FOR APPLICATION DEVELOPMENT & DELIVERY PROFESSIONALS

The Forrester Wave™: Continuous Testing Service Providers, Q3 2017

The 11 Providers That Matter Most And How They Stack Up

by Diego Lo Giudice
July 27, 2017

Why Read This Report

In our 29-criteria evaluation of continuous testing (CT) service providers, we identified the 11 most significant ones — Atos, Cigniti Technologies, EPAM Systems, Hexaware Technologies, HCL Technologies, Larsen & Toubro Infotech (LTI), Mindtree, NIIT Technologies, QualiTest, Syntel, and Tech Mahindra — and researched, analyzed, and scored them. This report shows application development and delivery (AD&D) pros how each provider measures up and helps application development and software quality assurance professionals make the right choice.

Key Takeaways

HCL, EPAM Systems, And Mindtree Lead The Pack
Forrester's research uncovered a market in which HCL Technologies, EPAM Systems, and Mindtree lead the pack. Tech Mahindra, Hexaware Technologies, Cigniti Technologies, and Atos offer competitive options. NIIT Technologies, Syntel, LTI, and QualiTest are Contenders.

AD&D Pros Want To Deliver Faster Without Sacrificing Software Quality
The CT services market is growing because more AD&D pros see continuous software delivery as a way to address the quality-at-speed challenges that continuous delivery brings. AD&D pros increasingly trust CT service providers to act as strategic partners in their Agile and development and operations (DevOps) transformations.

Accelerators, Automation, Modern Testing Practices, And Top Talent Are Differentiators
As organizations transition their development and testing teams to continuous delivery, traditional testing services no longer suffice. New types of consulting services, practices, and processes as well as an ambitious vision and road map on future testing developments will dictate which providers lead the pack.

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with Christopher Mines, Jeffrey S. Hammond, Luis Deya, Amy Homan, and Andrew Reese
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Continuous Testing, A Must-Do For Continuous Software Delivery

Digital disruptors and customer-obsessed organizations are improving customer experience (CX) by shortening their software delivery cycles, delivering features in smaller increments, and scaling their existing Agile processes with DevOps. Traditional testing services don't cut it for these organizations: 30 of the 37 reference customers contacted for this research claim they are adopting continuous testing (CT) services to support their Agile and DevOps initiatives within a digital transformation journey (see Figure 1). Of those services, broadly speaking, clients say automation is the most impactful and differentiating for delivering better software faster (see Figure 2). More specifically:

› **End-to-end automation is vital.** Overall, customers identified functional and nonfunctional test, design, and execution automation as the most impactful set of services for CT. Almost three-quarters of them reference functional test execution automation (either UI, data-driven, or API-led) as the most impactful automation service. They also frequently cited functional test design automation, service virtualization for automated integration testing, and API test automation, along with performance testing.

› **Shift-left performance testing gains traction.** Digital, mobile, and internet-of-things (IoT) software all increase the need for early performance testing; so far, just a sliver of customers understand that. Shift-left means running performance tests as early as possible during development to ensure designs and components work. Many also call this "unit" or "local" performance testing. Shift-left performance testing also provides developers with dedicated monitoring tools to give them insights early in development about how features and minimum viable products (MVPs) will behave once deployed in production.

› **Mobile application testing and TDD/BDD come next.** Other customers chose testing the front end of mobile applications on a multitude of devices and OS versions as one of their top three priorities; others chose test-driven development (TDD) and behavior-driven development (BDD).[1] TDD/BDD has long been a growing area of interest for our clients, and our survey confirmed it was on the radar screen of customers leveraging CT services. TDD/BDD leverages a common declarative language for describing requirements, tests, and feature behavior. Leading design and coding with testing helps create testable software, where more feedback gets rolled into the requirements early on. BDD gets the right things done, while TDD gets them done right. Done together, quality is much higher.

FIGURE 1 Most Digital Transformations Leverage Continuous Testing Services To Build Better Software Faster

