Conquer Testing Complexities with Automation and Artificial Intelligence (AI)

THOUGHT LEADERSHIP PAPER COMMISSIONED BY KEYSIGHT TECHNOLOGIES

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Methodology

In this study, Forrester conducted an online survey of 406 test operations decision-makers at organizations in North America, EMEA, and APAC to evaluate current testing capabilities for electronic design and development and to hear their thoughts on investing in automation (including AI). Questions provided to the participants asked about their organizations' current testing environments, future investments, challenges and expected outcomes from testing automation. The study was completed in December 2021.

Executive Summary

In technology development, companies collect great amounts of data, but they typically store it in functional silos, which creates artificial barriers to making holistic, agile design processes. By using data integration, analytics, artificial intelligence (AI) and machine learning (ML) both on-premises and in cloud-based environments, firms can fulfill long-standing promises in DevOps and TestOps.

The world of testing and validation is increasingly complex; are firms keeping up?

While respondents report relatively high satisfaction with their variety of testing methods, very few use an automated test approach or AI for integrating complex testing. Survey respondents reported that:

- 86% of organization are moderately/very satisfied with their current testing system.

- 59% of projects and designs are either complex, multilayer systems or integrated systems. Testing complexity has not only increased the number of tests, but also the length of the tests. Many types of tests cover much more than they need to which leads to the extended testing cycles.

- However, only about one-in-ten companies use a fully automated test approach.

- And just 16% of companies use AI for integrating complex test suites.

The goldilocks testing struggle: too much, too little, or just right?

Accurately finding bugs/issues is a technical issue that arises because of over-testing and complexity. Overall, this increases security risk, costs, and extends product time-to-market. Testers feel the challenge to cover every possible scenario and avoid release of faulty products, but that conflicts with the ever-increasing time to market challenge. Respondents to the questions in the studies reported that:

- For testing, complexity of testing has increased the number of tests (75%) and length of time to test (67%)

- More than half the time test routines cover more than needed; only about one-third consider their test routines just enough

- The biggest technical testing challenges are long testing cycles (34%) and capturing/fixing bugs or issues (32%/30%)

- As a result, the greatest impact on business results or product development processes are security breach risk (51%), increased expenses (48%), slower time-to-market (42%)

Current testing suffers with increasing complexity

84%

of testing decision-makers say half or more projects and designs are either complex, multilayer systems, or integrated systems.

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But only 11%

say their organizations fully automated testing and use AI for integration.

