Testing Center of Excellence (TCOE)

Digital Minds
TECHNOLOGIES INC.

Meeting of the intellectual minds where technology and creativity come together"

AGENDA

- Context
- Testing - challenges of an organization
- Mission and Vision of Testing Practice
- Our offerings

  - **F**unctional Testing
  - **N**on Functional Testing
  - **A**utomation Testing
  - **P**erformance Testing
  - **P**erformance Engineering
  - **P**erformance Testing Approach
  - **U**sability Testing
  - **S**ecurity Testing
  - **D**MT Security Testing Approach

- Delivery by leveraging various in built tools and accelerators
- Continuous service improvement ideas
- Need of an integrated KM framework
- We will deploy proven 3 phase Structured & De-risked Transition approach
- Our recommended governance framework in a multi vendor ecosystem
- Our recommendations
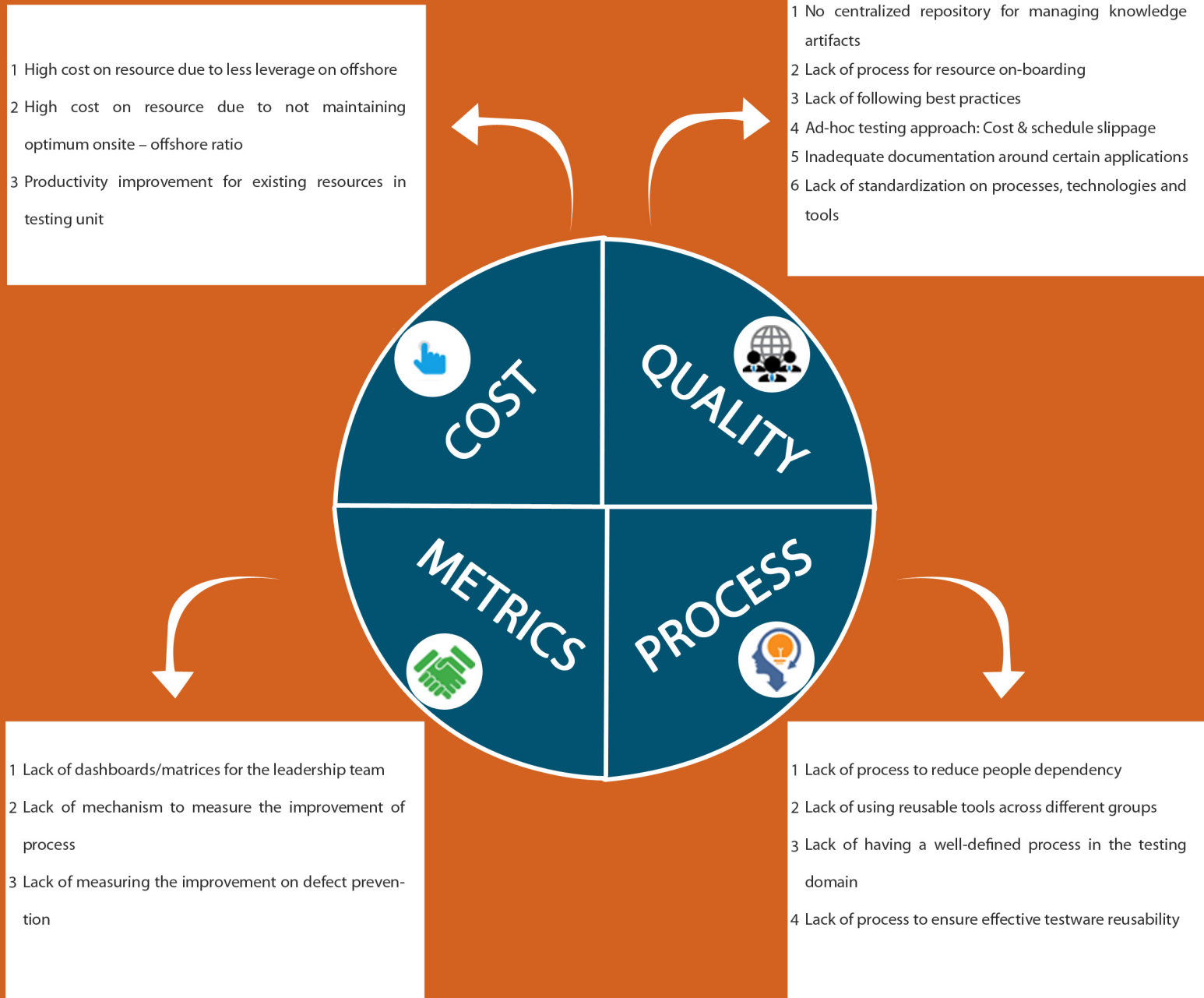- Value Proposition
- Case study

Context

Today, many of the leading IT companies moving towards reconsidering their operational decisions due to growing competition and melting of economy. Challenges like merger and acquisitions, technology advances and the increased demand from clients add to the tremendous pressure to make faster, informed decisions while maintaining product quality, improving productivity and enhancing operational effectiveness.

Today, many of the leading IT companies moving towards reconsidering their operational decisions due to growing competition and melting of economy. Challenges like merger and acquisitions, technology advances and the increased demand from clients add to the tremendous pressure to make faster, informed decisions while maintaining product quality, improving productivity and enhancing operational effectiveness.