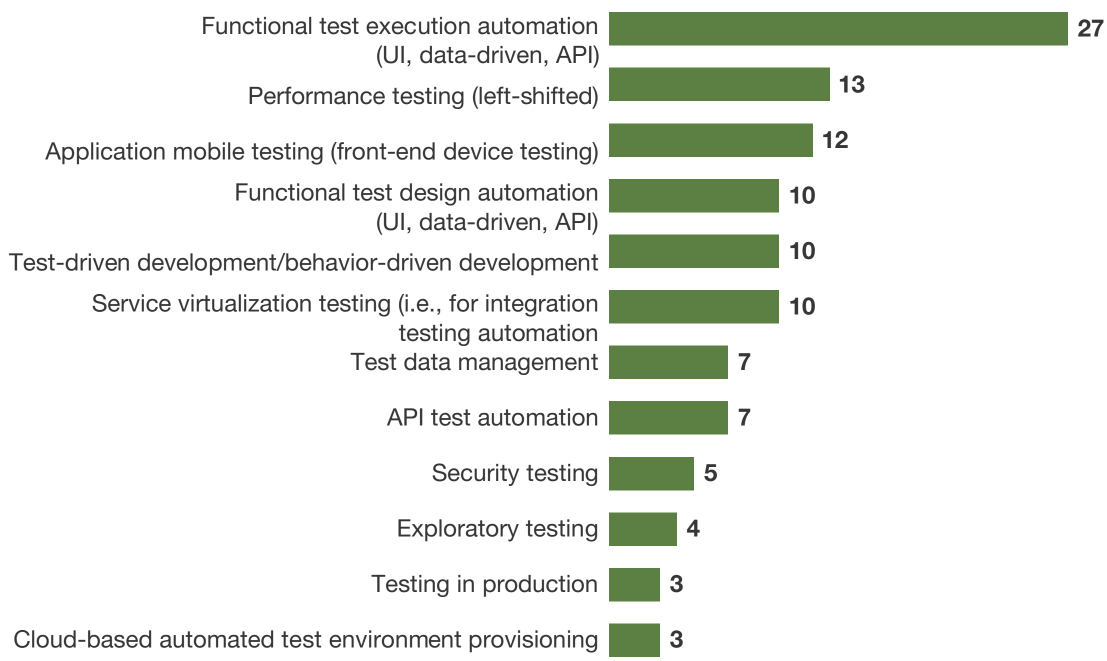
"Is the CT service that the vendor delivered part of a broader Agile+DevOps program to support digital acceleration transformation?"

Base: 37 business leaders provided by the evaluated vendors in this Forrester Wave

Source: Forrester's Q3 2017 Continuous Testing Service Providers Forrester Wave™ Client Reference Survey

FIGURE 2 The Top Three Must-Have CT Services

"Assuming an Agile and/or DevOps context for software development, please select the three most impactful and differentiating CT services your vendor has provided that have enhanced your ability to deliver better software, faster."
(Multiple responses accepted)



Base: 38 business leaders provided by the evaluated vendors in this Forrester Wave

Source: Forrester's Q3 2017 Continuous Testing Service Providers Forrester Wave™ Client Reference Survey

Most CT Services Customers Fall Short Of Their Automation Aspirations

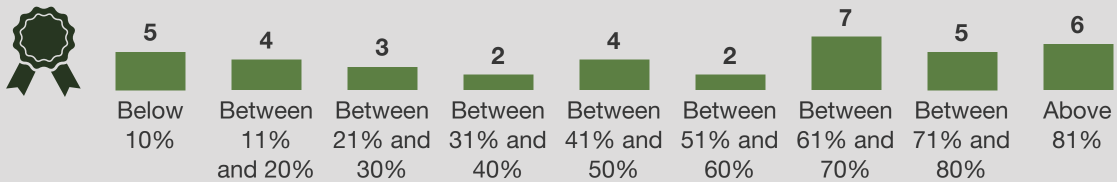
Our definition of CT services was the starting point for the evaluation criteria used in this Forrester Wave evaluation.[2] We highlight automation as one of the most important enabling factors for successful continuous testing, and we measured CT against various criteria aimed at evaluating vendor's capabilities in terms of practices, process, accelerators, and talent. We also asked about automation in interviews with reference clients. To better understand where they stood on automation, we asked what level of functional test automation they had achieved, how functional test automation coverage had improved in the last 12 months, what level of nonfunctional automation they had achieved, and how nonfunctional automation testing coverage had improved in the last 12 months, all as a result of the services received from their vendors (see Figure 3). In a nutshell:

- **Performance automation lags behind functional automation.** In the last 12 months, six of the customers had more than 80% coverage of functional test automation, while half as many had achieved that for performance testing automation.
- **Automating 80% is the goal, but only five get there.** The rule of thumb: For Agile teams to deliver software frequently, say within two weeks of sprints, they must automate more than 80% of their manual test cases. Just 14% of the customer references are at that level. Many more are on the journey to get there, but less than half automate more than 50% of their functional test cases, and the numbers are much lower for performance test automation.
- **Most customers are nevertheless happy with their CT service providers.** Client experience is what really matters for customers choosing a CT services provider. We asked reference users about client intimacy, the quality of interactions with vendor employees, the quality of the employees allocated to projects, and their approach to solving problems. On average, the customers scored their vendors favorably on these. To decrease the potential bias of each client for its vendor, we did a relative comparison that positioned all vendors as above average, average, below average, and way below average within the peer group (see Figure 4).

