Testing as a Service (TaaS)

A Paradigm shift in delivery model


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1. Abstract

We all know the importance of quality and time-to-market in a software solution. But as applications become more complex it may be cost effective to look into a Testing-as-a-Service (TaaS) solution, an outsourcing model for testing which is becoming more popular in the industry. What exactly are TaaS solutions and how do they differ from other solutions? And with the push towards more collaboration between development and test with agile methodologies, is TaaS the right way to go? Read on to find out the what’s, why’s, and when’s of a TaaS solution

Testing-as-a-service (TaaS) is a new model to provide testing capabilities to end users. Users save the cost of complicated maintenance and upgrade effort, and service providers can upgrade their services without impact on the end-users.

Testing services within TaaS include - functional testing, usability testing, performance testing, geo testing, localization testing, security testing and compatibility testing in a shared utility based model

2. Introduction

Organizations today understand the need for increased focus on quality. While they recognize the fact that failing on quality is not an option, especially when you are talking about business-critical or customer facing applications, most organizations are trying to reduce the total cost of ownership of IT and QA systems. With application performance catalyzing business growth, software testing assumes a very significant role in the growth of an enterprise. Over time, the software testing function has become a challenging activity for enterprises due to increasing technological complexities, software sourcing challenges, rising costs and security issues among others. Typically, software testing is done either internally using the infrastructure that exists within the organization, or then is outsourced to software services providers.

At the IT service provider’s side, software testing underwent a long drawn evolution cycle. From ad-hoc practices within different business units, it gradually evolved to a centralized Managed Test Center approach, and finally towards institutionalizing a Testing Center of Excellence (TCoE) within the organization. This offered customers a dynamically scalable and economical framework which enabled them to outsource their testing requirements and avoid complex contracts, long start-up times, and high levels on investment. The final stage of the evolution cycle of testing has manifested in the form of Testing-as-a-Service (TaaS). Today, Testing-as-a-Service is being increasingly considered a viable testing model by many organizations to achieve reduced costs and improved service for their IT test requirements.

Sourcing professionals are moving away from their historic emphasis on staff augmentation in testing engagements toward increasing focus on more predictable outcomes and consumption-based pricing. The result? Rising interest from both customers and suppliers in a new set of offerings that is often described as “testing-as-a-service.” Various suppliers of test outsourcing services are now formalizing their as-a-service offerings for the test outsourcing market. Together, these initiatives promise to transform the market for testing services by providing a new engagement model with many inherent benefits. However, these offerings pose challenges to sourcing and vendor management professionals who must understand the full benefits and risks associated with them. Unlike other as-a-service offerings, testing-as-a-service doesn’t necessarily represent a true cloud service, but it might incorporate aspects of cloud. Sourcing and vendor management professionals must be aware of such factors in evaluating these emerging offerings.
3. What is Testing as a Service?

“Testing-as-a-Service is an on-demand testing capability delivery model that offers faster provisioning of services with lower capital cost. TaaS can be offered either through cloud based environment or the current on-premise environment.

Wikipedia - Testing as a Service is a model of software testing whereby a provider undertakes the activity of software testing applications/solutions for customers as a service on demand. …involves the on-demand test execution of well-defined suites of test material, generally on an outsourced basis.

A Leading service provider site Testing as a service is …on demand service … "pay as you go" service.

IEEE article on TAAS in Cloud - Testing-as-a-service (TaaS) is a new model to provide testing capabilities to end users. Users save the cost of complicated maintenance and upgrade effort, and service providers can upgrade their services without impact on the end-users.

Testing as a Service (TaaS) is an outsourcing model in which testing activities associated with some of an organization’s business activities are performed by a service provider rather than employees. TaaS may involve engaging consultants to help and advice employees or simply outsourcing an area of testing to a service provider. Usually, a company will still do some testing in-house.

TaaS is most suitable for specialized testing efforts that don’t require a lot of in-depth knowledge of the design or the system. Services that are well-suited for the TaaS model include automated regression testing, performance testing, security testing, testing of major ERP (enterprise resource planning) software, and monitoring/testing of cloud-based applications.

Overview of ‘As a Service’ from a Testing point of view

![Diagram showing As a Service model with CaaS (Capability as a Service), PaaS (Platform as a Service), SaaS (Software as a Service), and testing at the center.]

