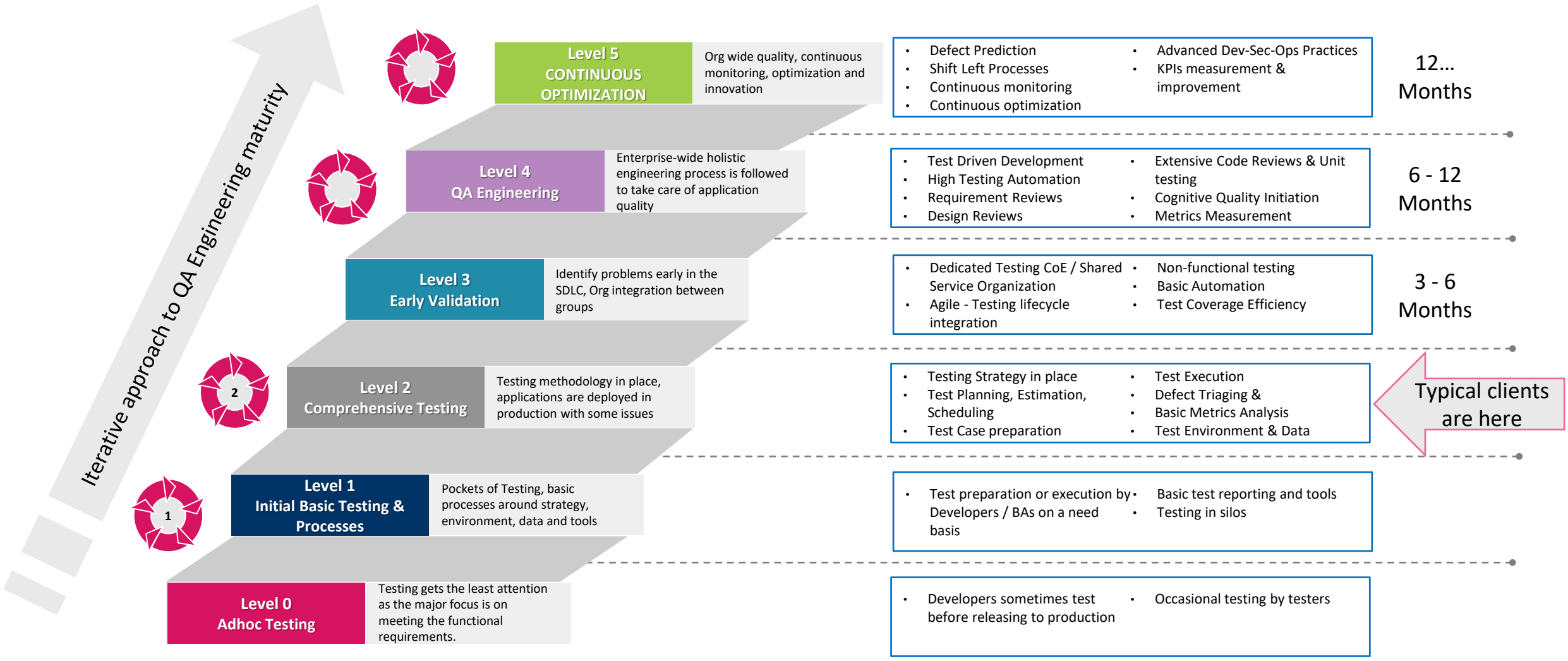
Enable testing optimization, Risk based testing, and future proofing of QE practices for clients ; including consulting, process improvement, AI/ML based CQE platform, and domain specific assets

Our differentiating Shift Left-QE Approach improves quality across the delivery value chain



Mphasis Security Orchestration Platform

Typical stages towards attaining long term maturity for QE in enterprises



Our proprietary portfolio of assets(NextSTEP™) can accelerate the QE adoption journey in enterprises

Mphasis has successfully reduced the dependency on SMEs/BAs by leveraging various tools and accelerators like ATDD, MSTF, MTAPE, PARGen, PAS-Q MDCERT/Gen, NFR Analyzer, MSAFE and MED depending on client context. The details the accelerators are given below.