- Effective collaboration among testing, development and IT infrastructure teams
- Effective testware reusability
- Adequate test coverage
- Standardization of processes, technologies and tools
- Effective knowledge management through metrics-based evaluation and processes

Testing – challenges of an organization

1 High cost on resource due to less leverage on offshore

2 High cost on resource due to not maintaining optimum onsite – offshore ratio

3 Productivity improvement for existing resources in testing unit

1 No centralized repository for managing knowledge artifacts

2 Lack of process for resource on-boarding

3 Lack of following best practices

4 Ad-hoc testing approach: Cost & schedule slippage

5 Inadequate documentation around certain applications

6 Lack of standardization on processes, technologies and tools

COST

QUALITY

METRICS

PROCESS

1 Lack of dashboards/matrices for the leadership team

2 Lack of mechanism to measure the improvement of process

3 Lack of measuring the improvement on defect prevention

1 Lack of process to reduce people dependency

2 Lack of using reusable tools across different groups

3 Lack of having a well-defined process in the testing domain

4 Lack of process to ensure effective testware reusability

Solution - Following Testing Center of Excellence

Mission and Vision of Testing Practice

Ensuring IT System Stability and Reliability with TCoE

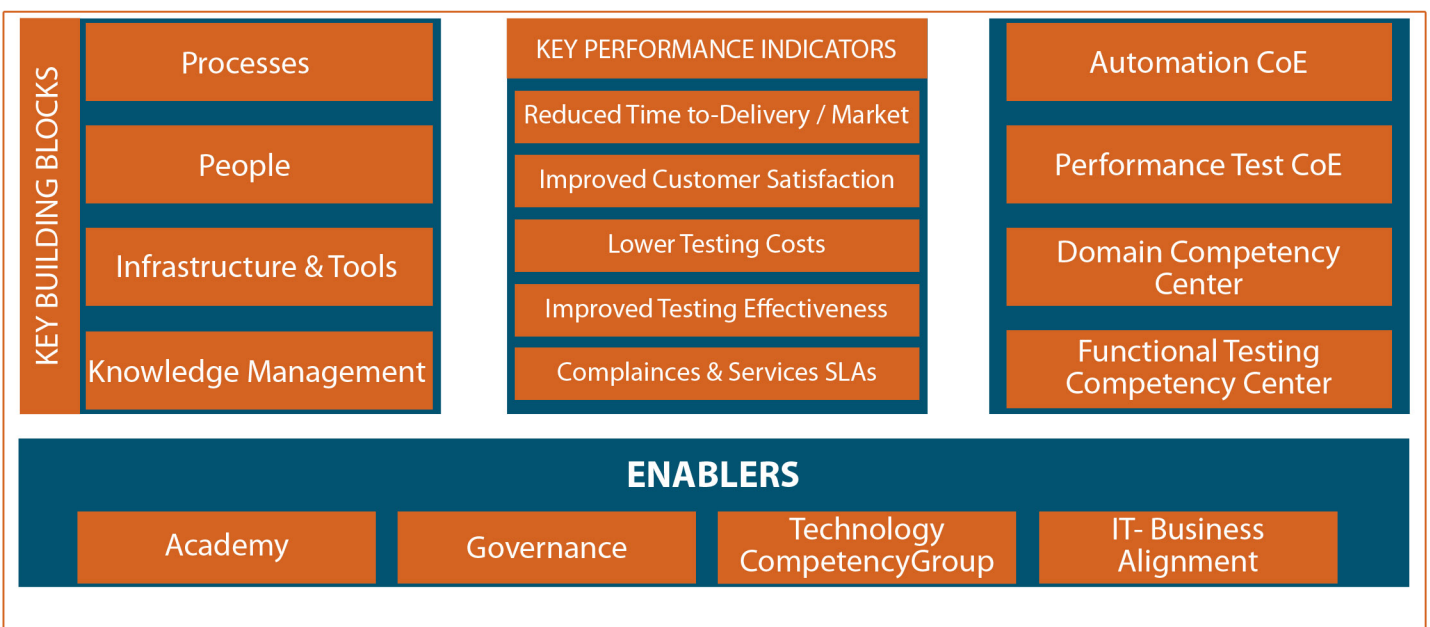| Building Valuable Customer Relation-ships	Transform the Way of Operating	**Vision**	Developing Talent	Making Performance Matter

Scalability	Efficiency	Predictability	Quality

Testing Centre of Excellence

KEY BUILDING BLOCKS

Processes	KEY PERFORMANCE INDICATORS	Automation CoE
People	Reduced Time to-Delivery / Market	Performance Test CoE
Infrastructure & Tools	Improved Customer Satisfaction	Domain Competency Center
Knowledge Management	Lower Testing Costs	Functional Testing Competency Center
	Improved Testing Effectiveness	
	Complainces & Services SLAs	

ENABLERS

Academy	Governance	Technology CompetencyGroup	IT- Business Alignment

Our offerings

- **Functional Testing**
- **Usability Testing**
- **Automation Testing**
- **Load / Performance Testing**
- **Security / Penetration Testing**

Functional Testing

Main objective of functional testing is to test and ensure the software works as per the functional requirements. This was done by taking through the application based on the requirements defined for building the software

Offerings:

- **Test Planning, Test Case design, Test case implementation and Execution.**
- **Unit/Integration/System/Regression/Acceptance Testing.**
- **On-Going development testing**
- **Pre-production Testing.**

Value adds:

- **Set of best practices and re-usable assets like process, templates, checklist and procedures**
- **Dashboards to leadership team, daily and weekly reports**
- **Testing professionals having experience in various industry verticals**

Non Functional Testing

This mainly refers to the non-functional requirements of the application. Apart from the business requirements, the software needs to be tested for the security aspects and the scalability.