FIGURE 3 Functional And Nonfunctional Test Automation Achieved And Improvements In The Last Year

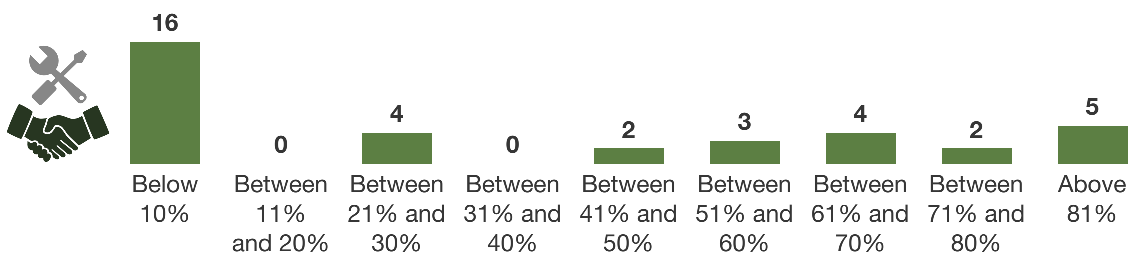
"What level of functional test automation has your organization achieved as a result of the services the vendor is providing/has provided you?"
(Percentage of overall manual functional tests you have automated)

Functional test automation achievements are much higher than performance test automation.



"What level of performance test automation has your organization achieved as a result of the services the vendor is providing/has provided you?"
(Percentage of overall manual performance tests you have automated)

While interest in performance testing is growing, practices, services, and tools need to improve.

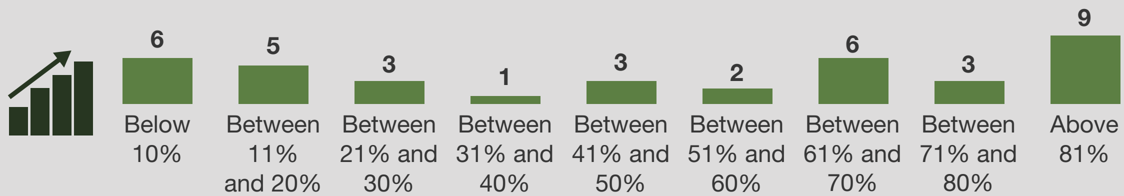


Base: 38 business leaders provided by the evaluated vendors in this Forrester Wave
Source: Forrester's Q3 2017 Continuous Testing Service Providers Forrester Wave™ Client Reference Survey

FIGURE 3 Functional And Nonfunctional Test Automation Achieved And Improvements In The Last Year (Cont.)

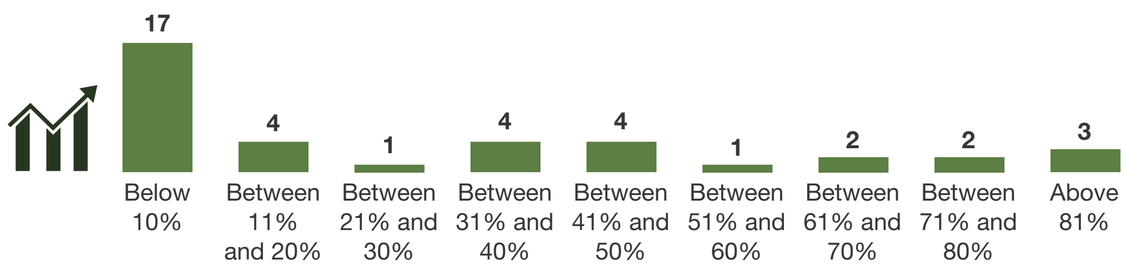
"Within the last 12 months, what percentage of improvement in the level of functional test automation of manual functional tests has the vendor helped your organization achieve?"

Functional test automation keeps improving . . .



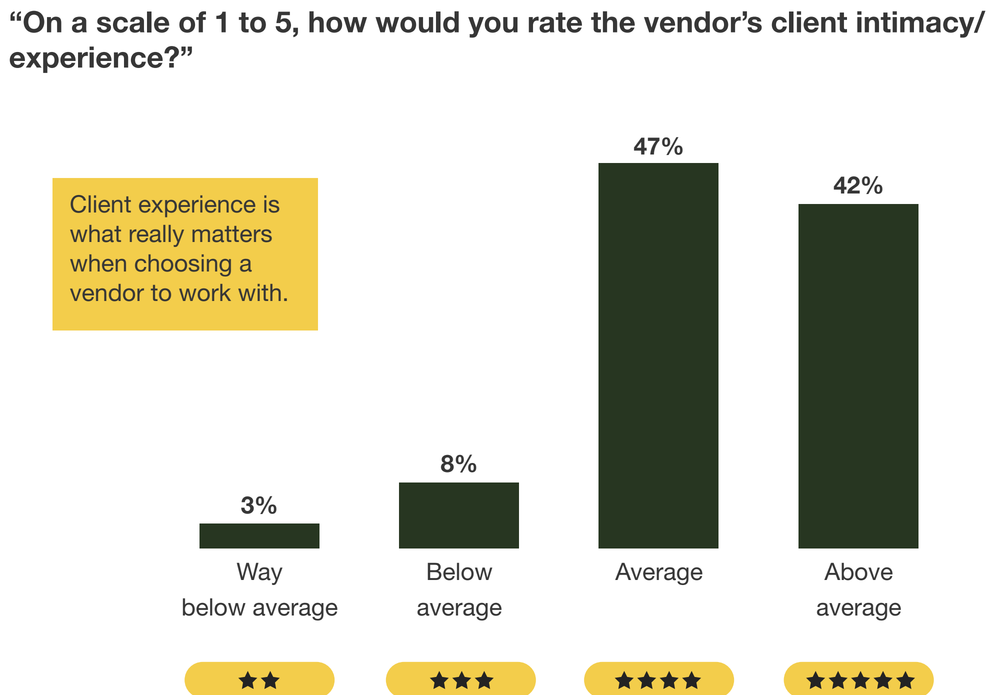
"Within the last 12 months, what percentage of improvement has the vendor helped your organization achieve in the level of performance test automation?"