Scriptless Automation

- Script less 'Code Free' Test automation framework built on Selenium to test Web and Mobile UI validations.
- Minimal automation knowledge.
- Ensures the early test suite preparation during Rapid
- Business users can participate

~60% effort savings

MSTF

- Script less 'Code Free' Service Test automation framework built on SoapUI to test for microservices, SOAP/JMS Web services and database validations.
- No prior knowledge of web services testing is required

40 - 50% effort savings

MTAPE

- Single framework and approach for automation Web and mobile applications
- Client server model to accelerate, centrally manage, monitor and trigger automation tests on multiple clients using rich UI based dashboard

30-40% effort savings

MSAFE

- Optimizing the features of Selenium. A highly modular and reusable, hybrid driven framework.
- It defines the method for scripting of business scenarios as reusable modules. Introducing a simplified modular mapping approach to test automation.

40 - 50% effort savings

Enterprise Dashboard

- Enterprise Dashboard provides visual display for entire account information at a glance.
- Dashboard focuses on compressing important facts and figures by bringing them out in one screen.
- Identifies and consolidates relevant information, such as Key performance indicators (KPI's) from a multitude of sources

~15% effort savings

ATDD

- End to End ATDD process orchestration framework
- Helps to automate the BDD Process from user stories to test results
- Maintains E-2-E traceability (User stories to test results on ALM

12-15% effort savings

PARGen

- Automatic test report generation from the raw data from different sources {e.g. LoadRunner/JMeter, Monitoring tools (PerfMon, Dynatrace) etc.} for each performance test executions.

~50% of manual effort savings

MDCert

- MDCert is Mphasis developed tool using Python that is used to do Data Comparison and report anomalies across different Data Sources & Data Formats.

~30% effort savings

MDGen

- Platform to create synthetic data. Has self service capability to create and provision data on-demand

~25% effort savings

NFR Analyzer

- Analyze server logs and automatically determine Performance Test Requirements for performance testing (Tools : AppDynamics)
- Faster data capture and analysis with accuracy.

~50% of manual effort savings

Our Cognitive Quality Engineering (CQE) platform achieves an 'Intelligence Led' approach for testing

CQE platform enables quality engineering teams to take decisive actions for high volume testing throughout the lifecycle

Testing Challenges

Test Reporting
Lack of prompt Test Status Reporting

Automation Acceleration
Lack of automation is leading to increased testing efforts

Test Process Standardization
Lack of adherence to industry standard Test process

CQE Ecosystem

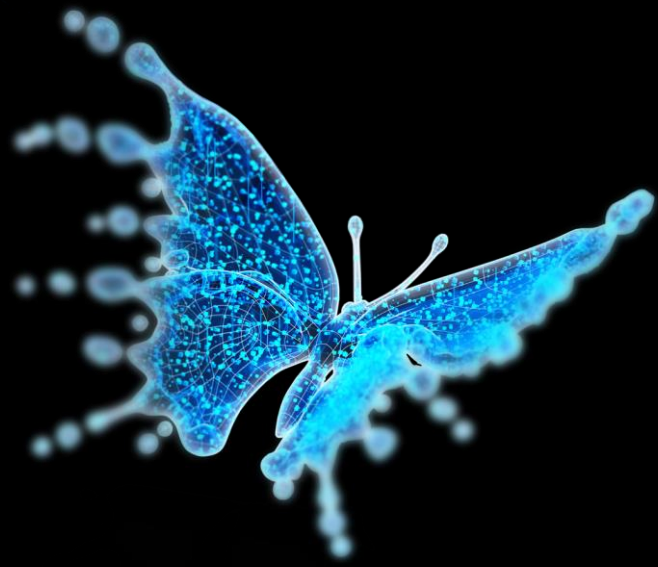
AI-ML enabled **CQE Ecosystem** provides a holistic Testing Solution to accelerate Digital Transformation and IT Modernization

