# Market Guide for AI-Augmented Software Testing Tools

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The market for software testing tools is rapidly moving from supporting simple test execution to applying AI throughout the full software test cycle. Software engineering leaders must build a portfolio of multiple tools and capabilities to support AI-augmented software testing.

## Overview

### Key Findings

- AI-augmented software testing tools support different approaches to accelerate the testing process. However, no single tool covers all aspects of testing, and the market is rapidly evolving. As a result, software engineering leaders find it challenging to select the right combination of tools.

- Software engineering leaders face a highly competitive hiring market for experienced quality assurance (QA) engineers. Gartner TalentNeuron research found that the average job posting for a QA engineer had only nine applicants.

- The use of AI can dramatically increase the efficacy rate of test automation tools, reducing the need for humans to identify critical issues via traditional testing.

- New legislation and guidelines for accessibility, security and compliance are expanding and getting more complex, fueling increased demand for intelligent testing solutions.

### Recommendations

Software engineering leaders responsible for technology selection should:

- Identify your organization's specific testing needs by creating a prioritized list of capabilities that are required to ensure the optimal testing process.

- Support your teams by budgeting for these tools to enable them to deal with increased pace and complexity and drive quality.

- Use this research to identify vendors that are offering AI-augmented testing technology by asking how they can improve your testing efficacy and what evidence and metrics they can provide.

- Deliver better user experiences by identifying usability issues with AI-augmented testing tools.

## Strategic Planning Assumptions

By 2025, 70% of enterprises will have implemented an active use of AI-augmented testing, up from 5% in 2021.

By 2025, organizations that ignore the opportunity to utilize AI-augmented testing will spend twice as much effort on testing and defect remediation compared with their competitors that take advantage of AI.

## Market Definition

AI-augmented software testing tools comprise a subset of the overall software testing tools market. They provide capabilities for advanced, self-optimizing and adaptive automated testing through the usage of AI technologies such as machine learning, self-healing heuristics or computer vision technologies in the following areas:

- Test case and test data generation

- Test suite optimization and coverage detection

- Test efficacy and robustness

- Test analysis and defect prediction

- Test effort estimation and decision making

AI-augmented testing tools streamline, accelerate and improve the test workflow over time by self-learning based on the data collected from the activities they perform — thereby enhancing human productivity.

## Market Description

AI-augmented software testing tools enable software engineering teams to accelerate testing and improve software quality. By applying AI- and ML-based technologies, AI-augmented software testing tools can assist humans in their testing efforts and make the testing process less dependent on human intervention. These tools reduce the complexity of creating, maintaining and executing a diverse set of tests, analyzing test results, and governing testing activities.
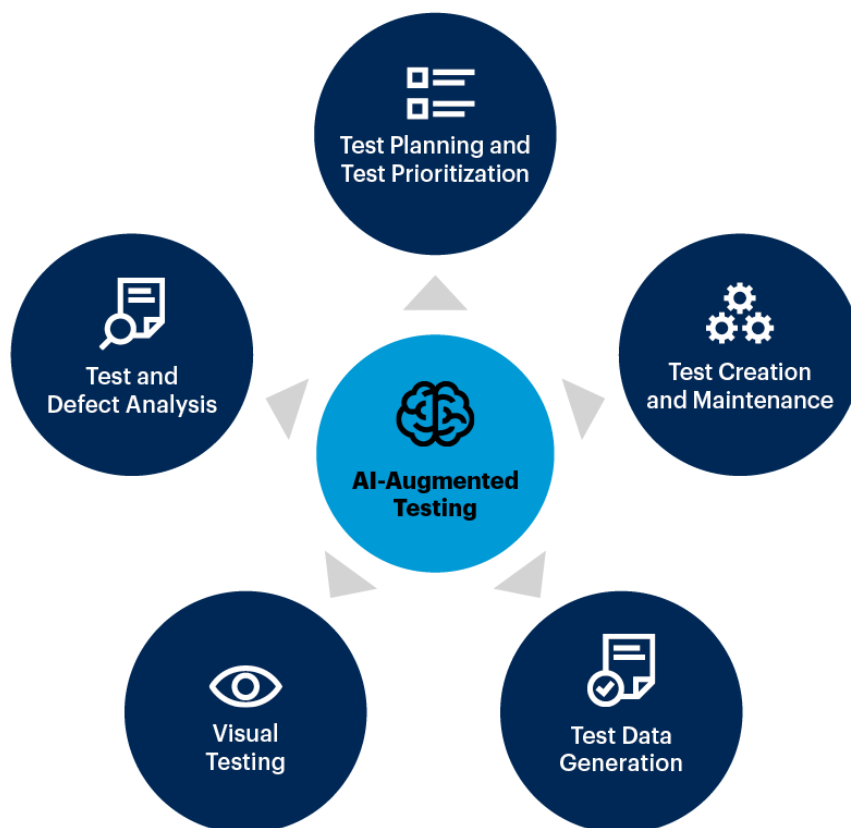
**AI-augmented software testing tools help to improve software quality and reduce cycle times by optimizing test efforts, providing early feedback about the quality of release candidates and improving consistency.**