- **Capability-as-a-Service (CaaS)**
  - Functional Testing as a Service
  - Performance Testing as a Service
  - Mobile Testing as a Service
  - Test Automation as a Service
  - Security Testing as a Service

- **Platform-as-a-Service (PaaS)**
  - Test Environment (Servers / Desktops / Configurations) on demand to support
  - New Development / Enhancement
  - Patches / Hotfixes
  - Migrations / Upgrades

- **Software as a Service (SaaS)**
  - Tools in different licensing models
  - Test Management Tools
  - Automation tools
  - Performance Testing tools
  - Open Source Tools

Figure 1. Overview of “As a Service Model”
As applications have become more complex with more complex testing requirements, organizations have looked for solutions to help them test and still have a return on investment. The cost of automation tools and the people with the skills required to properly execute those tools can be expensive. And some companies cannot afford to invest in best-of-breed solutions when testing and automation is not their core competency.

One model used to handle specialized test efforts is to augment the staff with highly-skilled consultants. Another option is to use “Managed Service” solutions where organizations pay for full-service testing efforts, paying for the people resources needed during the period of time when specialized skills are necessary.

“As a Service” solutions are becoming a popular way for organizations to get a service, without the investments or risks necessary by doing the work in-house. Often taking advantage of cloud computing and utility pricing, this model allows organizations to buy what they need, when they need it. Testing as a Service (TaaS) solutions are popular for complex testing efforts requiring a specialized skill set, expensive testing tools or a large amount of resources.

**TaaS Ecosystem – A snapshot**

![TaaS Ecosystem](image)

**SAAS (Software as a Service)**

<table>
<thead>
<tr>
<th>Apps &amp; Services</th>
<th>Web Applications</th>
<th>Client / Server</th>
<th>Enterprise Applications – SAP, Oracle, Cadence, PTC, Sugar CRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTKO / LISA</td>
<td>Microsoft</td>
<td>Se</td>
<td>GREENHAT</td>
</tr>
<tr>
<td>Worksoft</td>
<td><strong>Tools Sandbox</strong></td>
<td>IBM Rational</td>
<td>IDEAL SOFTWARE</td>
</tr>
<tr>
<td>FORTIFY</td>
<td>Datamaker</td>
<td>tealeaf</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Platforms</th>
<th>Windows (Multilingual, Multi CPUs)</th>
<th>Linux (Red Hat, SUSE, Debian)</th>
<th>Elastic servers (Tomcat, MySQL combinations)</th>
<th>BarCode ES, Coldfusion, Tomcat, Weblogic, WebSphere, Web Application server (SAP), AIG Dynamo, JBOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-SQL</td>
<td>Oracle, DB2, Informix, MySQL, Teradata</td>
<td>Sun Solaris</td>
<td>Mobile Platform simulators</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. TaaS Ecosystem
4. Why TaaS –Market Need?

The traditional rationale for test outsourcing is that by applying economies of scale to the testing of applications, a test service provider can test better, cheaper and faster than companies can themselves. TaaS could be the next step in test outsourcing. Some of the top reasons for this change in delivery model are:

- The testing industry has matured into a standard practice: In the past, executives viewed corporate test centers as strategic investments. Today, people consider testing to be a cost center and, as such, it is suitable for cost reduction and outsourcing.
- IT is commodity - testing is a commodity!
  In-source testing activities require expensive overhead including salaries, health care, liability and physical building space.
- Standard test approaches are available: With some exceptions, testers can use a standard test approach to test any application.
- A specialized testing provider can target global markets: A testing provider specialized in testing widespread applications (packages) can more easily reach the entire user base.
- Security is sufficiently well trusted and transparent: With the broad adoption of SSL, VPN and Citrix, testing providers have a secure way of reaching the applications under test. This still allows the environments to remain isolated from each other.
- Wide Area Network’s bandwidth has grown drastically: Added to network quality of service improvement, this makes it possible for testing providers to trustfully access remote locations and applications with low latencies and acceptable speeds.

IT as a utility ensures the customer that test environments are no longer scarce and mysterious environments that must be carefully managed. Therefore, test environment capacity can be quickly increased and decreased without upfront investments. The traditional rationale for test outsourcing is that by applying economies of scale to the testing of applications, a test service provider can test better, cheaper and faster than companies can themselves. TaaS could be the next step in test outsourcing.

Since, there is no standardized approach to implementing TaaS, enterprises need to undertake a thorough assessment specifically around testing. This assessment exercise will lead to the formation of a right cloud environment, load, risk analysis, mitigation and governance for the enterprise. The discovery and portfolio analysis process is an important phase that sets the right expectations with the stakeholders, produces a cohesive testing roadmap, and ultimately leads to the greatest ROI.

The realm of software has changed significantly in the recent past. Most of the software is delivered from the cloud, can be accessed from multiple devices, are enabled for global customers, and are targeted towards a larger cross section of audience. Testing is no longer confined to validating the intended product behavior, but extends to ascertain how the product behaves in a given environment (platform / device). In most of these cases, testing gets repeated on different form factors, browser versions and platform versions. Such testing is typically well defined, time bound (few test cycles) and requires availability of test engineers, resources (device, lab) in an on-demand model across geographies.
5. How is TaaS different from Traditional Testing Models?