	Planning & Analysis	Design	Execution & Reporting
Testing Lifecycle	Requirement Analysis; Test Plan Creation	Test Case/Script Preparation; Test Data Generation	Functional Testing; Performance & Security Testing; Test Report generation; Test Closure
CQE Platform	Test Plan Generation, Schedule Prediction ,Test Prioritization, Resource Allocation ,Test Optimization	Auto BDD Gherkin Test Design, Auto BDD Test Script, Automation Prediction, De-Duplication, Test Data Generation	Smart Defect Tracking, Defect Prediction, Enterprise Dashboard
External Tools/ Partners	MICRO FOCUS, TestRail, SMARTBEAR Zephyr, GitHub, JIRA, mabl, Jenkins, talend, cucumber, perfecto mobile, experitest, Selenium, sauce LABS, aws, verifaya		
Benefits	**30%** Reduction in Defect Leakage	**40%** Improvement in product coverage	**50%** Reduction in product release test scheduling and planning efforts

Enable Faster turnaround to production

Mphasis
The Next Applied

AI Augmented Use cases



AI Augmented QE Use Cases (1/2)

1 Unit Testing

Generation of unit tests from ML models by analysing code snippets

Orpheus

Mphasis.ai

diffblue AI for Code

codium ai

SapientAI

Copilot

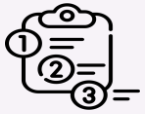
2 Defect Prediction

Identifies gaps in QA goals leveraging ML and NLP techniques using historical QA data

DeepInsights™ Predictive engine

Mphasis CQE AI/ML Models

3 Requirements Management

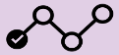


Generates requirements automatically using natural language techniques, NLP , NLU or from Pseudocode

gene

DeepInsights™ Machine Learning

4 Customer Journey-Driven Testing



Automatic Generationn of test steps that mimics production workflow using ML, Incorporates AI models to analyse production logs , Usage patterns, and personas

DeepInsights™ Machine Learning

eggplant

ProdPerfect

appvance IQ

5 Scenario Driven API Testing

Generates Tests based on business logic using ML models to learn logical connection between test steps to create test scenarios

PARASOFT

6 Requirements Driven Testing

Generates and analyze requirements, user stories and information captured by NLP and NLU

DeepInsights™ Machine Learning

aqua

functionize

testsigma

AI Augmented QE Use Cases (2/2)

Test Case Selection

7

Leverages historical QA data to determine optimal test sets and risk indexes continuously refactored from execution cycles

Mphasis CQE AI/ML Models

DeepInsights™ Predictive engine

digitate

Test Set Optimization

8

Leverages CQE models to identify duplicates, redundant test cases, optimization of test execution sequence and gaps in test coverage

Mphasis CQE AI/ML Models

TRICENTIS LiveCompare

Self Healing

9

Leverages capabilities within AI enabled tools to identify changes to object properties. Endpoints, workflow and environment configurations

TRICENTIS Tosca

applitools

testim

digitate

Katalon

Auto Completion

10

Leverage AI / ML models and historical data to auto correct test scripts, input test data sets from test execution cycles

functionize

testsigma

Performance Engineering

11

Create relevant and accurate performance models based on real user behavior by using ML to analyze data from real user monitoring and production logs.

Neotys

APPDYNAMICS

PARGen NFR Analyser

ATAKAMA

dynatrace

Test Data Generation

12

Generate large volume test data based on usage patterns and domain insights, cleanses and purges duplicate data sets.