AI-augmented software testing vendors are innovating rapidly and expanding their capabilities. Figure 1 highlights the areas where AI is most applicable and impactful. Vendors included in this research typically focus on a few of those scenarios, but no one vendor supports the complete testing life cycle with AI. We expect vendors to continue expanding their capabilities through acquisitions or third-party integrations, while remaining focused on their core value propositions.

**Figure 1: Areas in Software Testing Where AI Is Most Applicable and Impactful**

**Areas in Software Testing Where AI Is Most Applicable and Impactful**

Test Planning and Test Prioritization

Test and Defect Analysis

AI-Augmented Testing

Test Creation and Maintenance

Visual Testing

Test Data Generation

Source: Gartner
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Gartner.

## Market Direction

Our conversations with clients indicate that the demand for AI-augmented software testing tools is growing rapidly, as software engineering leaders need insight into release success and user satisfaction.

They also need to accelerate software development and delivery and reduce costs. In Gartner's 2020 Achieve Business Agility With Automation, Continuous Quality and DevOps Survey, 84% of recipients responded that AI/ML features are more important than other features in testing tools selection. [1]

Similarly, the World Quality Report 2020-21 found that 86% of respondents said that AI is now a key criterion for selecting QA solutions, products or tools. [2]

Vendors that don't have well-designed AI-augmented capabilities in their offerings will fade to niche positions in the market.

Several trends will drive the rapid adoption of AI-augmented software testing tools in the next two to three years, including:

- Cloud and SaaS adoption

- Container-native architectures and microservices

- Business pressure to deliver fault-free business-critical applications

- The challenge of correlating testing and quality with value realization

- The need to balance quality and delivery velocity

- Heightened regulatory, safety, security and privacy needs

- New remote and hybrid work configurations

Continuous testing is now an integral part of a mature DevOps process; but even that will no longer be sufficient in the future. Instead, software engineering leaders should invest in these tools to enable smarter testing and improve testing efficacy (see Figure 2).