Following are the various offerings we have in non-functional requirement area:

- Performance Testing
- Security Testing
- Usability Testing
- Static Testing

Automation Testing

Automation testing mainly focus on automating the testing of software with the greater advantages like fewer human resources, reusability of test cases, higher reliability etc.

What do we offer?:

Automation Test Plan, R&D for selecting the right tool for scripting, POC, Test Scripts design, implementation and execution

Implementation on a variety of tools (Selenium, Geb, Spock, QTP, JS script based frameworks, TestNG etc.)

Performance Testing

- Agile performance testing methodology helps design tests considering business criticality, geographic distribution, arrival rate, completion rate etc. This helps achieve realistic loads on the system requirements along with providing comprehensive reports that would help the clients to understand application quality and helps them undertake improvement actions. We also built reusable accelerators and solutions that aid testing of various systems like web, GUI applications etc
- Teams follow a robust Agile Performance Testing methodology to test applications using a cloud-based load generation strategy. Key benefits of this approach include:
- Early detection of bottlenecks
- Reduction in development costs and time to market
- Reduction in infrastructure costs through provisioning of on-demand test environments at
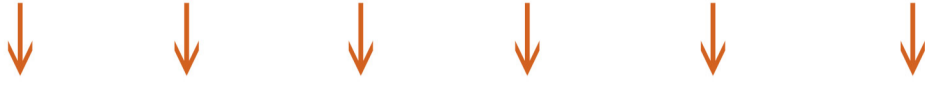
offer:

Performance test plan & test scripts design and implementation.

Scenario execution and results analysis. Improvements suggestions.

Implementation on a variety of tools (Load Runner, Soasta, JMeter, etc.).

Performance Engineering

Performance Assessment
- Define business metrics
- Benchmark as-is Performance
- Hardware assessment
- Load testing strategy
- Test Planning
- Critical scenarios
- Final assessment
- Monitoring dashboards
- Tools analysis & assessment
- Architecture Decisions

Performance Solutions
- Environment & VM fine tuning
- Code fixes for Perf issues
- Server farm redesign
- Caching – front end & backend
- Perf based development
- Code freeze /Change Mgmt
- Front end fine tuning
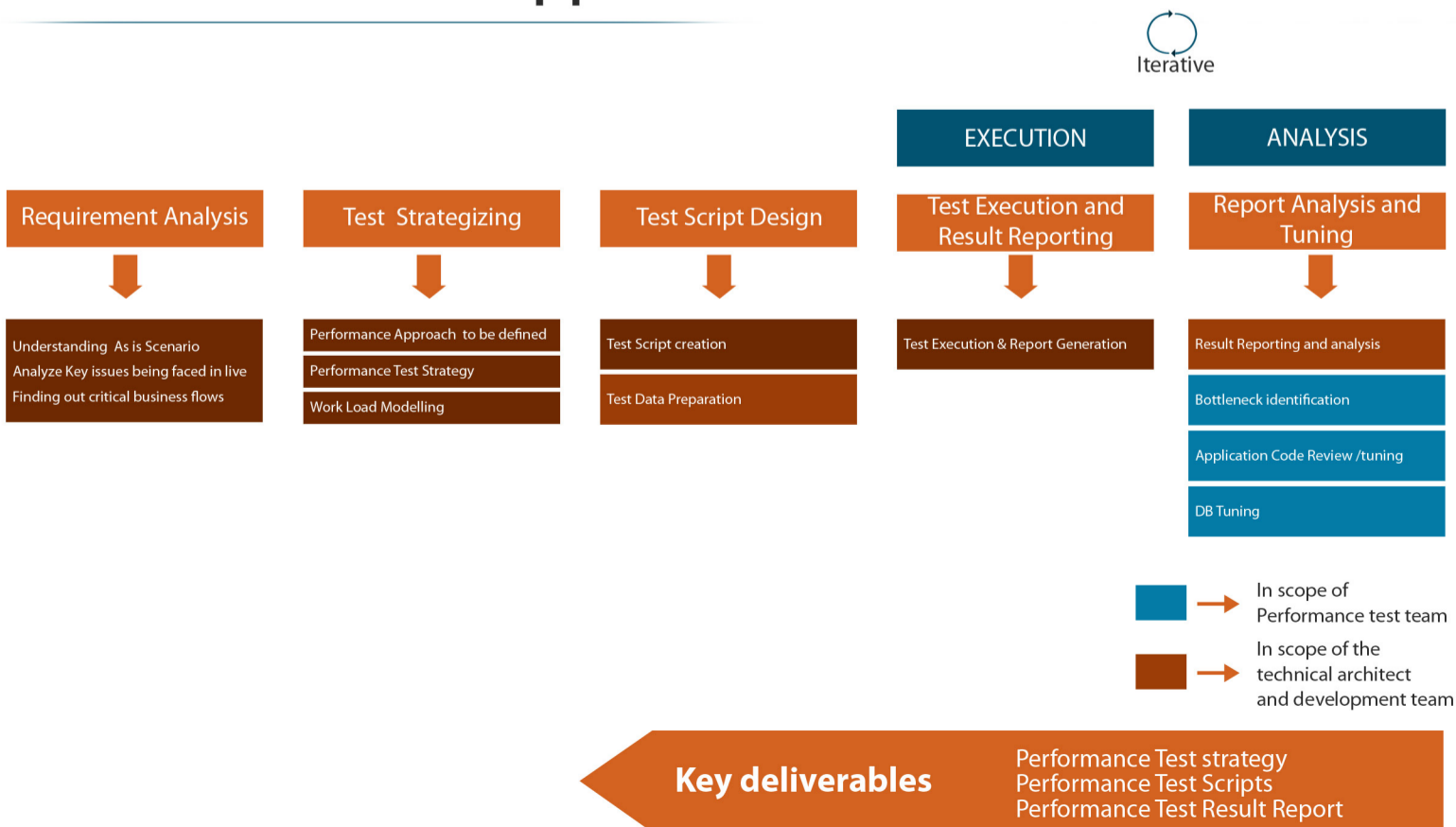- DB fine tuning
- Fallback mechanism