Smart Data
Generation (Synth Studio)
Structured, Unstructured, - used with MDGen, MDCert

MOSTLY AI

Mphasis Testing Services Augmented With AI

Consulting

- AI-powered tools have the capability to gather and analyze vast amounts of data from various sources, such as Personas, User Behavior, customer feedback and Trends
- NLU/ NLP capabilities in tools assist in understanding inputs from personas more accurately, simplifying the process of capturing and documenting requirements in an effective and structured manner.

Planning

- AI Enabled Components including Mphasis Deepinsights TM Machine Learning aid in document analysis) (Pre-processing, text identification and layout analysis, extracts data and performs task allocation
- AI enables the automation of document classification, with benchmarks such as cost, resources, etc., to accomplish the task. The AI/ML component subsequently processes the data and predicts values for each benchmark.

Implementation

- By analyzing predetermined benchmarks, AI/ML components can help evaluate and predict the output of the design or prototype .
- AI/ML components can perform design validations and simulations to identify potential defects or performance issues early in the design process,

Deployment

- AI-driven continuous deployment tools enable automatic and efficient deployment of new builds/ software updates, ensuring a smooth and continuous release process.

Testing

- AI-driven testing offers developers numerous benefits, including faster and continuous testing, reduced maintenance time and costs, and increased ROI. AI in the testing stage of SDLC can be implemented for:
  - Test case design
  - Auto Generation of UI test Scripts in Different Languages
  - Test case prioritization and Optimization
  - Test Data Generation

Maintenance

- AI can analyze performance metrics and customer feedback to identify performance bottlenecks and suggest optimizations for enhanced software efficiency.
- Determine the most appropriate updates and patches based on user behavior and feedback.

PERSONALIZATION

A/B TESTING

COMPLIANCE

METRICS & ANALYTICS

PERFORMANCE Engineering

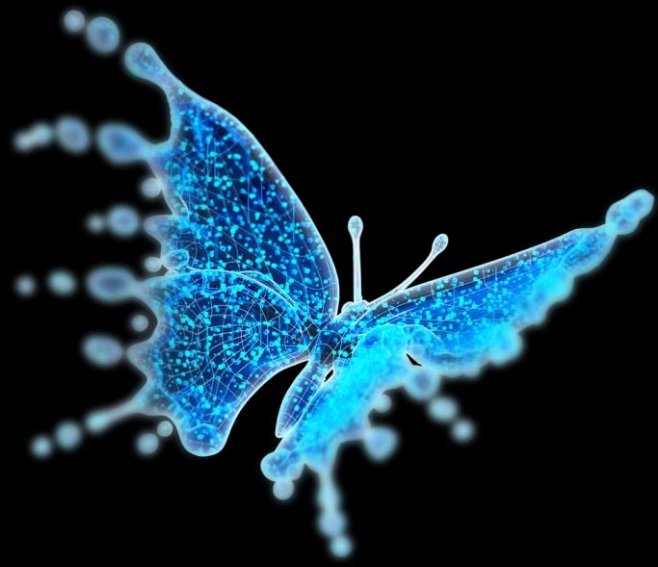
QE INFRASTRUCTURE

COGNITIVE INTEGRATION

INTELLIGENT REPOSITORY

Mphasis
The Next Applied

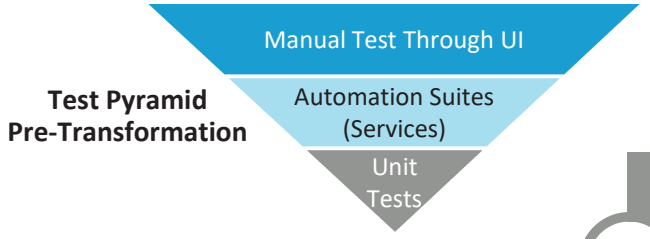
Case Studies



Customer Success Stories

Clients	Key Highlights
 Agile Testing Transformation for Brokerage & Banking Company	• Transformation from Manual to ATDD framework using Ruby/Cucumber adopting DevOps principles. • Resulted in Effort Saving of ~35%
 End-to-End Test Automation for a large global European Bank	• Implemented a Continuous Testing (CT) solution leveraging our accelerators • Triggered automated Jenkins scripts post build deployment • Platform is being successfully used for last 5+ years resulting in **40%** effort reduction
 TCoE setup for a large Global logistics player	• Implementation of TCoE, cross-leveraging test assets, processes & people across geographies • Increase in productivity & performance. Optimal usage of tools.