Source: Forrester commissioned study by Keysight, March 2020

Find the balance and improve results with artificial intelligence and automation

Despite their reported high satisfaction levels with their testing methods, companies are interested in moving to more automated approaches and using AI for integrating complex test suites. They understand this will increase their productivity, simulate product function or performance, and shorten design cycles, thereby, reducing product time to market.
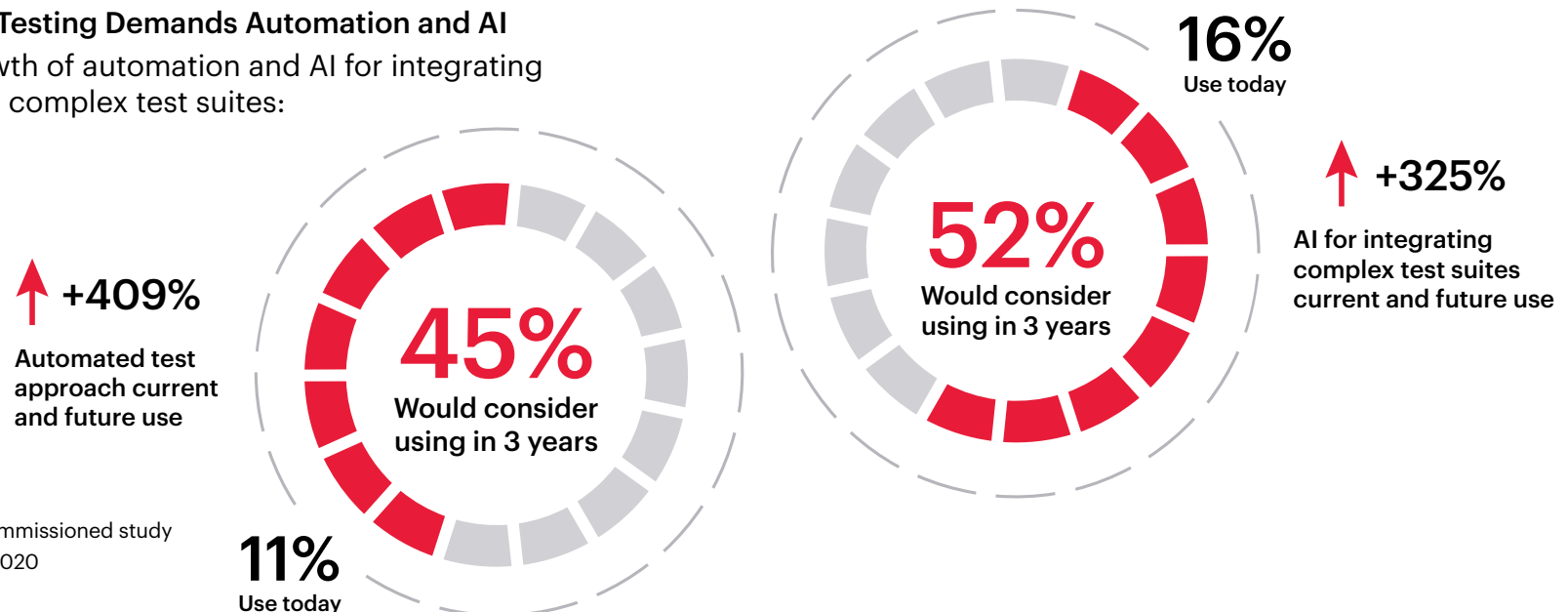
In turn, this improvement in the testing and development process will yield higher customer satisfaction and increase product sales or revenue. They recognize that reducing time to market can be achieved by better analytics on current test and measurement data, integrated software tools across the product development lifecycle, and an improved ability to share data across teams. In the survey, respondents reported that:

- In 3 years, 45% (an increase of 409%) of companies would consider using an automated test approach and 52% (an increase of 325%) of companies would consider using AI for integrating complex test suites

- Companies seek increased productivity (59%), the ability to simulate product function/performance (54%), and bug fix automation/simulation (53%) to reduce product time-to-market (50%)

- Results are higher quality product that increases customer satisfaction (59%), and increased product sales or revenue (46%)

- Time to market is minimized by better analytics on current test and measurement data (23%), integrated software tools across the product development lifecycle (18%), and an improved ability to share data across teams (18%)

Test Smarter with Automation and AI Implementation

The Future of Testing Demands Automation and AI
Expected growth of automation and AI for integrating and managing complex test suites:

↑ +409%
Automated test approach current and future use

45%
Would consider using in 3 years

11%
Use today

16%
Use today

↑ +325%
AI for integrating complex test suites current and future use

52%
Would consider using in 3 years

Source: Forrester commissioned study by Keysight, March 2020

Key Recommendations

From the study, Forrester provides the following recommendations for companies to move forward with increasing the amount of automation and intelligence in testing electronic systems:

- Reinforce the cost savings of moving to more automation. Automating mindless tests doesn't just reduce testing costs, it leverages resources to be used better elsewhere

- Use AI for integrated testing. Intelligent, integrated testing provides both better (not necessarily more) testing coverage and the ability to support agile product development and release.

- Reduce over-testing rates. Firms need to get better at identifying what truly needs to be tested (and no more than that) to increase efficiencies

- Augment human testing don't replace them. Humans are still critical elements of the testing process as dependencies add complexity

- Facilitate integration between hardware and software. Automation and AI can ensure complicated, multi-environment product suites work from end to end

- Form a tighter relationship to holistic business results. Forrester sees an opportunity for test teams to make a compelling business case for implementing the culture and process/technology changes above.

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