Performance Testing
- Internal & External load test
- Load test - major release
- External party testing
- Business metrics validation
- Automation

Legend:
- → Major Release
- One time activity
- On-Going activity
- Holiday specific

Performance Testing Approach

DMT will perform Benchmark and Load Testing using HP Load Runner/SOASTA for E-Commerce system.

Performance Test Approach:

Iterative

Requirement Analysis	Test Strategizing	Test Script Design	EXECUTION — Test Execution and Result Reporting	ANALYSIS — Report Analysis and Tuning
Understanding As is Scenario / Analyze Key issues being faced in live / Finding out critical business flows	Performance Approach to be defined / Performance Test Strategy / Work Load Modelling	Test Script creation / Test Data Preparation	Test Execution & Report Generation	Result Reporting and analysis / Bottleneck identification / Application Code Review /tuning / DB Tuning

Legend:
- → In scope of Performance test team
- → In scope of the technical architect and development team

Key deliverables
Performance Test strategy
Performance Test Scripts
Performance Test Result Report

Usability Testing

Usability testing measures the easiness of using an application. Usability testing gives direct input on how real users use the system and how it can be improved to achieve better usability results.

What do we offer?:

Usability test plan & usability analysis and users tests.

Test execution and results analysis.

Usability & design improvements suggestions.

Why usability testing?:

To improve the customer satisfaction index and thereby improve the revenue

To simplify the operations of an application and reduce the support cost

Improving the productivity

Security Testing

Security testing is a method to reveal the flaws in the security aspects of software that protects data. The process involves an active analysis of the system for any potential vulnerabilities that may result from poor or improper system configuration, known and/or unknown hardware or software flaws, or operational weaknesses in process or technical countermeasures.

What do we offer?:

Security test plan & security analysis.

Report identifying security issues found, their impact and optionally a proposal for mitigation.

Why security testing?:

Security can produce high economic & image costs.

Risks associated to service availability, data integrity & readiness, etc.

Risks associated to legal aspects
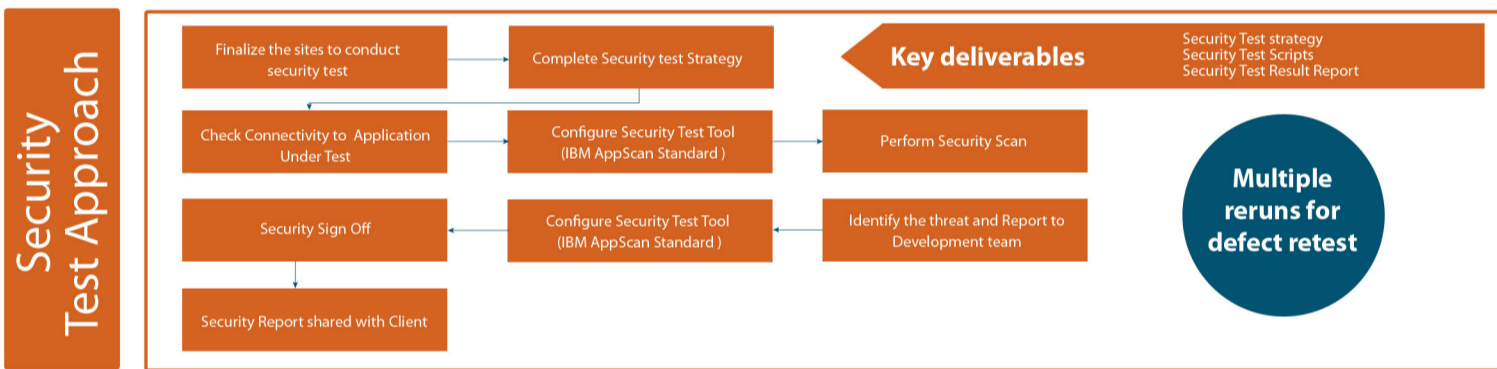
DMT Security Testing Approach