. . . but improvements in the performance testing space are lagging.



Base: 38 business leaders provided by the evaluated vendors in this Forrester Wave
Source: Forrester's Q3 2017 Continuous Testing Service Providers Forrester Wave™ Client Reference Survey

FIGURE 4 Clients, With Few Exceptions, Are Happy With Their Overall Experience



Base: 38 business leaders provided by the evaluated vendors in this Forrester Wave

Source: Forrester's Q3 2017 Continuous Testing Service Providers Forrester Wave™ Client Reference Survey

Navigating The Landscape Of Continuous Testing Service Providers

The CT services market is quite broad, occupied by large vendors that have been in the space for years as well as a wealth of new and smaller organizations.[3] It ranges from tiny boutiques with less than $10 million in annual revenue to the usual suspects with well over $1 billion.[4] As the CT services market grows, it shows:

› **Slowing growth among the big players.** Many of the large testing service providers (those with more than $500 million and, in particular, $1 billion in revenue) are struggling to maintain the double-digit growth of years past. The largest vendors are on multiyear transitions from traditional manual testing services to CT and automation- and data-driven services. At most of these vendors, the new services are not growing fast enough to offset the decline in the older services. In addition, as Agile and DevOps increasingly take hold, outsourced development services tend to embed and integrate testing rather than offer and report it as an independent service line.

- **Dynamism among small to midsize providers.** Many of the vendors under the $500 million mark are more dynamic, growing at double-digit rates or higher and providing good client intimacy. Some also have respectable scaling capabilities. Most of the vendors evaluated in this Forrester Wave are in this midrange segment. Smaller shops that have innovative testing accelerators, native automation techniques, and facility with AI are popping up like mushrooms, but we did not include a number of them because they lack referenceable customers or fall below our $50 million revenue threshold. This category includes 3Pillar Global, Aspire Systems, Birlasoft, Ciklum, CSS Corp, Maveric Systems, Luxoft, Ness Digital Engineering, Quinnox, Qentelli, Tavant Technologies, Virtusa, and WillowTree.

- **Further blending of software-plus-services.** Crowdsourced-based testing, sometimes called real testing, is a growing trend for mobile and IoT applications, which increasingly require evaluating the full digital and physical experience remotely and onsite. Providers like Applause App Quality, Testbirds, and Ubertesters blend testing capabilities with software testing platforms to provide CT services in a new way. Although the reference customers we contacted showed little interest in this type of testing, we will monitor this area closely and decide whether to add criteria to future CT evaluations or dedicate a separate evaluation to it.

Continuous Testing Service Providers Evaluation Overview

To assess the state of the CT services market and see how the vendors stack up against each other, Forrester evaluated the strengths and weaknesses of top CT services vendors. After examining past research, user need assessments, and vendor and expert interviews, we developed a comprehensive set of evaluation criteria. We evaluated vendors against 29 criteria, which we grouped into three high-level buckets:

- **Current offering.** We evaluated each of the types and the breadth of the CT consulting services each vendor offers, its adaptability to integrate with development teams, and its ability to operate independently. We scrutinized its testing processes and practices; test case design automation; automation engineering; test data management; services virtualization; test environment provisioning; and even more advanced testing-in-production capabilities. We also looked at accelerators, but we put the biggest emphasis on CT talent, taking a look at practices, scale, and referenceable work.

- **Strategy.** We analyzed each vendor's vision and road map, looking at how it understood the future of testing in the context of modern Agile and DevOps application delivery. We considered the vendors' development programs for talent; shifting from manual to automated and from business to developer-testers (DTEST); employee happiness as evidenced on social sites and by retention; their new commercial models and adaptability to new services — and, more importantly, extensive client experience data provided through a survey of 38 customer references, ongoing client inquiries, and other sources.

› **Market presence.** We also evaluated each vendor's continuous testing client base as a subset of its total testing client base, CT-specific services revenue, and its internal complement of CT testers.

Evaluated Vendors And Inclusion Criteria

Forrester included 11 vendors in the assessment: Atos, Cigniti Technologies, EPAM Systems, HCL Technologies, Hexaware Technologies, LTI, Mindtree, NIIT Technologies, QualiTest, Syntel, and Tech Mahindra. Each of these vendors (see Figure 5):

› **Provided at least three referenceable CT clients.** During the screening phase, we required five names of clients currently working on CT services with them. During the evaluation, we allowed more than five client reference submissions, and we required interviews with at least three.

› **Had between $50 million and $1 billion in global CT revenue.** We focused on the middle tier in terms of vendor size.