Mphasis Success @ Top American Brokerage and Banking Company



Test Pyramid Pre-Transformation

Manual Testing

People
- Monotony Low Defect Identification
- Non-Technical

Process/ Method
- Segmented Test cases
- Testing according to release train
- 40,000+ test cases/ test case duplication

Tools & Accelerators

Automation Testing

People
- QA Finds Bugs
- Skill gaps

Process/ Method
- Test automation including Unit testing
- ~15000 Manual & 25,000+ automated tests – Low defect count, 12 bugs in 9 releases
- No automation on mobile web

Tools & Accelerators
- Test Automation**: QTP, CodedUI Automation Framework**
- No Process tool integration (TFS, HPQC)
- No distribution, No Multi browsers, No Multi device, No Synchronizers

ATDD Transformation

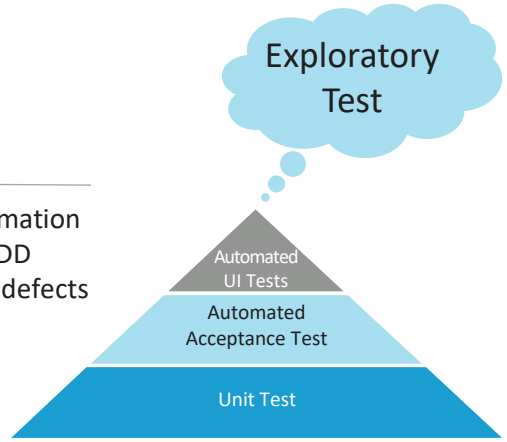
People
- Quality Assurance to Quality Engineers (Left Shift)
- QA Prevent bugs
- Continuous learning (Training, Coaches connect, Pluralsight, library, training classes, cook book)

Process/ Method
- Coaches engaged to lead the transformation
- Test Pyramid optimized thru BDD & TDD
- In sprint automation leading to lesser defects
- Exploratory testing
- Visual Boards
- Gemba walks
- Agile Transformation Adoption measurements- Lean Metrics

Tools & Accelerators
- Adapt Engineering Practices- BDD & TDD
- BDD**: Ruby/Cucumber Framework**
- Gherkins as user stories
- Service Virtualization**: Wiremock Framework**
- **Device Library for Mobile web testing**
- **Real-time dashboarding**: Zephyr
- **Multi-Device/Multi-browser framework**: Saucelabs, SeeTest
- Quality Enablers: **Rubocop, Cukesniffer**
- **Test Data Management** enable CICD
- Mobile Web testing on Multiple Devices with Sauce labs

Next Steps

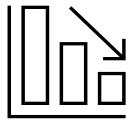
- Applitools for visual testing



Test Pyramid post ATDD Transformation

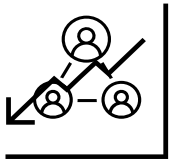
Mphasis Success @ Top American Brokerage and Banking Company

Reduction of 99% of defects over the product lifecycle



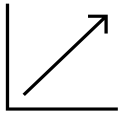
60-80% reduction in overall cycle time

50% reduction in testing headcount



High quality with Zero or <1% defects in Production

Up to 80% saving in execution cycle and faster time to market



Examples of Business Benefits Realized in Projects

Time to Market

- **80% improvement in time to market with zero critical defects leaked to production.**
- In-sprint Test : **1-2 Days at End of Dev sprint to 45 Minutes**
- Regression test : Separate Sprint **(3 – weeks*) to EoD (60 Minutes)**
- UAT : **1 Day to 60 Minutes**