Integrated Security Testing Coverage for Web Portals / Sites

Vulnerability Coverage	Application is checked for OWASP Top 10 Vulnerability like SSO, Penetration Testing, Cross Site Scripting, SQL Injection Flaws, Session, Payment Card Interface, ISO/IEC 17799 and Cookie Flaws.	**Tools Expertise**
Technology	Hybris in Java, HTML SS3, Web Methods	**Security Testing Tools:** IBM App Scan **Security Compliance :** Payment Card Interface ISO/IEC 17799 OWASP
Attack Points	External Attacks, Internal Attacks, Exploit Logical Errors, Check for PII data leakage through Logs	
E2E Security Testing	Web Application includes Web Portals /Sites	

Security Test Approach

- Finalize the sites to conduct security test
- Complete Security test Strategy
- **Key deliverables** → Security Test strategy / Security Test Scripts / Security Test Result Report
- Check Connectivity to Application Under Test
- Configure Security Test Tool (IBM AppScan Standard)
- Perform Security Scan
- Security Sign Off
- Configure Security Test Tool (IBM AppScan Standard)
- Identify the threat and Report to Development team
- Security Report shared with Client

Multiple reruns for defect retest

Delivery by leveraging various in built tools and accelerators

65% — 70% of the most common E-com functions available in test case repository

Automation and continuous integration Testing framework using open source software
Automated multi browser compatibility testing on cloud
Easily integrated with continuous integration tools like Jenkins for automated build validations
40% effort savings in test execution

1000+ — 7Hybris e-Commerce Functional Test Accelerator – Generates Ready-to-use test cases for new development

Accelerates testing of data warehouse applications through data comparison, data quality analysis and report verification
Supports fully automated data processing and anomaly reporting
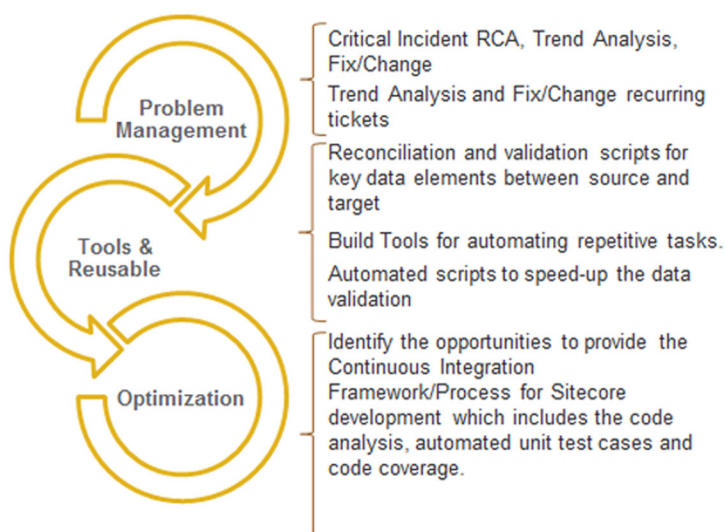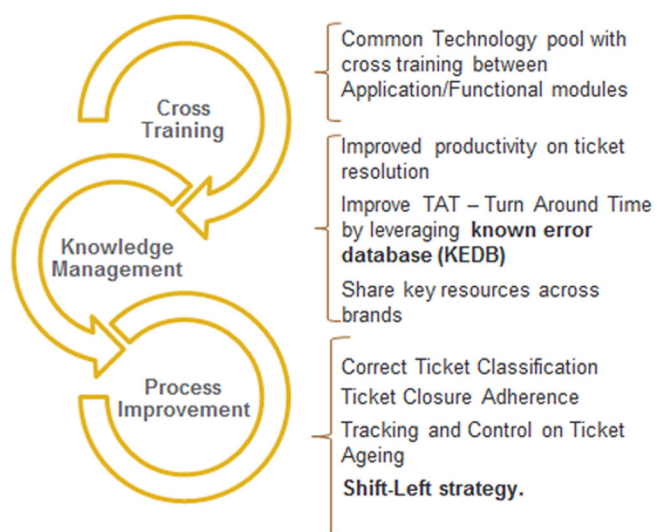Effort savings by 40%
20% Reduces time to market

60% — Effort reduction in test planning using existing scenarios & automatic scenario generation

Automate testing in applications that require multiple touch points in their disparate components, such as real-time transaction processing systems, messaging middleware, databases, scripts, etc.
30% effort reduction in test planning
Effort reduction of 50-70% in testing