› **Provide continuous testing services as defined by Forrester.** We required proof points that the vendor provided a majority of testing services that work in an Agile and DevOps context.[5]

› **Sparked client inquiries or services that put the vendor on Forrester's radar.** Forrester clients often discuss these vendors in inquiries; alternatively, a vendor may, in Forrester's judgment, have warranted inclusion or exclusion in this evaluation because of its standing in our previous Vendor Landscape research.

FIGURE 5 Evaluated Vendors: Vendor Information And Selection Criteria

Vendor
Atos
Cigniti Technologies
EPAM Systems
HCL Technologies
Hexaware Technologies
Larsen & Toubro Infotech (LTI)
Mindtree
NIIT Technologies
QualiTest
Syntel
Tech Mahindra

Vendor selection criteria
Provided at least three referenceable continuous testing clients
Had between $50 million and $1 billion in global continuous testing revenue
Provides continuous testing services as defined by Forrester
Sparked client inquiries or services that put the vendor on Forrester's radar

Vendor Profiles

This evaluation of the CT services market is intended to be a starting point only. We encourage clients to view detailed product evaluations and adapt criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool (see Figure 6).

FIGURE 6 Forrester Wave™: Continuous Testing Service Providers, Q3 '17

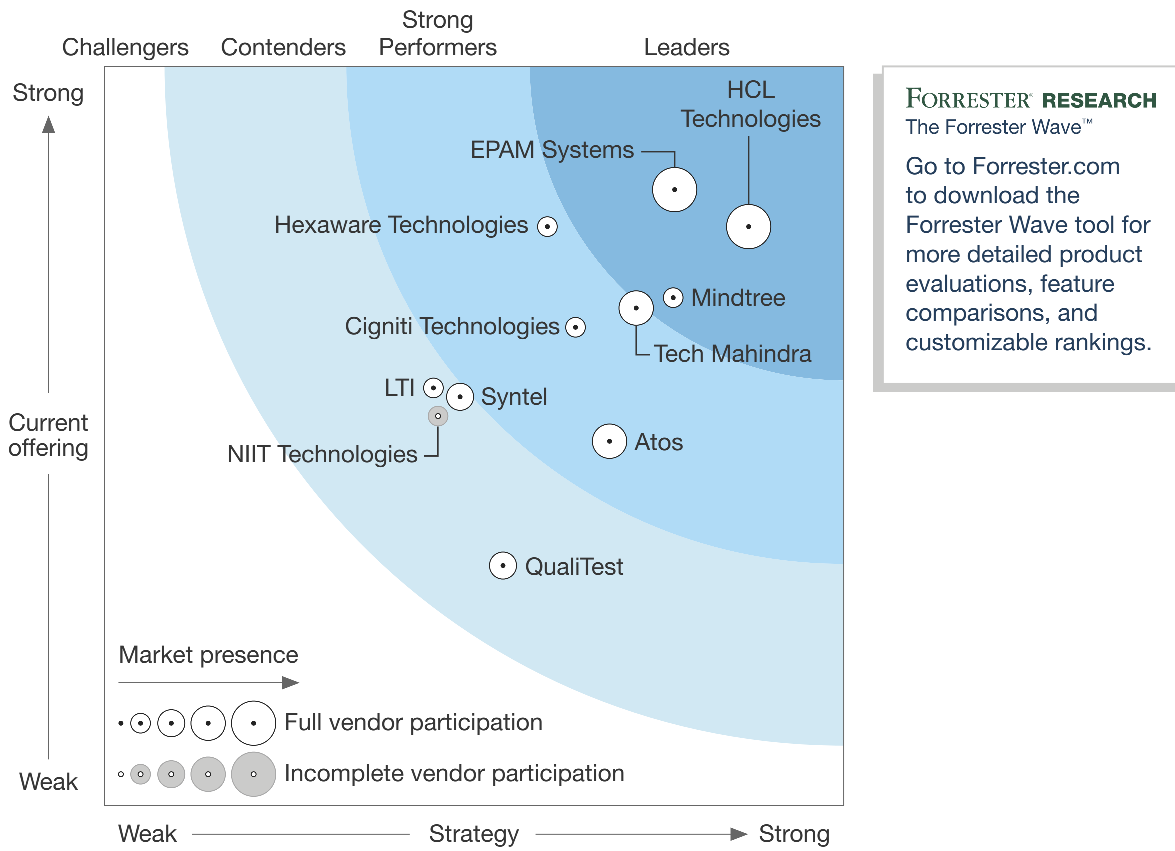


FIGURE 6 Forrester Wave™: Continuous Testing Service Providers, Q3 ’17 (Cont.)