<table>
<thead>
<tr>
<th>TaaS is not just</th>
<th>but is....</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online order management system of service providers</td>
<td>Automated Provisioning service platform capable of delivering testing services on outcome based model</td>
</tr>
<tr>
<td>Warehouse of Testing Tools or Frameworks</td>
<td>Ecosystem where methods, tools and people synchronize to deliver services</td>
</tr>
<tr>
<td>Alternative to current testing model</td>
<td>An extended arm that addresses unique, niche &amp; fractional testing needs that arise</td>
</tr>
<tr>
<td>One stop shop for all Testing needs</td>
<td>Testing ecosystem that promises higher levels of efficiencies</td>
</tr>
<tr>
<td>Test Environment provisioning system on cloud</td>
<td>Gateway to leveraging proven cloud based testing techniques</td>
</tr>
</tbody>
</table>

Figure 3. TaaS system

<table>
<thead>
<tr>
<th>Traditional Testing</th>
<th>TaaS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Arbitrage as key lever</td>
<td>Business Value + Cost Reduction as key lever</td>
</tr>
<tr>
<td>Craftsman Approach</td>
<td>Industrialized</td>
</tr>
<tr>
<td>Input based pricing</td>
<td>Output / Outcome based pricing</td>
</tr>
<tr>
<td>Rigid</td>
<td>Flexible and Scalable on Demand</td>
</tr>
<tr>
<td>Testing seen as a tactical activity</td>
<td>Testing seen as a strategic enabler</td>
</tr>
<tr>
<td>Resource ( People ) focus</td>
<td>Services ( Assets) focus</td>
</tr>
</tbody>
</table>

Figure 4. Difference between TaaS and traditional model
6. TaaS Delivery Model

The delivery model for TaaS has quite few differences from conventional model. Here service provider needs to setup Test Factories – specialised in each testing domain/area which can be leveraged by customers on need basis.

This “On Demand” usage and test factory setup becomes the foundation for delivery model of TaaS.

![Figure 5. TaaS delivery model](image)

![Figure 6. TaaS in Cloud](image)
Figure 7. TaaS Services model
7. When you want to use TaaS?
TaaS can be used in the following scenarios:

1. Functional testing – In a continuous integration kind of scenario, TaaS could be a platform for creating an agile based functional testing environment

2. Load Testing – TaaS could be used for creating various kinds of loads to stress test applications. The scale-in/scale-out nature of cloud comes in handy for generating variable loads.

3. Performance and Benchmark testing – For ISV’s, looking to create benchmark reports for their products with their standardized test suites, TaaS can be used

4. Regression testing – Applications which are in maintenance mode, can make use of TaaS to run regression tests of previously written test scripts

5. Mobile application testing – Mobile applications can be tested on TaaS. TaaS provides a realistic platform to test mobile applications, and leverages the key advantages of cloud to test application performance using cloud based content delivery networks (CDN) distributed across multiple locations around the world, effect of network latency and this will be testing on a live network

6. Specialized Testing : Testing of ERP/CRM applications, testing of DW/BI platforms which requires niche skill set and combination of various technologies

Certainly TaaS will not cover all of your testing needs. Regardless of test efforts that are outsourced, a good amount of testing should be done in-house when a project is under development. Unit tests, functional tests, and integration tests that require knowledge of the system should be performed throughout the lifecycle with a strong partnership between developers and testers. However, for tasks that can be automated, but require a specialized skill set or tools, it may be best to use an outsourced solution rather than try to hire highly skilled specialists or purchase and maintain tools and testing environments.

Outsourcing testing efforts is best for specialized testing efforts that don’t require as much in-depth knowledge of the design or the system. Types of services that are well-suited for the TaaS model are automated regression testing, performance testing, security testing, testing of major ERP software such as SAP testing, or monitoring and testing of cloud-based applications.

TaaS solutions often use huge amounts of automation and prebuilt test cases, so would be appropriate for testing for regression bugs, performance and security in mission-critical production systems. With the TaaS model, organizations aren’t paying licensing fees or personnel fees. The TaaS utility model allows users to have access to the latest testing tools and expertise when they need it, at the volume needed.

Smaller businesses that have specialized testing needs may want to invest in developing the skills in-house. Again, in a TaaS solution there is no developer-tester collaboration. Tests that are written are done in a repeatable, methodical way that does not depend on development interaction or exploratory testing. On Agile teams, automated regression tests are usually developed by the development team using test-driven development (TDD) methods. These teams will not need to use TaaS for automated regression, but may consider using TaaS for performance or security testing if they don’t have specialized testers on their staff.
8. Benefits

Testing-as-a-Service has demonstrated significant improvements over traditional testing environments. By switching to TaaS, customers get access to a centralized test environment, with standardized software library and test suites. It also has a self-service portal, which cuts down time required to provision test environments.