It will be an iterative process where Digital Minds will mutually decide with Lenovo on improvement ideas and implementation timelines for the same. Below are just some of the best practices/ideas which Digital Minds has implemented in past in similar circumstances
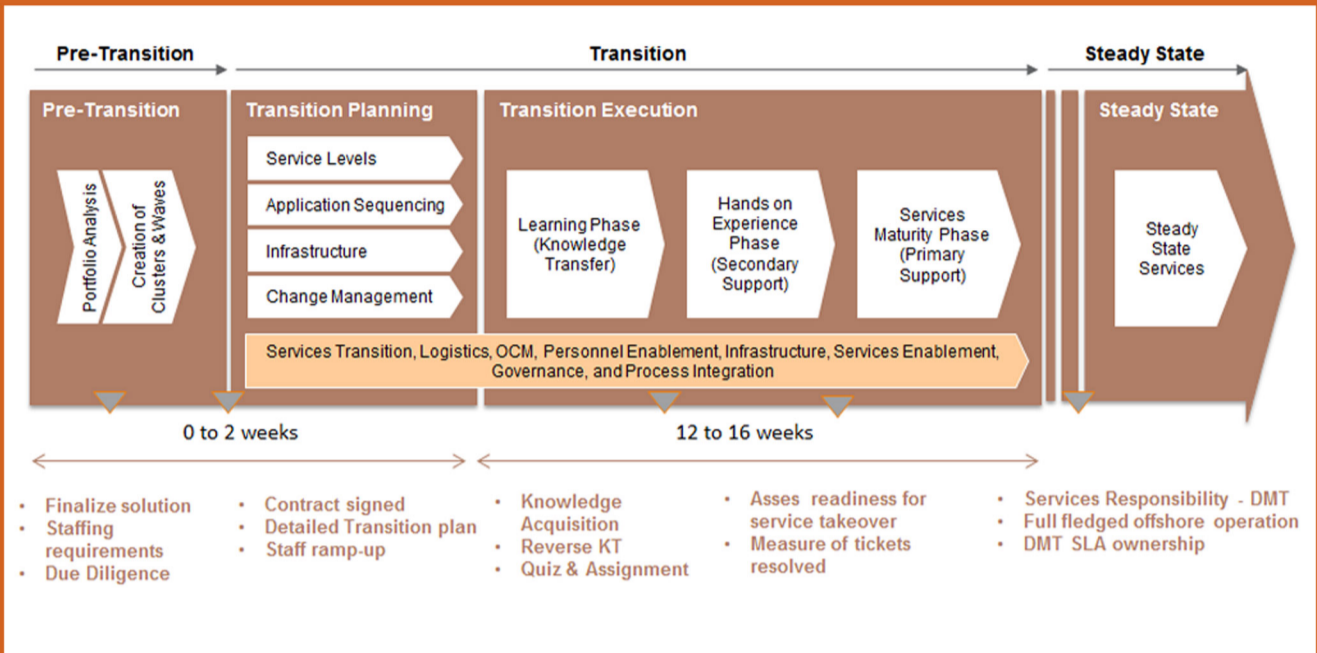
Cross Training
Common Technology pool with cross training between Application/Functional modules

Knowledge Management
Improved productivity on ticket resolution
Improve TAT – Turn Around Time by leveraging **known error database (KEDB)**
Share key resources across brands

Process Improvement
Correct Ticket Classification
Ticket Closure Adherence
Tracking and Control on Ticket Ageing
Shift-Left strategy.

Problem Management
Critical Incident RCA, Trend Analysis, Fix/Change
Trend Analysis and Fix/Change recurring tickets

Tools & Reusable
Reconciliation and validation scripts for key data elements between source and target
Build Tools for automating repetitive tasks.
Automated scripts to speed-up the data validation

Optimization
Identify the opportunities to provide the Continuous Integration Framework/Process for Sitecore development which includes the code analysis, automated unit test cases and code coverage.

Need of an integrated KM framework for Lenovo

Digital Minds proposes the below robust 7 step knowledge management framework for enabling the people, process, technology and content dimensions

1 KM Repository
2 Reusable Artifacts
3 Tools repository
4 Co collab ion
5 Certification center
6 Lenovo specific artifacts
7 Cross Trainings

KM

1	Central Repository for sharing knowledge across the company across domain, technology and service areas
2	Central repository for sharing reusable artifacts (code) across technologies
3	Central Repository for sharing tools built within the company across technologies
4	Centre of Excellence – Collaboration of experts across domain, technology and service areas
5	Compulsory domain and technical certifications to enhance the knowledge base
6	Repository of tools/re-usable artifacts specific to Lenovo
7	Regular offshore/onsite KT sessions and sessions across tracks

We will deploy proven 3 phase Structured & De-risked Transition approach

Pre-Transition	Transition	Steady State

Pre-Transition
- Portfolio Analysis
- Creation of Clusters & Waves

Transition Planning
- Service Levels
- Application Sequencing
- Infrastructure
- Change Management

Transition Execution
- Learning Phase (Knowledge Transfer)
- Hands on Experience Phase (Secondary Support)
- Services Maturity Phase (Primary Support)

Services Transition, Logistics, OCM, Personnel Enablement, Infrastructure, Services Enablement, Governance, and Process Integration

Steady State
- Steady State Services

0 to 2 weeks   12 to 16 weeks

- Finalize solution
- Staffing requirements
- Due Diligence

- Contract signed
- Detailed Transition plan
- Staff ramp-up

- Knowledge Acquisition
- Reverse KT
- Quiz & Assignment

- Asses readiness for service takeover
- Measure of tickets resolved

- Services Responsibility - DMT
- Full fledged offshore operation
- DMT SLA ownership

Our recommended governance framework in a multi vendor ecosystem

Work breakdown with clear assignment of ownership
Roles and responsibilities documentation and sign-off
Penalty Terms

Identify all multi-vendor interactions
Establish clear hand-offs and mandates between parties.
Assign criticality to different interactions.
Establish interaction breakdown scenarios, consequent impact and their redemption paths

Define reporting structure.
Establish guidelines and controls for the vendor.