	Forrester's weighting	Atos	Cigniti Technologies	EPAM Systems	HCL Technologies	Hexaware Technologies	LTI	Mindtree	QualiTest	Syntel	Tech Mahindra
Current offering	50%	2.46	3.23	4.16	3.91	3.91	2.82	3.43	1.62	2.76	3.36
Testing services types and breadth	20%	3.20	3.50	4.00	5.00	3.50	3.20	3.30	2.70	3.00	3.80
Testing process and practices	25%	2.00	3.65	4.90	3.85	3.70	3.30	3.30	1.05	3.00	3.30
Accelerators	25%	3.35	3.35	3.00	3.70	3.60	3.00	3.70	1.60	3.00	3.00
CT talent	30%	1.60	2.60	4.60	3.40	4.60	2.00	3.40	1.40	2.20	3.40
Strategy	50%	3.41	3.18	3.85	4.35	2.99	2.22	3.84	2.69	2.40	3.59
CT service vision	20%	3.00	4.00	4.00	4.00	4.00	1.00	4.00	3.00	4.00	3.00
Innovation road map	20%	4.00	3.00	5.00	5.00	3.00	3.00	3.00	3.00	4.00	3.00
Employee happiness/retention	15%	3.00	1.00	5.00	3.00	3.00	3.00	4.00	3.00	1.00	3.00
Revenue per tester	5%	3.00	3.00	2.00	2.00	3.00	1.00	3.00	1.00	3.00	3.00
Commercial models	5%	3.00	3.00	3.00	5.00	3.00	3.00	3.00	3.00	3.00	5.00
Client experience	35%	3.60	3.80	3.00	5.00	2.40	2.20	4.40	2.40	1.00	4.40
Market presence	0%	3.20	1.60	4.40	4.60	2.00	1.80	1.80	2.20	2.20	3.40
CT client base	40%	3.00	2.00	5.00	4.00	2.00	2.00	1.00	3.00	1.00	2.00
CT services revenue	40%	3.00	1.00	4.00	5.00	2.00	1.00	2.00	1.00	3.00	4.00
CT full-time testers	20%	4.00	2.00	4.00	5.00	2.00	3.00	3.00	3.00	3.00	5.00

All scores are based on a scale of 0 (weak) to 5 (strong).

Leaders

- **EPAM Systems has engineering DNA, tooling, accelerators, and ruthless automation.** EPAM demonstrated both breadth and depth in all services. It has global reach, rooted in Eastern Europe, with an established presence in the US and a growing one in India. EPAM provided an impressive range of CT clients who raved about its functional test automation capabilities, among other services. EPAM leverages its product engineering roots, an ideal foundation for modern testing. Employees also rate EPAM as a great place to work, with internal tools for managing employees' talent growth, as well as transparent reporting on the CT services for Agile and DevOps engagements. Its workforce's skills are strong in test design and execution automation, TDD, BDD, TDM, service virtualization, and test environment provisioning. In addition, 100% of EPAM's projects are Agile.

  EPAM garnered relatively weak feedback on client intimacy — important signals to which EPAM and its clients should pay attention. EPAM is an ideal partner for both newcomers and mature practitioners of digital business that aspire to deliver quality at speed and are moving to Agile and continuous delivery models.

- **HCL Technologies executes quickly and at scale on a strong CT strategy and vision.** HCL has scaled its workforce engineering skills through acquisitions, most recently of IP and talent from IBM Rational's testing tools portfolio. It also has active partnerships with universities for AI-based testing. HCL offers testing software-as-a-service, helping clients move capital expenditure (capex) to operational expenditure (opex). Clients surveyed cited great client experiences, despite HCL's scale. HCL invests in its employees through a compelling training platform. HCL demonstrated leadership in a breadth of consulting-led and lab-based testing services. HCL has a strong market presence and global reach.

  The vendor's technical and innovation-focused go-to-market approach might overwhelm clients seeking a more business value-driven approach. HCL has relatively low CT revenue, but it is working hard to scale up its CT client services. With more than 11,000 testers, 54 global delivery centers, and a broad line of services, the elements for growth are there — suiting clients that have large-scale CT delivery and testing transformation needs.

- **Mindtree provides CT engineering services and a clear evolution road map.** Mindtree developed a well-structured competency development plan after assessing its entire testing workforce's readiness for CT. Its goal is to more quickly train full-stack engineers who can tackle testing, user experience, big data testing, and more. Mindtree uses its CAPE accelerator to help clients speed the automation journey across the IT life cycle; it complements this with its CT DTEP accelerator for test design automation as well as model-based testing with Conformiq.[6] MIST completes the suite with test execution automation on Selenium, integration with Jenkins for continuous integration, and provisioning of test environments in public cloud and virtual environments.[7] Mindtree has a good reservoir of CT talent for functional test automation, mobile, and IoT testing services.

Mindtree needs to further develop skills and services for testing in production; evolve its functional test automation and exploratory testing processes to meet demanding CT requirements; and increase its market presence in CT services. Clients looking for full-stack testing engineers and advanced Agile practices should consider Mindtree as a reliable partner.

Strong Performers

- **Cigniti Technologies differentiates its pure-play CT services with a DevOps focus.** Cigniti Technologies, an India-based provider of pure-play testing services with a growing presence in the US and UK, is rapidly maturing its Agile and DevOps CT services. Cigniti stands out for its IP investments in BlueSwan, a comprehensive testing services platform accelerator; in Liqe, a US testing client community growing globally; and in an innovative, machine-learning-powered tool for analyzing user experience for the airline industry. These, coupled with Cignit's strong, diverse engineering skills and its DevOps consulting capabilities, support Cigniti in its shift. The vendor also has solid client programs, methods, and frameworks for CT transformation consulting. It provides a breadth of CT practices and services with points of excellence in test execution automation, test environment provisioning, and testing in production.