Quality

- **< 1% defects** in release hardening
- **< 5% in Sprint defects** due to well defined acceptance criteria

Overall Cost

- **95% automated test suite**
- **50%** cost avoidance over 5 years
- 60 % over all **testing cycle** reduction

Success story: QA to QE Transformation for one of the top 4 US Bank

- Mphasis is involved in defining and executing the overall QE transformation journey, tools and frameworks
- QE adoption across 330 scrum teams
- Embedded 550 QE Engineers to enable the journey (QE engineers roll off to new scrum teams post maturity)
- As part of adoption, trained Scrum Teams to practice & achieve QE adoption (achieved 100% self sustaining maturity)

Transformation Levers

Transformation Impact

Time to Market

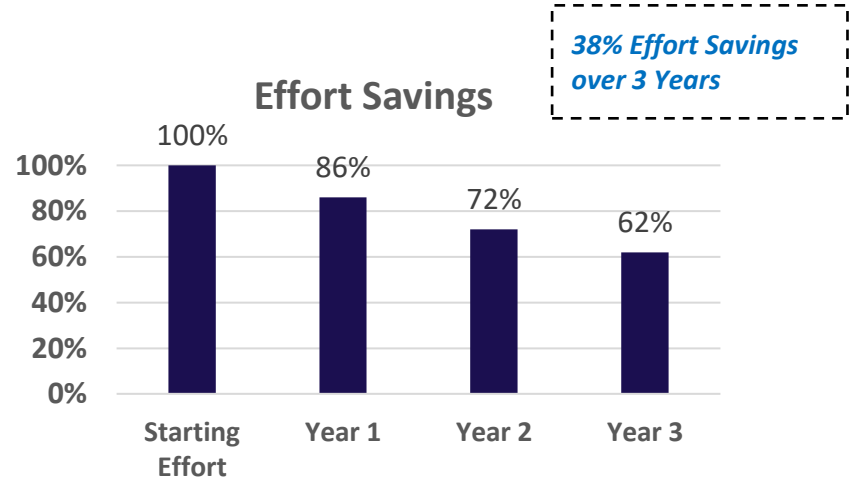
- Acceptance tests - **2 days to 45 mins**
- Regression tests - **3 weeks to 60 mins**

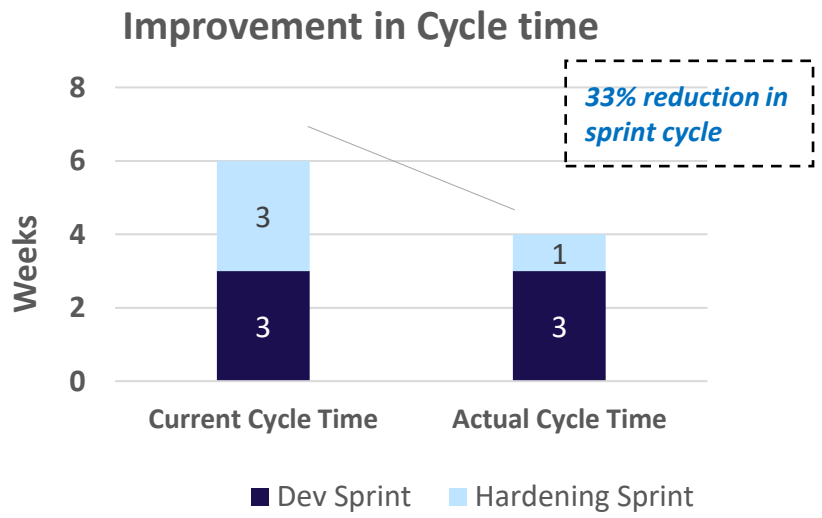
Quality

- **Less than 1% defect** in integration environment
- **Less than 5%** in-sprint defects because of well defined acceptance criteria