Provide platform for vendor grievances and concerns.

Define adjudication procedures

Establish vendor metrics for different performance categories.

Set up Service Level Agreements with vendors to ensure compliance and to penalize vendors in cases of default.

Vendor Management Objectives
- Other Vendor Interactions
- Clear ownership
- Vendor Metrics
- Governance model
- Communication & Issue resolution
- Transition & Knowledge Management

Documentation of program, project and process artifacts
Establishment of standards, checklists and templates.
Document best practices and lessons learnt.
Use KM infrastructure for sharing documents

Establish escalation procedures and communication protocols.
Establish easy and clear communication processes for status/ issue reporting.
Establish issue resolution process

Our Recommendations

People

Challenges	Recommendations
Enhancing the productivity of existing testing resources	Cross training and utilization of testing resource
High Cost due to zero/ minimal offshore leverage	Cost Saving out of optimum off-shoring/ outsourcing

Process

Challenges	Recommendations
Heterogeneous testing standards	Standardized process across Functional Groups
Quality Assurance gate not established	Well Defined ETVX Model with Quality gates
Sub-optimal test coverage	Risk Based Testing approach for optimal coverage
People dependent	Moving from people dependent to process dependent
Adhoc testing approach: Cost & schedule slippage	Best in Class Testing Process ensuring on time on cost delivery
Inadequate documentation around certain applications	Standard documents, Templates and review machines

Tool

Challenges	Recommendations
Lack of standard tools usage across functional groups	Integrated tooling approach to enhance productivity
Increased test cycle time & time to market	Leveraging test automation leading to reduced test cycle time

Governance

Challenges	Recommendations
Inadequate metrics / dashboards leading to less visibility on project health	Standard Metrics with Online dashboard
Lack of defect prevention mechanism	Moving to defect prevention using Root Cause Analysis

Value Proposition

QA Investment Management

Improved offshore leverage to ensure lower cost
Productivity improvements through well-defined framework
Institutionalize TCoE across segments

Reduced Operating Cost in steady state

Process Maturity

Deployment of standard process across business segments
Rigorous metrics collection with proven Metrics Framework
Continuous process improvement
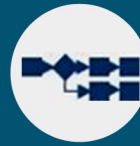
Process standardization and improved test coverage

Organization model and Scalability

Componentized TCOE model which is scalable and extensible
Scalable Core team and a flex team based on demand forecast
Optimal mix of Domain, Tool and Testing experts

Optimal Resource Utilization and better demand management

Technology Foundation

Reduced effort through deployment of frameworks and accelerators
Digitization of test process and test execution
Enabling enterprise wide collaboration and reuse

Improved efficiency, better productivity and faster time-to-market

Centralized Knowledge Repository and Training

Knowledge institutionalization through effective KM framework/portal
Reusable assets and best practices to accelerate and improve the efficiency of knowledge transfer
Structured Competency development / cross training for fungibility / capacity add-ons

Knowledge management and retention enabling faster induction

Case study

The Client

One of the largest financial services provider in the Middle East

Business need

Achieving significant cost optimization
Improving the existing time-to-market
Maintaining on-time high quality product rollouts
Bringing consistency in processes & procedures across LOBS
Retention of location-specific domain knowledge

Solution

TCOE set up at offshore to cater to all testing requirements across the organization
Developed an automation framework that can be leveraged across technologies and applications
Centralized repository for reusable components and function libraries that accelerated testing cycles
Ensured effective resource utilization, knowledge management and governance

Business benefits

Total cost of quality dropped by nearly 42%
Testing efforts reduced by 40% due to automation and reusability
Testing cycle time cut by 35%
Significant improvement in time-to-market
Faster ramp up through pro-active investment in training and knowledge management

Case Study 2

Multi-Device Application Testing and Automation

Client Profile

Mobile Equipment Manufacturer

Business Case

Internet Tablet Application Testing
Development and Testing of internet applications across multiple Internet tablet devices

Solution

IApplication Testing - Functionality
Chat/VoIP Apps: Skype, Gizmo, MSN, Yahoo
Music Streaming Apps: Real Rhapsody, Last.FM, MP3 Tuner
Social Networking App: Facebook
Enterprise Solutions: VPN, Tablet to Projector, Outlook Web Access, Remote Desktop, Seamless Software Update (SSU), and other day-to-day office applications

Application Automation provided higher efficiency to overall testing process
Faster go to market product
Functional Tests, IOP tests, Field Exercises, Endurance Tests with 100% traceability delivered
Digital Minds coordinated Pilot Implementation, Supporting Internet Tablet to Projector development

Case Study 3

Performance Engineering

Client Profile

3rd largest Mobile selling company in the world
New innovative upgraded smart phone and other accessory are introduced in the market.

Business Case

To increase the performance of the system to increase the usability of the system.

