
THE MATURITY CURVE OF TESTING SERVICES



The customer is king—more so in recent times, when IT has become the backbone of all industries. Customers have become more demanding and unforgiving with the availability of easy options from service provider firms. The services provided by the firms have turned into commodities. A new product or service provides a competitive advantage, but only for a short span of time. It easily gets replicated, if accepted by the market. In such a scenario, it becomes vital that the new services are delivered to the market faster than the demands of competition. It is equally important that it meets or exceeds customer expectation in terms of functional and non-functional quality or else face the threat of rejection and failure.

In the product development life cycle, the quality of a product is measured and ensured through testing. Testing is a very critical phase in product development life cycle, ensuring the future of its release in the market.

This paper examines the way testing practice organically matures in an organization. An understanding of the natural growth helps an organization baseline understand its current status. It can then plan and strive to skip over certain steps to reach the desired maturity level.

WHITE PAPER



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The Buyers' Market

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The Testing Process

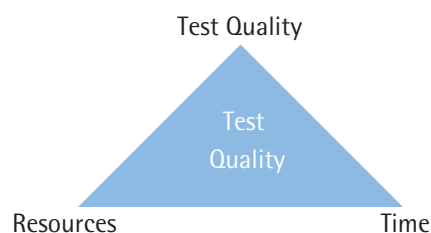
The testing phase is the final frontier for software before it enters the market. Testing strives to ensure that products meet the market needs. Testing provides information or data that helps assure the quality of the following:

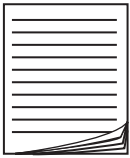
1. Product (finding faults)
2. Decision (identifying risks)
3. Process (finding root cause)

Testing is the process of comparing what a product or service is, to what it should be.

Based on the discussion so far, testing faces two conflicting needs. It needs to ensure the quality of the product, and do so in the shortest possible time, to maintain a competitive edge in the market. The scenario becomes more complex if we consider the software delivery challenges. There is another dimension to this scenario—the need to reduce the effort spent on producing the highest quality product in the shortest possible time.

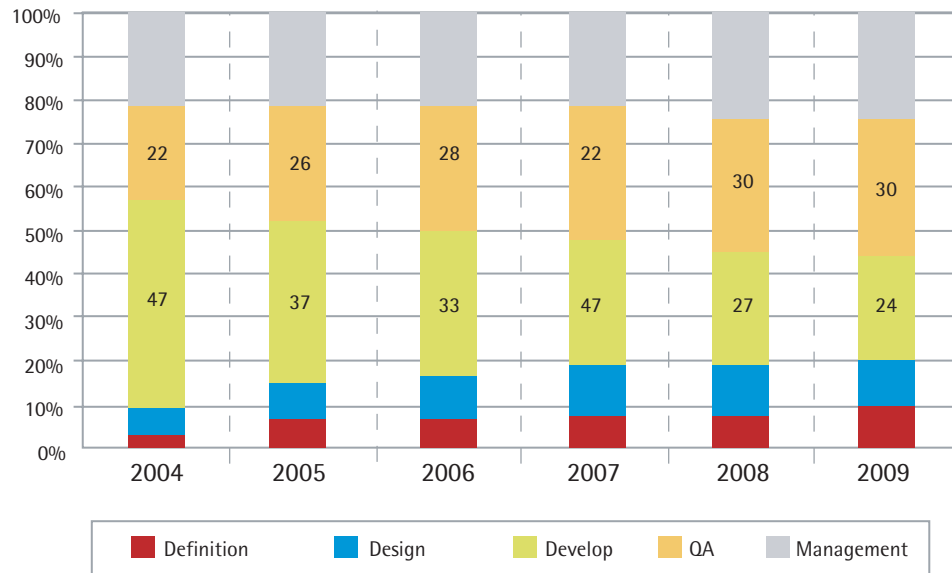
The Testing team, acting as a custodian of the customer expectation, has to strike a balance between three critical parameters: Quality, Resources, and Time. None of these can be changed in isolation because a change always affects the other two parameters.