Figure 2: The Evolution of Testing

## The Evolution of Testing
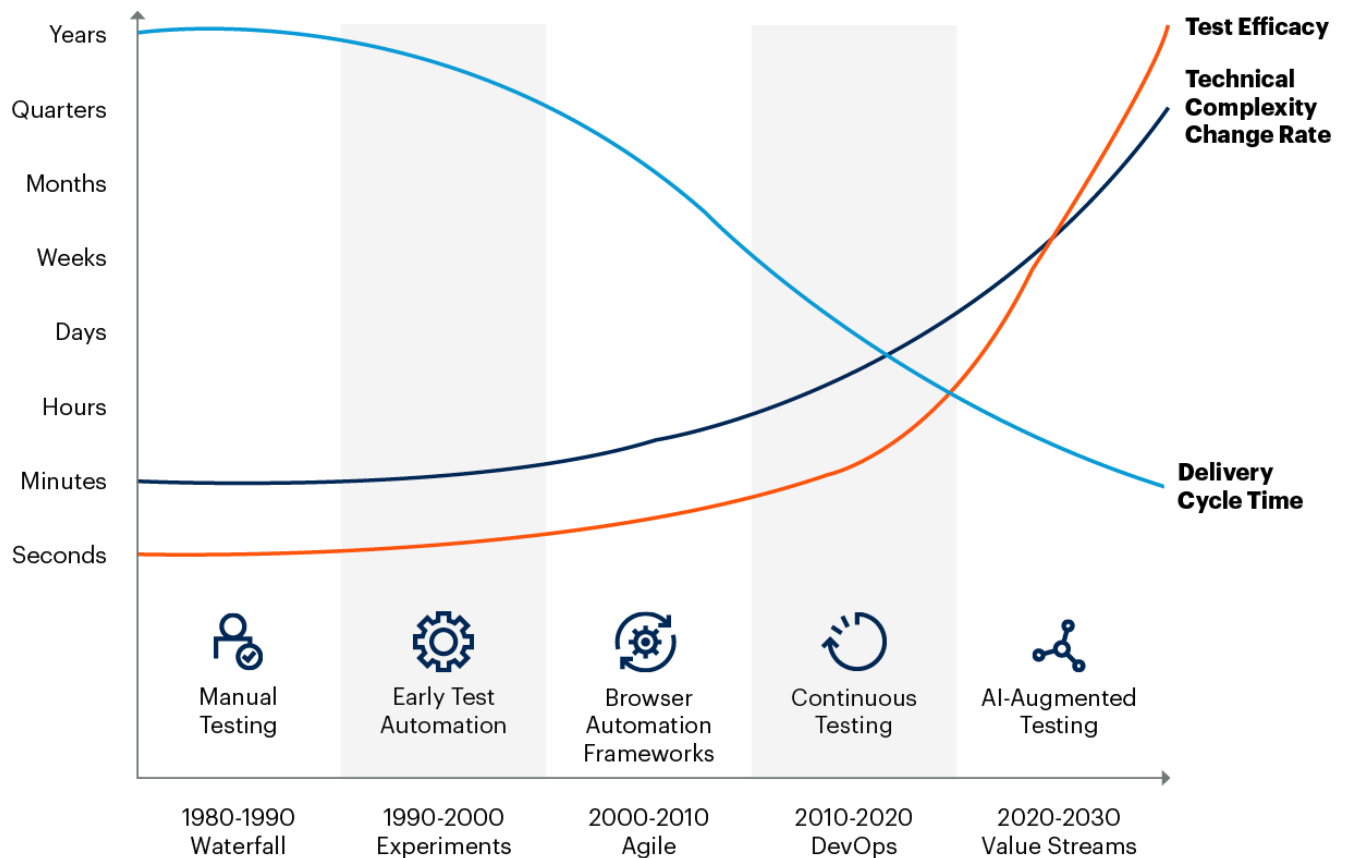


Source: Gartner
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Gartner.

# Market Analysis

With the increased use of AI technologies, the state of the art in testing has evolved significantly during the last three years. The market for AI-augmented testing tools continues to mature, both in terms of new entrants, and existing vendors expanding their portfolios to include AI-augmented solutions.

The areas of focus during the next three years will be:

- Generation of test cases based on requirements as well as real usage patterns of users. Examples include automatic test script generation directly through user stories or through commonly executed processes or actions.

- Autonomous exploration of applications to automatically generate meaningful test cases, such as bots or crawlers.

- Applying AI to data collected from tests to identify risks and issues with potential changes and to automate decisions related to those changes. Examples include the identification of flaky tests and incomplete test scenarios.

- Use of natural language processing (NLP) to enable humans to express requirements in their own languages instead of describing commands in imperative, technical terms.

- Intelligent refactoring of tests or deletion of tests from regression suites based upon the enhancement of the application or changes in user journeys.

- The extension and reuse of functional automation artifacts in nonfunctional testing such as toward the performance or reliability characteristics of products.

- Increasing the use of visual testing so that no specific assertions have to be written because it mimics how a human tester would see when things don't "look right." For example, text not rendering properly, or elements being partly off screen.

- Compliance and accessibility testing that addresses aspects such as color or contrast.

- Creation of synthetic test data that mimics production cases without exposing identity information. This can be used to drive both positive and negative feature testing.