Talent

- **All resources are BDD trained engineers to handle stories end-to-end**





Testing Transformation for a large global European Bank

Business Challenge

- Transition the testing services from a high onshore based model to offshore based delivery
- Implement a comprehensive Testing Transformation (People, Process, Tools)
- Achieve more 80% Test Automation for functional and production regression
- Test data related activities are done manually. Reduce the number of defects arising due to usage of wrong test data
- Induce Test Automation within sprint to support BDD model
- Support the Agile delivery model and reduction of critical path for testing

Solution

- Mphasis Delivered the engagement with seamless transition from incumbent and moved towards offshore based distributed agile model without disturbing existing scheduled releases.
- **BO Aligned Transformation :** A detailed and milestone-based Testing Transformation plan was formulated aligned to the Business objectives
- **Test Automation Framework :** Implemented BDD driven Test Automation framework using Selenium for UI and API Testing.
- **Achieved continuous integration through DevOps (CI/CD):** Team City integration with Selenium for continuous testing.
- Replaced manual Test data mining with Automated processes
- **Skill Capability Matrix** : A robust skill-based matrix is built covering the technical and domain level skills.

Benefits

A. Test Automation

- More than 80% automation of regression, reduced 1 weeks of regression cycle to 15 Hours using CI/CD integration with Team City.
- Implemented Sprint Automation
- Mobile and API test automation

B. Test Data Management

- Achieved more than 60% of Test Data automation for the releases
- In built tools like Back Office data Automator for Legacy Database/Systems (wait time reduced from 5-7 days to 2 days)

C. CI/CD integration for Performance Testing (JMeter integration with Team City)

D. Continuous monitoring and improvement of Team Capability using the Skill mapping Matrix

E. Performance Testing - Utility to find downstream MS response time from Splunk logs

Testing Transformation Journey for a large global European Bank

Mar 2021
- Test Data - Trace Clearing for Autosys Jobs

Apr 2021
- CI/CD - UBR integration with Team City (Dev, QA, NFT)

May 2021
- Test Data Model Creation

Jun 2021
- CI/CD – UBR integration

Jul 2021
- Back Office Test Data Automator
- Test Data - Proposal Creation using Selenium

Aug 2021
- CI/CD – Day2 Configuration
- Test Automation - Coding Standard Document
- Trace Clearing - Test Data Reuse for RBR using DB Macro
- Performance Testing - Utility to find downstream MS response time from Splunk logs

Milestone based Transformation Plan

Dec 2021
- Transformation Planning for 2022
- Data Mining and Verification Automation
- Testing Metrics & Skill Mapping Matrix (Q4)
- Performance Testing – Complete JMeter integration with Team City

Nov 2021
- Production Regression - Automated Day 2 RPA test cases
- Trace Clearing - Test Data Readiness for RPA

Oct 2021
- CI/CD – Day 2 Complete integration for all Scripts
- API test framework
- Production Regression Analysis
- Automate Test Data for Day2 RPA

Sep 2021
- CI/CD – Day 2 PoC (Internet level Proxy)
- Test Automation - Advance Report Upgradation
- Testing Metrics & Skill Mapping Matrix (Q3)
- Performance Testing – POC to run JMeter through Maven (CI/CD integration)

Mphasis Success @ Large Multinational Logistics Company

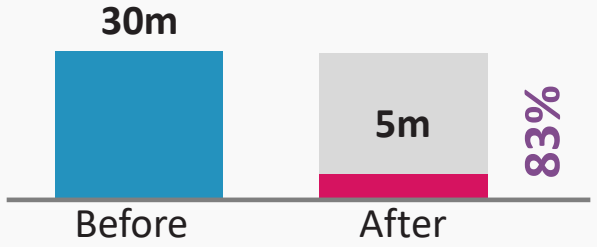
A Continuous Integration & Continuous Delivery Transformation Project