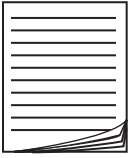
The Testing Market

The services industry is rapidly adopting software solutions. The use of commercial off-the-shelf products (COTS) and third-party solutions is becoming common. In this scenario the IT group of a services company virtually becomes a system integrator. Testing becomes a vital component with COTS and multi-party development. Though it adds no functional value, it adds an immense business value. A testimony of the growing significance of testing is the increase in the Quality Assurance (QA) share of spends in the product life cycle, as shown in the chart below:



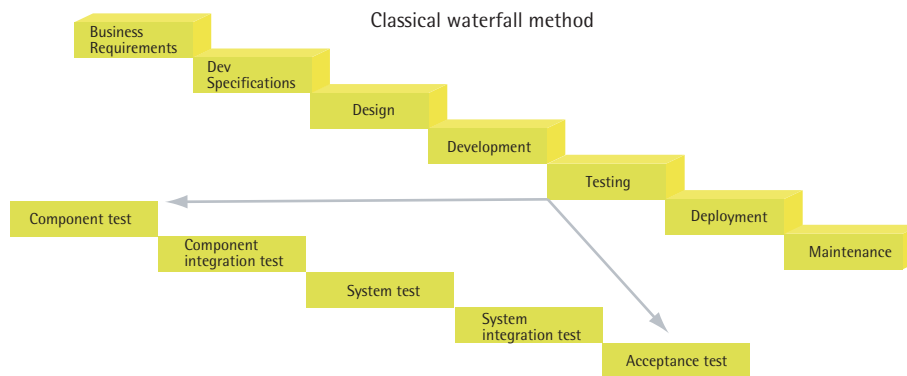
Testing is fast becoming a specialized service. The increase in the time spent is not a real indicator of the increase in the spread of the testing effort. The testing coverage and importance has increased much more than what is indicated above. More and more automation tools are being used. Initially these tools impact the CAPEX, but within a short period of time (2-6 cycles for a low-complexity product or application), the breakeven is achieved. Thereafter, the tools provide a much higher cover for a lower cost. They reduce the OPEX.

Testing requires specialized skills. Contrary to the best case scenarios architected, designed, and coded by the development team, the testing team has to visualize all the boundary and negative usage scenarios that the product may be subjected to in the real world. A huge opportunity space coupled with the need of specialized skills is the primary driving factor behind the growth of the testing market.



Conventional Testing in SDLC

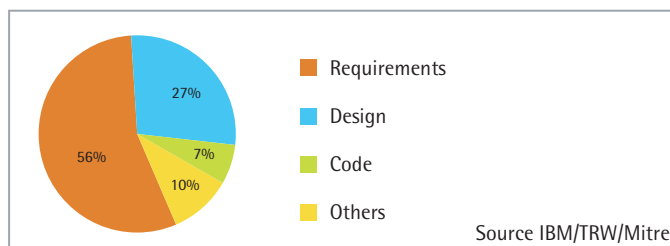
Software Development Life Cycle (SDLC) defines the stages or phases of a project from inception through completion and delivery of the final project. In the conventional waterfall method, testing comes at the very end of the life cycle.



The strength of the waterfall method lies in its thoroughness, and leads to an extremely robust code. But it has its drawback too---the time taken to reach the market. The testing stage, confined to the end, has its own problems as explained below.

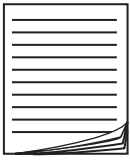
The chart on the right shows the distribution of defects in the life cycle.

As shown by a study, 56% of the defects result out of the requirements analysis phase, which if tackled then, will not percolate down to subsequent phases, and hence will reduce time and effort required later to fix those defects.



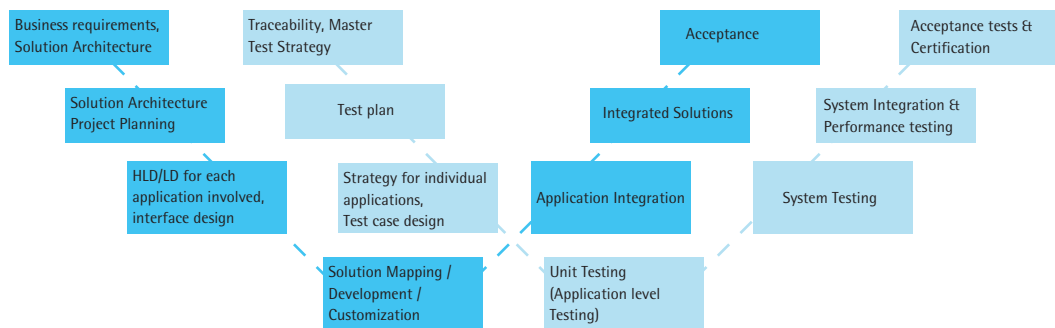
From a cost angle, the cost of a defect increases with time. Let's assume that a defect found during requirements stage costs \$x to fix. According to a Gartner study, if the defect is found and fixed in the design stage, it will cost \$5x. If further delayed, finding and fixing it will cost \$10x during the coding stage and \$20x during the unit testing stage. Finding and fixing it during the test execution phases will cost \$50x and if it leaks to field, the cost goes up to \$200x. Hence, it is imperative to find and fix the defect as early as possible.