  Cigniti needs to invest more in internal employee programs since its relatively low employee retention and satisfaction are a liability in the type of durable partnerships that clients want. Cigniti Technologies is among the top three global vendors for clients looking for independent and pure-play CT services focused on Agile DevOps.

- **Hexaware Technologies increases automation by cannibalizing its manual testing.** Hexaware demonstrated a strong overall offering. It is forming a growing base of CT talent by leveraging its multiskilled development and testing workforce. It offers effective incentives to encourage managers and testers to shift focus from manual testing to automated testing. Hexaware puts a lot of focus on the most upstream step of test automation: test creation and design. It has also developed partnerships with testing tool vendors — working with Conformiq, for instance, to build connectors to link test design automation to test execution using Selenium. Hexaware has also demonstrated capabilities in providing CT services over many years with enterprise clients.

  As with many of the service providers in this evaluation, Hexaware falls behind on leading-edge production testing techniques. And its profile is diminished by a smaller CT client base and market presence than other vendors, as well as lower revenue. It would be a good fit for clients that are trying to optimize test design and data management automation and are looking for multiskilled developer-tester (DTEST) resources.

- **Tech Mahindra leverages scale and innovative pricing models.** Test environment provisioning for CT emerged as a strong service for Tech Mahindra; it also excelled in end-to-end test automation services. Its strength in automation is backed up by a large contingent of seasoned CT talent and mature accelerators for test case design automation and manual exploratory testing. Tech Mahindra also integrates test design automation with test execution automation using homegrown frameworks —

all complemented by a strong test data management service. Tech Mahindra has developed a detailed and transparent management dashboard to provide information on automation levels and other quality performance data by client project. Clients praised Tech Mahindra's flexible and innovative engagement and pricing models, which go beyond time and materials (T&M) and managed services toward outcome-based or fixed percentage of total overall development cost models.

Service virtualization and testing, as well as a lack of testing in production, are some of the weak areas Tech Mahindra needs to improve. It also lacks analytics and reporting of CT results that connect back to continuous integration, CD, and DevOps processes. Clients should shortlist Tech Mahindra, with its 11,500-plus testers and global presence, as a large-scale CT provider if end-to-end automation is a key objective.

› **Atos delivers CT services wrapped up in large-scale DevOps transformation.** Atos is the only European-centric system integrator with CT services capabilities in this evaluation. It has strong CT consulting and advisory capabilities that contribute to DevOps projects, supported by its longstanding accelerator Tempo, for end-to-end automation testing. A new version of Tempo that will embed leading-edge machine learning and AI capabilities is in the works. Atos is updating most of its traditional testing services, such as reporting, regression testing, and test data management, to embed them in broader DevOps projects. It is also building accelerators to support end-to-end testing for continuous delivery.

Atos did not provide supporting proof points or sufficient documentation for its CT services — resulting in relatively weak evaluations of its testing processes and practices — or of its CT talent pool compared with other participants. Nevertheless, Atos could be a good choice for providing CT services for large-scale DevOps transformation projects in Europe.

Contenders

› **NIIT Technologies bets on output and outcome-based models to transition to CT.** In the last two years, NIIT shifted its internal resources to culturally align with the new testing services that Agile and DevOps require. This meant hiring or retraining established professionals and new graduates alike, coaching them in technology boot camps augmented with TDD, automation, and client engagement skills. NIIT has developed an automation platform accelerator called TRON Smart Automation, based on AI, machine learning (ML), and analytics, to help enterprise clients automate app development, testing, delivery, and monitoring. NIIT has also engaged with a few large clients to transition and consolidate new governance and payment models focused on output- and outcome-based pricing.

NIIT is catching up on the CT-specific market, as are many other players. NIIT must match its CT services deployment to the high level of Agile delivery it already does, and it must transform and scale its CT testing practice more aggressively. NIIT's concentration on the media, airline, finance, insurance, and retail industries will be an attractive solution for clients with a prominent business focus for testing. NIIT Technologies did not participate in this evaluation.

- **LTI differentiates with TDM and automated CX testing services.** LTI, a smaller systems integrator, offers CT services with two focused offerings: one in the growing TDM market and another in the nascent AI testing space. In TDM, LTI offers software accelerators and services to address test data governance, provisioning, and specifically compliance to address the needs of the upcoming European General Data Protection Regulation. Its DiCE accelerator leverages ML to test CX beyond the usual accessibility, discoverability, performance, response time, and omnichannel factors.[8] It addresses human perception by testing visual appeal, thinking, and patience. DIiCE represents an initial foray toward automated CX testing. LTI invests in internal employee programs, and employees rate their company quite high on Glassdoor.