- **Zero Launch Defects** in the last 3 releases
- **Shift Testing Left** for overall quality improvement
- Continuous insights to optimise test bed and improve test coverage

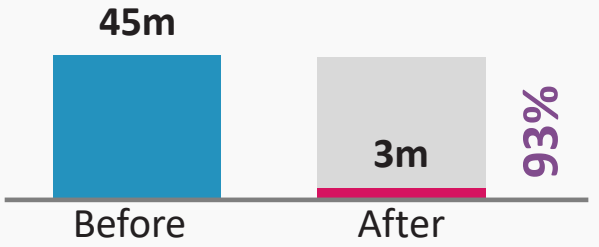
Key Technology and Frameworks

SoapUI, SUBVERSION, APACHE ANT, Pmd, urban{code} Deploy, JACOCO Java Code Coverage, sonarqube, Maven, Gradle, emma, JUnit, TestNG, hp Unified Functional Testing (UFT), Se, LZ

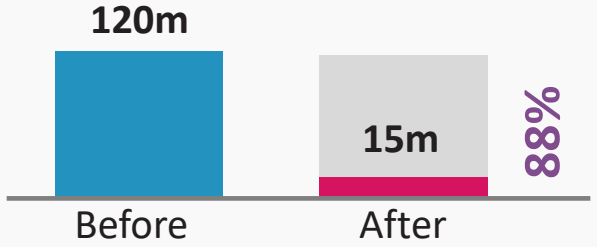
Static code analysis and building



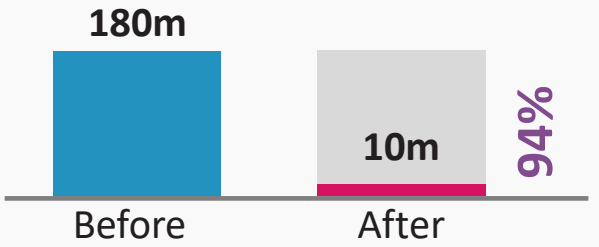
Finding individual development defects



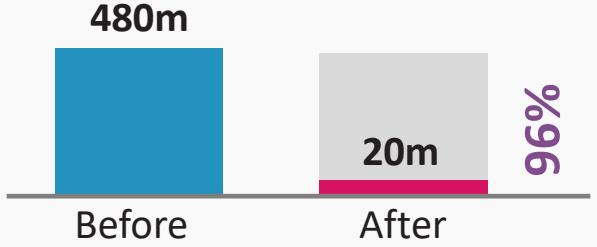
Early warning of broken/incompatible code



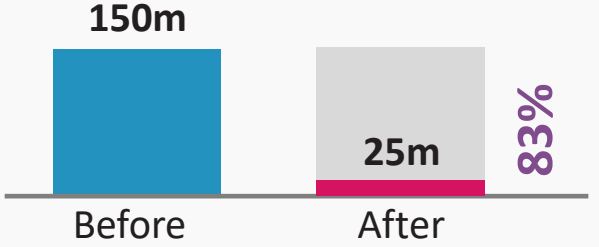
Unit testing



Regression testing



Extensible integration framework



Thank You!

For more information, please contact:

About Mphasis

Mphasis (BSE: 526299; NSE: MPHASIS) applies next-generation technology to help enterprises transform businesses globally. Customer centricity is foundational to Mphasis and is reflected in the Mphasis' Front2Back™ Transformation approach. Front2Back™ uses the exponential power of cloud and cognitive to provide hyper-personalized (C=X2C2 TM=1) digital experience to clients and their end customers. Mphasis' Service Transformation approach helps 'shrink the core' through the application of digital technologies across legacy environments within an enterprise, enabling businesses to stay ahead in a changing world. Mphasis' core reference architectures and tools, speed and innovation with domain expertise and specialization are key to building strong relationships with marquee clients. Click here to know