There are alternate life cycle models that aim to speed up the process of finding the defect. A few of these are V-process model, iterative model, spiral model etc. The V-process model extends all the benefits of waterfall model and eliminates the delay in defect detection.



V&V Process Model

The V-process model details the development and the test activities. The V&V testing model has been structured to align the testing phases with the development phases of the V-process model. There is a one-to-one correlation between the activities of the development phase and the test phase. The test strategy preparation is done in parallel with the preparation of the business requirements document. Similarly, test planning happens parallel to solution architecture. The V&V model figure below shows the correlation between the development and test activities.



V&V Model

The test process rigidity and maturity in an organization comes with time and in different phases. The selection of the life cycle model is one aspect of the maturity. More often than not, the journey begins with waterfall model. The other aspect of maturity lies in the process being followed in bringing the operational segregation and division of labor. This aspect is discussed below.

Stages of Testing Practice Maturity

In an organization, the degree of independence that the testing practice has is a measure of the maturity of the testing practice. The testing practice in most organizations follows a maturity curve. The curve has four distinct stages. In the first stage, the developers test their own products. In the second stage, the tests are designed by other members of the development team. The third stage is reached when the tests are designed by independent testers, who are a part of the same team. In the most mature organization, the tests are designed by specialized external testers. This fourth and final stage is also known as Independent Verification and Validation (IV&V).

IV&V separates testing from development both in terms of the process and the people. IV&V considers unit testing to be a part of the development phase. There are clear entry criteria (or quality gate) defined for a system or product to enter the system testing phase from unit testing phase. In fact, there are elaborate Entry, Task, Validation and Exit (ETVX) criteria defined for each phase of the testing including system, system



progress, issues, and resolutions. An independent third party view leads to an effective and early recognition of issues, which results in earlier and cost-effective resolution. Most of the firms providing testing service customize IV&V in their own way. Quite often, this customization extends the IV&V benefits.

Testing as a Managed Service - the Wipro Way of IV&V

As a strategic management tool, "Managed Service" enables companies to reduce costs, acquire new skills, use new technology, reduce the in-house effort, improve the time to market, and improve shareholder value through a contractual agreement with a third party provider.

The third party provider should be able to deliver a superior level of service in an economical manner. The resources hence freed could be used for more critical business activities. Managed service becomes an effective business strategy if the right vendor is selected, and he deploys the right expertise, in the right way, at the right time.

Coming back to testing, the final stage on the testing maturity scale, as discussed earlier, envisages a separate testing team. IV&V model brings the process rigidity and ensures repeatability, predictability and continuous improvement in the testing process.

Wipro's Testing as a Managed Service (TMS) model, brings all the benefits of the "managed service", which further extends the benefits of IV&V. It is an integrated full-time, permanent group that operates as a public utility or service center on behalf of other parts of the enterprise. It delivers shared test services (worker, project, location, organization, etc.); champions test tools, and defines standards, as well as takes care of the business-alignment, project prioritization, management, and skills issues associated with projects.

Architecturally, TMS divides the testing operations management into four layers: Demand Management Layer, Process Management (consulting) Layer, Core Service Management Layer, and the Infrastructure Management Layer. Each of these layers consolidates the activity across the organization. This consolidation brings in different advantages at different level as indicated below.

Demand Management Layer: This is the planning layer. Demand from different units of the organization in different locations gets consolidated in this layer. This leads to a standard engagement process and reduces cycle time. Proper planning leads to effective utilization of resources, thus reducing efforts and cost.

Process Management & Consulting Layer: Different groups have different best practices. This layer, which may be implemented in form a "Process Center of Excellence", leads to sharing of best practices. This layer provides process consulting, which includes finding gaps in as-is process, providing the solutions, thus leading to continuous improvement. The direct benefits are enterprise-wide common process and improved maintainability. Test Policy may also be an outcome of this layer.