Solution

SOASTA, AppDynamic, Google Analytics tools used to monitor the tool.
POC is carried on BlazeMeter for creating Mobile simulation as part of Performance test strategy.
Load, stress, breakpoint test are being carried out with various workload model for the application flow
Identifying the root cause of the failure and slowness in the system and providing suggestion to Development team to fix

Business Benefits

Performance issues resolved to improve customer satisfaction
BlazeMeter tool is evaluated, which can be leveraged for mobile simulation.
Regular application performance reports are being provided in order to decide on to push or no push for the release.

Case Study 4

E2E E-Commerce Automation Testing

Client Profile

Mobile Manufacture E-Commerce Website

Business Case

Automating Functional and Regression Testing for complete E2E E-Commerce Flow.
Running the Automation Test suite on different Browser OS and Mobile devices

Solution

Complete Open Source Selenium Based In House Automation Framework.

Functional Automation along with development and running the automation suite before go live on UAT Environment.

Using Jenkins and Sauce Labs for parallel execution and multi browser and OS coverage with one click .

Business Benefits

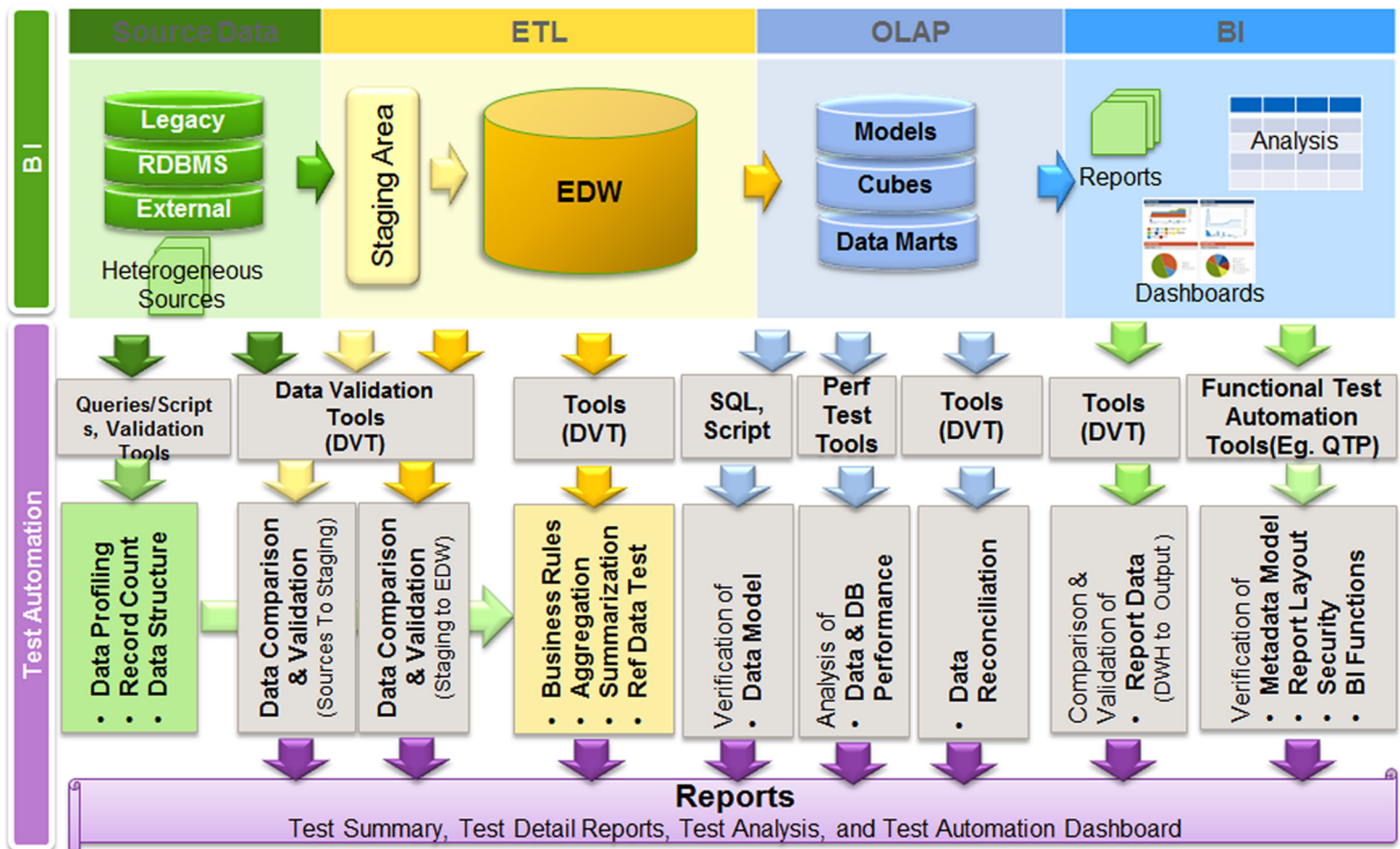Functional Automation reduced the Agile cycle by 1 week.
Pushing to product with complete test coverage in short duration
Confidence Levels are Increased for the Product Team due to vast coverage of testing using Automation
Digital Minds coordinated in the Implementation and enhancements of the framework

Case study 5

BI testing for one of the leading e-commerce company in the USA