Vendor capabilities and support for use cases still vary a great deal. Most vendors are still small and don't cover every area of testing. Also, their ability to support global enterprises may be limited. However, users can gain productivity today, and they should not dismiss newer and smaller vendors in favor of larger and more established ones. Larger vendors must continue to innovate on top of legacy codebases that are typically focused on specific markets and challenges.

Gartner has identified six market segments for AI-augmented software testing tools (see Figure 3). One element to note is that the majority of the market is focused on GUI-driven functional test automation. There are far fewer vendors addressing other segments such as test management, visual testing, API testing or performance testing.

Figure 3: Market Segments

**Market Segments**
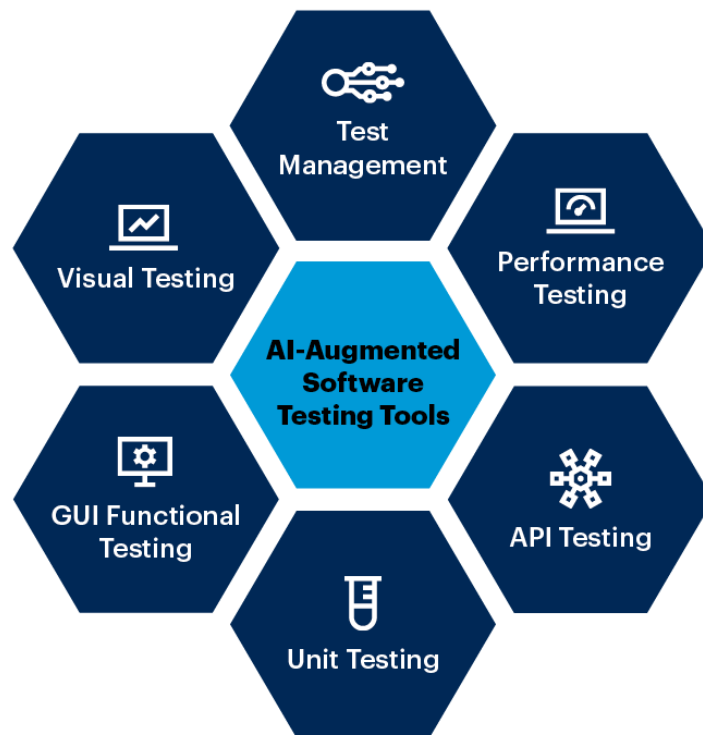


Source: Gartner
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The main reason for this imbalance is that most organizations that transition from manual testing and start to invest in test automation tools initially focus on testing through the UI layer. Consequently, many vendors focus on leveraging AI technologies to make it cheaper and faster to produce and maintain UI-driven functional tests. But this is only the first step.

We expect vendors to significantly evolve their products in this very competitive market in the next three years in order to stay ahead. Specifically, they will reach beyond the more established areas, such as basic test automation and test management, to include automated test design, test generation and advanced test result analytics. This will help to make testing accessible to all software teams, including those that do not have deep test automation expertise.Software engineering leaders must tactically select AI-augmented software testing solutions to address use cases across the full life cycle of testing activities. AI-augmented software testing tools will improve the process, amplify testing capacity and help to eliminate steps that can be performed more efficiently by intelligent technologies. As the market evolves, the degree to which AI-augmented software testing tools will automatically build, maintain, execute, monitor and analyze tests will continually increase.

## Representative Vendors

*The vendors listed in this Market Guide do not imply an exhaustive list. This section is intended to provide more understanding of the market and its offerings.*

## Market Introduction

AI-augmented software testing vendors are rapidly expanding and evolving their capabilities to support different testing use cases across different contexts — cloud-native, mobile, edge, packaged applications and regulatory environments.

Table 1 provides a sample list of AI-augmented software testing vendors and their products (see also Note 1 and Note 2).