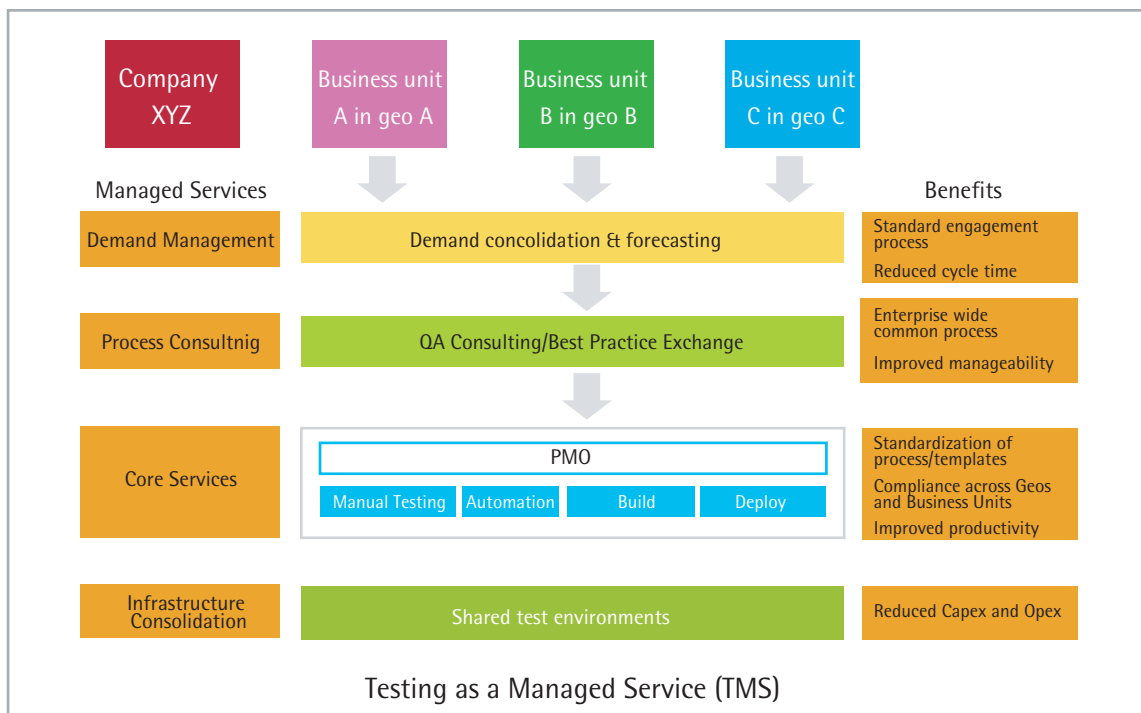


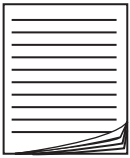
Core Service Management Layer: This is the layer where the rubber meets the road. The basic or core testing services are the focus of this layer. The activities in this layer include test strategy, test plan, test execution, test recording, and reporting. Core services cater to both functional and non-functional testing. A central, leveraged core team of individuals participates in all the test phases, works on projects with integration between cross-functional applications, provides specialized services around automation and performance testing, using standard test tools.

As this layer is delivery-centric, there is a Program Management Office (PMO), which focuses on on-time, in-budget, and right-quality delivery. They use all the outputs from the above two layers. This layer leads to an optimized use of resources. The direct benefits are-optimized resource deployment, standardization of templates, process (e.g. reporting and recording), and improved productivity. This improved productivity is a result of the ability of the resources to excel in a specific area, e.g. performance testing, instead of being spread over all the areas of testing of one or a few specific applications assigned.

This layer also provides a centralized knowledge management for integration across the different parts of the organization.

Infrastructure Consolidation Layer: The need of infrastructure in a consolidated environment is always less than in a distributed one. This directly benefits CAPEX. The consolidation leads to a better and higher utilization of infrastructure. The optimized utilization helps the core delivery team get more time on the systems. The infrastructure management process may reduce the setup time for the core team, thus improving their productivity. Consolidation leads to a reduction in the operation expenditure.





TMS - A Case Study

The proof of the pudding is in the eating. The following case study demonstrates how a customer benefited by using Wipro TMS.