Key Benefits:

- Leverages standardized and highly efficient test methodologies addressing security, reliability and manageability while catering to continuous cost pressures, higher transparency, certainty of outcomes and service level compliance.
- Enables organizations to set up much larger test labs which were previously unimaginable.
- Tests like performance / load testing can be done as close as possible to real life (as if the system were up and running) – multiple locations, multiple languages, over different time zones run dynamically having a large number of parameters.
- TaaS solutions are dynamically priced allowing customers to dynamically use and dynamically pay
- Flexible resourcing and pricing based usage reduces testing costs
- Acquire testing services when needed and calibrate scale, which helps reduce time to launch new products
- Industrialize the test services (“Test Factory”)
- Give advance insight into costs and running time.
- Improve test processes continuously

In terms of costs, the TaaS model is beneficial since enterprises pay for the actual time utilised for testing a leading to controlled costs. Compare this to a situation where an enterprise manages its own infrastructure and has to incur capital expenditure and yearly depreciation costs on testing environments. The TAAS model also offers licensing benefits since test tools, hardware, application licensing or even operating platform (UNIX, Linux etc.) are managed by the cloud. Additionally, using standardized testing processing and tools can yield a 10%-20% cost reduction due to increased quality and Test Automation from cloud deployments show a 5%-10% revenue enhancement. Enterprises also witness productivity gains of 5%-10% year-over-year due to test method improvements. Leveraging a global talent pool through an extended cloud ecosystem can lead to a 10%-20% savings in personnel costs.

By switching to TaaS, customers get access to a centralized test environment, with standardized software library and test suites. It also has a self service portal, which cuts down time required to provision test environments.
9. Conclusion

The complexities of the future are changing. It is becoming demanding, consumer oriented and the number of devices/ user interfaces that the organization has to support is becoming much more versatile. In such an environment, it is imperative to assess and implement the right methodologies to achieve scale, minimize costs and offer improved services. The CIOs and their organization hence should take adequate care and caution in evaluating TaaS offerings and must consider the following:

New TaaS offerings provide substantial benefits but prudence lies in validating if it can be easily customized and adopted by the internal business organization.

While potential of Cloud based TaaS is huge, its deployment may vary from one industry to another. Matching the offering with needed compliance and security requirements is something that Vendor Management Organization needs to duly evaluate.

The service works best where volumes are high and workload can be easily delinked from live operations. This makes outsourcing easier to manage.

True benefit of TaaS lies in aligning the pricing to successful outcome based models than merely accepting Transaction Pricing. While it is primarily volume driven, combining success rates and variability of transactions is the key to determine right outcome.

10. Summary

Though the entire domain of outsourced testing can be the potential for managed testing, as per Industry reports, the worldwide market for software and systems testing services will reach over $56 billion in 2013-14 (about 20% of end-user spending). Out of this the potential for managed test services may account for nearly USD 30 billion (~53%). Considering the potential, it is utmost necessary to evaluate innovative and more efficient models focusing on outcomes than the effort.

Specialized tests such as performance tests, security tests, automated regression tests or SAP tests can be complex and time-consuming and require expensive tools, resources and people. Testing-as-a-service is a model which will allow organizations to pay for what they need, when they need it. By using a consumption-based pay model, there is less risk and investment on the part of the organization. While this solution may be right for some test efforts, keep in mind that it won’t solve all your quality needs. Collaboration between development, business and test is still recommended for functional test efforts of new development and some organizations may choose to develop automation and specialized testing skills in house. However, TaaS solutions may be the answer to give your organization the state-of-the-art testing solution without the high price tag.

11. About the Author

Charanjit Singh is a Systems Analyst in Accenture with close to 7 years of experience in Business Intelligence and Data Warehousing testing. He has extensive working experience in the offshore-onshore model with experience in leading offshore teams and working onshore as a QA Lead consultant. He is ISTQB -Testing certified. He is AHM-250 certified for US Health Care domain and Retail Industry Generalist certified. He has been part of Client Assessment teams for setting up TCoE’s, test factory model -TaaS. Recently he was part of consulting team for major US retailer to assess and recommend test factory best practices and helped them in creating implementation plan.

Charanjit has extensive experience in setting up TCoE’s for several clients and solution which model is best suitable for clients. Currently he is leading testing team of more than 40 members in shared services model and has been able to implement TaaS model successfully for major US retailer. This has resulted in huge benefits and was able to deliver complex projects with stringent timelines by leveraging shared services model. BI Specialized testing team working in shared services model was able to deliver more than 15 projects in a year spanning work of 20,000 hours.