### Table 1: Representative Vendors in AI-Augmented Software Testing

| Vendor ↓ | Product Name(s) ↓ | Location of Headquarters ↓ |
|---|---|---|
| ACCELQ | Automate WebAutomate API <br> Automate Mobile <br> ACCELQ Manual <br> ACCELQ Unified | San Francisco, CA |
| Applitools | Eyes <br> Ultrafast Test Cloud | San Mateo, CA |
| Appvance.ai | Appvance IQ | Santa Clara, CA |
| Autify | Autify for Web <br> Autify for Mobile | San Francisco, CA |
| Avo Automation | Avo Assist <br> Avo Assure <br> Avo Discover | Cincinnati, OH |
| Bespoken | Bespoken | Seattle, WA |
| Copado | Copado Robotic Testing | Chicago, IL |
| Curiosity | Test Modeller <br> Test Data Automation | Bray, Wicklow, Ireland |

| Vendor ↓ | Product Name(s) ↓ | Location of Headquarters ↓ |
|---|---|---|
| Diffblue | Diffblue Cover | Oxford, U.K. |
| Functionize | Functionize | Walnut Creek, CA |
| Keysight | Digital Automation Intelligence | Santa Rosa, CA |
| Leapwork | Leapwork | Copenhagen, Denmark |
| mabl | mabl | Boston, MA |
| Micro Focus | UFT One | Newbury, Berkshire, U.K. |
| Opkey | Opkey | Dublin, CA |
| Parasoft | Selenic<br>SOAtest | Monrovia, CA |
| Perforce Software | Perfecto | Minneapolis, MN |
| Ponicode | Ponicode | Paris, France |
| ProdPerfect | ProdPerfect | San Francisco, CA |
| Quinnox | Qyrus | Chicago, IL |
| Sauce Labs | AutonomIQ | San Francisco, CA |

| Vendor ↓ | Product Name(s) ↓ | Location of Headquarters ↓ |
|---|---|---|
| SeaLights | Software Quality Analytics<br>Software Quality Intelligence | Dallas, TX |
| Test.ai | Test.ai Platform | San Francisco, CA |
| Testim | Testim Automate | Sunnyvale, CA |
| testRigor | testRigor | San Francisco, CA |
| Testsigma | Testsigma | Palo Alto, CA |
| Tricentis | Tosca | Vienna, Austria |

Source: Gartner (December 2021)

## Market Recommendations

- Identify your organization's specific testing needs by creating a prioritized list of capabilities that are required to ensure the optimal testing process.

- Use this research to identify vendors that are offering AI-augmented testing technology by asking how they can improve your testing efficacy and what evidence and metrics they can provide.

- Balance risk and opportunity when selecting AI-augmented testing tools by focusing on closing gaps in your testing technology stack.

## Evidence

[1] The 2020 Gartner Achieve Business Agility With Automation, Continuous Quality and DevOps Survey was conducted online from June 2020 through August 2020 among 205 respondents working for service providers, cloud providers and end-user organizations in North America and Western Europe that have deployed or are using DevOps.

Qualified organizations had at least $500 million in annual revenue and were required to primarily operate in the banking and financial services, government, insurance, healthcare, and retail industries. Respondents were required to work in their organization's IT function, have a job title less senior than C-level, and be two or more layers away from the most senior executive in their organization.

The respondent's role had to be primarily focused on application development, infrastructure and operations, or business intelligence and information management. In these focus areas, they were also required to perform relevant roles/activities. Results of this study do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.

[2] World Quality Report 20-21, Twelfth Edition, Capgemini.

Data provided in this report comes from the 2Q21 Gartner Global Labor Market Survey of 18,001 employees from 40 countries, including 1,852 IT employees and 349 software engineering employees.

Gartner TalentNeuron, which is a labor market intelligence solution combining real-time data from job postings, censuses and government statistical bureaus with expert research and advice.

Software engineering roles analyzed include: software engineer, product owner, Scrum Master, testing engineer, solution architect, user interface engineer, product manager, business analyst, agile coach, DevOps engineer and VP of software engineering.

## Note 1: Representative Vendor Selection

The vendors listed in this research are a representative sample of the total market. Although none of the vendors meets the needs for all use cases, these representative vendors continue to innovate and expand their capabilities in alignment with the market definition.

Some products focus on test design and maintenance, while others focus on continuous testing and test result analysis. Vendors differentiate themselves by enhancing the test development experience, streamlining testing workflows and accelerating the delivery life cycle.

## Note 2
## Gartner's Initial Market Coverage

This Market Guide provides Gartner's initial coverage of the market and focuses on the market definition, rationale for the market and market dynamics.

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