Organization: A leading Wall Street Investment Bank

Challenges faced by client:

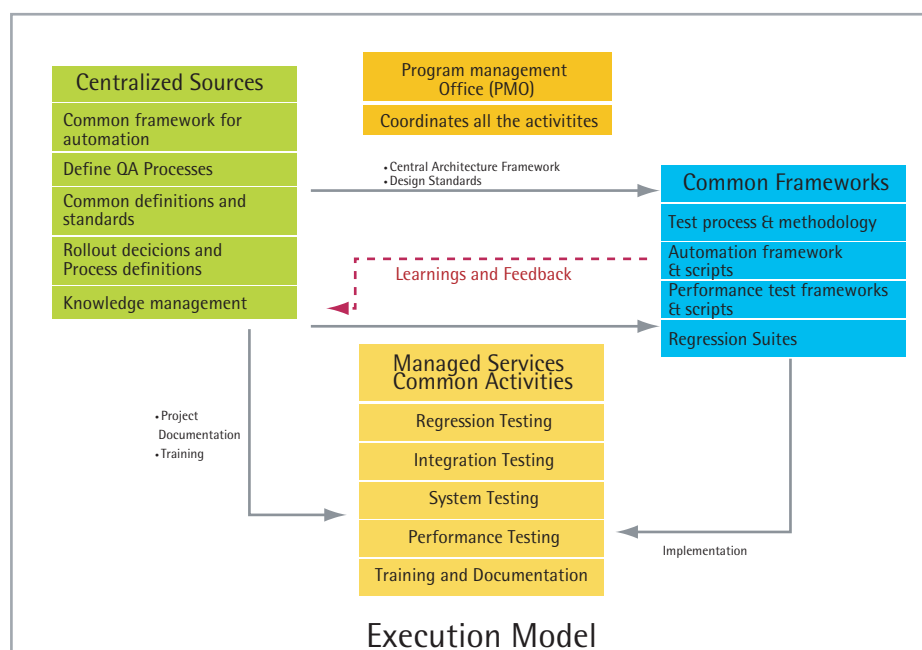
- Lack of a common organizational-wide platform to ensure QA of IT initiatives
- Absence of an streamlined testing efforts and QA cell
- Lack of an automation framework
- Multiple QA vendors, inability to push SLA-based approach
- Multiple testing tools resulting in minimum reusability across projects

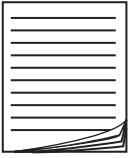
To meet the above challenges, Wipro:

- Implemented a 'Managed Services' QA model
- Performed end to end QA of close to 40 applications
- Reduced effort by almost 40% using test automation
- Used an onsite / offshore model (30:70)
- Automated 60% of the 40 applications
- Provided and SLA driven service contract

Execution Model

The diagram below shows the execution model:





The Benefits

The chart below illustrates some of the benefits delivered by Wipro TMS:

Metric	Critical Cash trade app.		Critical Derivative App. (after 10 months)	
	Pre-engagement	Pre-engagement	Pre-engagement	Pre-engagement
Developer Time Spent in Testing	60 hrs / release	20 hrs / release	20 hrs / release	10 hrs / release
Developer Time Spent in Post-Release Troubleshooting	12 hrs / release	2 hrs / release	10 hrs / release	4 hrs / release
Post production Patches/Code Rollbacks	12	1	3	1
Number of Test Cases executed	540	1600	400	1252
Percentage of Tests Automated	0%	70%	0%	42%
Average Support Calls	18 hrs / week	25% drop	12 hrs / week	41% drop

Conclusion

The services industry is becoming a buyers' market and IT is becoming the foundation of the service industry. Testing is becoming a critical success factor for the services firms. A service launched with superior quality helps maintain the competitive edge in the market. IV&V brings the advantages of third party, independent, unbiased and unperturbed by the happening-in-development view. Testing as a managed service, a customized offering from Wipro extends the benefits of IV&V. TMS as a delivery model brings many operational advantages ensuring optimum use of resources across an organization.

About The Author

Arun Kumar Singh, General Manager - BFSI Testing Services, has about 19 years of experience in IT design, development and QA. He has worked with C-DOT, DCM-DP, AT&T in USA. Arun joined Wipro in its telecom solution division in 1999. During his career in Wipro he has served in a variety of management positions encompassing technical, marketing, strategic planning, business development and delivery roles in telecom and BFSI domains. Arun has done his B.E. (honors) in Electronics and Communication Engineering and masters in Marketing Management.

Arun currently heads the group providing QA solutions to the banking, finance, securities and insurance customers across the world.