  LTI won't be a fit for very large enterprises looking for large-scale testing services because of its relatively small number of automation engineers and the limited breadth of its CT services. LTI fits midrange clients who are looking for IoT and mobile testing, TDM services, and who are willing to experiment with AI and CX testing.

- **Syntel envisions using AI to augment and unburden testers.** Syntel's vision and road map center on the use of innovative technologies like AI to improve defect ratios, requirements tracing, and performance engineering. In its CT services and practices, Syntel offers CX testing through crowdsourcing partnerships. On the test automation front, Syntel offers a test case design automation accelerator focused on business process management (BPM) generation of optimized test cases. Add-ons for the most popular commercial and open source testing tools enable test execution automation. Syntel offers embedded testers in client or third-party app dev teams as well as fully outsourced, integrated teams of developers and testers. Its CT talent is weighted toward nonfunctional testing skills and expertise, including IoT and mobile.

  Syntel's AI vision in testing is appealing, but it has yet to effectively carry this through to its current testing offering and accelerators at scale; it also doesn't offer consulting services on the scale of some of its competitors. It received relatively low scores from referenced clients, especially on client intimacy. Employee happiness and retention are lower. Prospective clients should engage with Syntel for integrated CT services within Agile and DevOps teams or more traditional process automation testing and keep an eye on the new capabilities in the road map reaching fruition.

- **QualiTest is a pure-play tester that embeds CT testers in client development teams.** QualiTest's aim is to scale as the largest pure-play testing services provider worldwide. QualiTest specializes in embedding its resources in existing development teams, whether client-based or third-party. QualiTest's road map focuses on shifting its CT services to adapt to the changing nature of development from traditional waterfall, to Agile, to Agile and DevOps. QualiTest will have to build on reporting through ML and analytics, crowdsourcing, mobile testing, and scale of testing resources to create a complete portfolio of CT services required for Agile and DevOps. The clients surveyed appreciate many aspects of QualiTest's support and services.

To realize its ambition, QualiTest needs to attract Global 2000 clients for CT, where it is a newcomer compared with its successful managed services business. The vendor's weaknesses include a lack of proof points for a number of services and a relatively small pool of CT talent for test automation. Given clients' positive feedback, QualiTest is a good fit for dev shops looking to embed outside testers in their CD teams.

Supplemental Material

Online Resource

The online version of Figure 6 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Data Sources Used In This Forrester Wave

Forrester used a combination of several data sources to assess the strengths and weaknesses of each solution. We evaluated the vendors participating in this Forrester Wave, in part, using materials that they provided to us by July 7, 2017.

- **Hands-on lab evaluations.** Vendors spent one day with a team of analysts who performed a hands-on evaluation of the product using a scenario-based testing methodology. We evaluated each product using the same scenario(s), creating a level playing field by evaluating every product on the same criteria.
- **Vendor surveys.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.
- **Product demos.** We asked vendors to conduct demonstrations of their products' functionality. We used findings from these product demos to validate details of each vendor's product capabilities.
- **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference surveys with between three or more of each vendor's current customers.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria to be evaluated in this market. From that initial pool of vendors, we then narrow our final list. We choose these vendors based on: 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave evaluation — and then score the vendors based on a clearly defined scale. We intend these default weightings to serve only as a starting point and encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve. For more information on the methodology that every Forrester Wave follows, go to http://www.forrester.com/marketing/policies/forrester-wave-methodology.html.

Integrity Policy

We conduct all our research, including Forrester Wave evaluations, in accordance with our Integrity Policy. For more information, go to http://www.forrester.com/marketing/policies/integrity-policy.html.

Endnotes

[1] For more on front-end mobile testing, see the Forrester report "The Forrester Wave™: Mobile Front-End Test Automation Tools, Q2 2016."

[2] Forrester defines continuous testing as the people, processes, and technology to deliver quality at speed and minimize business risk by conducting all Agile testing activities continuously in parallel to and in an integrated fashion with ideating/planning, building, integrating, delivering, and deploying features into production. Testing also happens post-production by leveraging the DevOps feedback loop. For more on CT services, see the Forrester report "Vendor Landscape: Continuous Testing Services For Agile And DevOps Environments."

[3] See the Forrester report "Vendor Landscape: Continuous Testing Services For Agile And DevOps Environments."

[4] See the Forrester report "Vendor Landscape: Continuous Testing Services For Agile And DevOps Environments."

[5] The testing services for which we required proof are: service virtualization testing (i.e., for integration testing automation); test-driven development/behavior-driven development; exploratory testing; functional test execution automation — (UI, data-driven, API); functional test design automation — (UI, data-driven, API); API test automation; front-end mobile testing; test data management (automated governance, provisioning); performance testing (left-shifted); A/B testing; analytics and machine learning; production testing; crowdsourced testing; cloud-based automated test environment provisioning; and mobile testing (front-end device testing).

[6] CAPE: Composable Automated Platform for Enterprises; DTEP: Dynamic Test Engineering Platform.

[7] MIST: Mindtree Integrated Scriptless Test Automation Framework.

[8] DiCE: Digital Customer Experience.

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