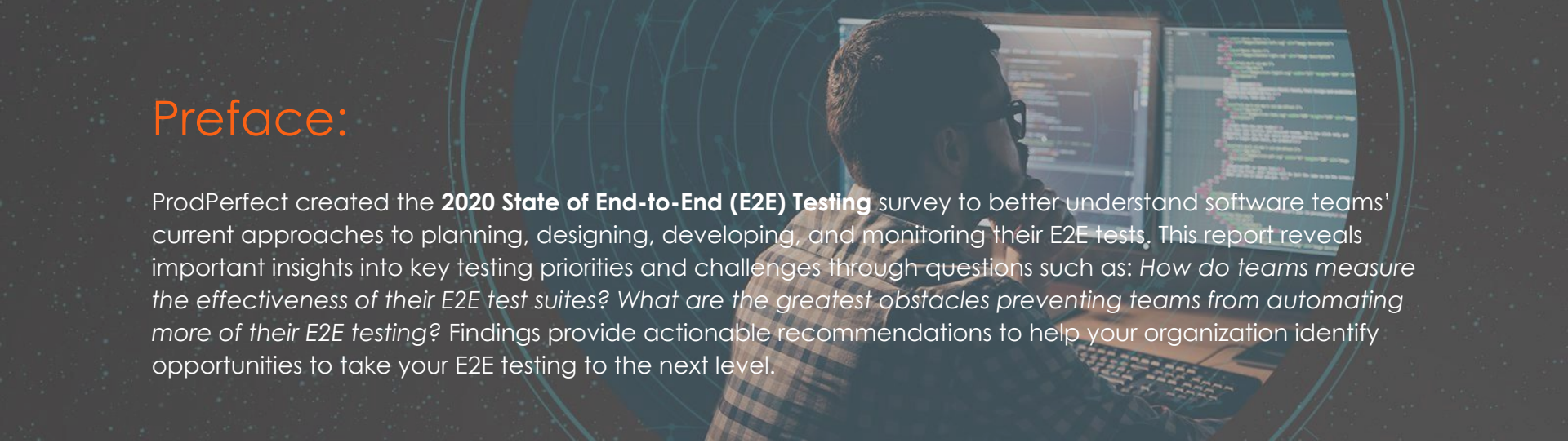
State of E2E Testing 2020



Preface:

ProdPerfect created the **2020 State of End-to-End (E2E) Testing** survey to better understand software teams' current approaches to planning, designing, developing, and monitoring their E2E tests. This report reveals important insights into key testing priorities and challenges through questions such as: *How do teams measure the effectiveness of their E2E test suites? What are the greatest obstacles preventing teams from automating more of their E2E testing?* Findings provide actionable recommendations to help your organization identify opportunities to take your E2E testing to the next level.

Methodology:

We conducted a global online 30-question survey from April to May 2020 and collected a total of 193 responses. The primary audience for the survey were QA and software testing professionals. Responses were collected via email, online advertisements, and social media. Findings presented are based upon the completed responses from 150 developers, software testers, and QA professionals and leaders from 32 countries. A copy of this report and five $100 Amazon gift cards were offered as incentives for full participation.

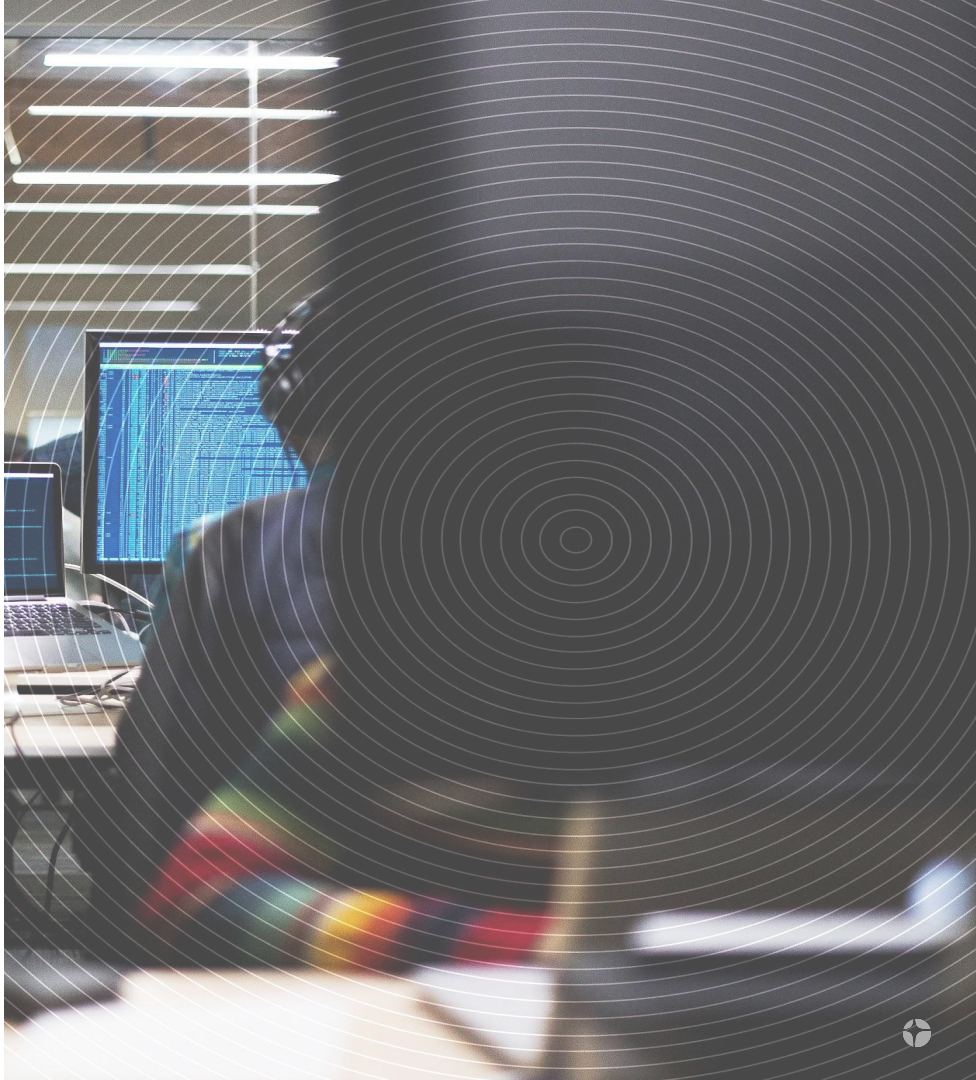
Introduction:

As software continues to eat the world and as the software industry continues to evolve, E2E testing has remained a key part of the development process. With this flagship survey, we reached across the QA and software testing community to get a pulse on the tools, development methodologies, and testing techniques used by software professionals today, as well as to establish measurable benchmarks for future analyses.

If your E2E testing practices aren't where you want them to be, don't worry. This report will help you learn more about what your peers are doing today in testing. You'll also see key callouts and recommendations from our thought leaders and testing experts to get you to the next level. Keep reading to discover more.

Lastly, if you're one of the contributors that took the time to fill out the survey, **thank you**. Your priceless feedback and insights helped make this report possible.

Contents:



Key Takeaways:

1 Even though Selenium has existed for over fifteen years, most teams are not even halfway through automating their E2E tests.

2 Browser automation runtimes remain long, despite growing adoption of CI/CD and high-frequency deployments, leaving a fundamental tension between quality and speed.

3 Testing **priorities** are driven largely by qualitative measures, but testing **success** is generally measured in terms of bugs caught.

4 Very few QA leaders are confident in their testing coverage, most report significant gaps in test coverage, and on average leaders report low satisfaction with outcomes.

5 Despite significant promise to improve E2E testing outcomes, adoption of scriptless and autonomous toolsets is just beginning.

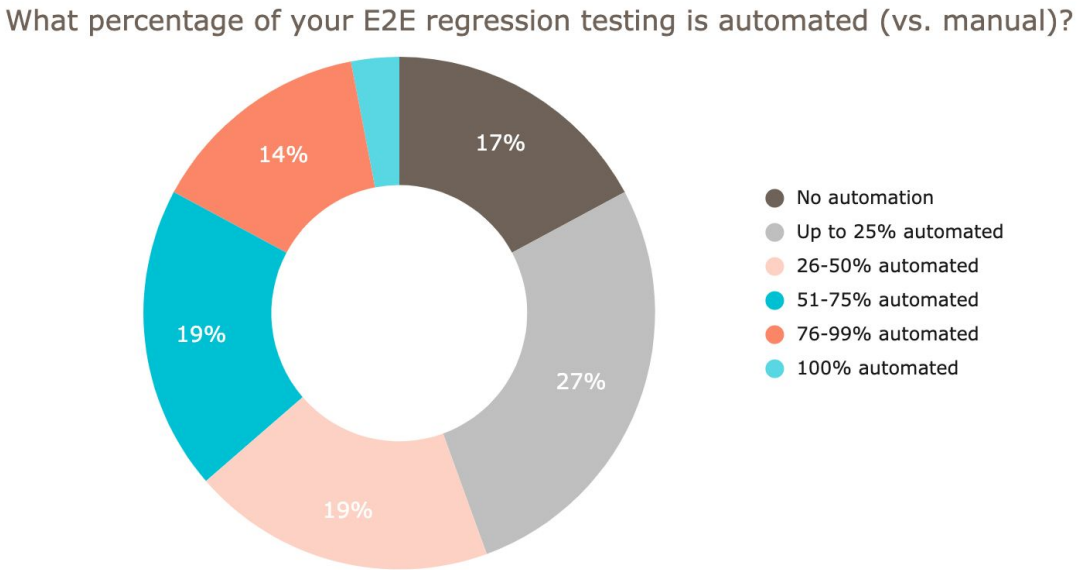
E2E Test Development Strategies

How do teams measure effectiveness and decide on a testing strategy?

The vast majority of teams still test entirely or mostly manually -- very few teams are close to fully automated

Many teams are running behind on where they believe they should be when it comes to test automation. Most teams have automated a little, but less than half of them have automated more than 50% of their test cases.

Notably, only 3% of teams reported that their testing was 100% automated, and 17% used no automation whatsoever.

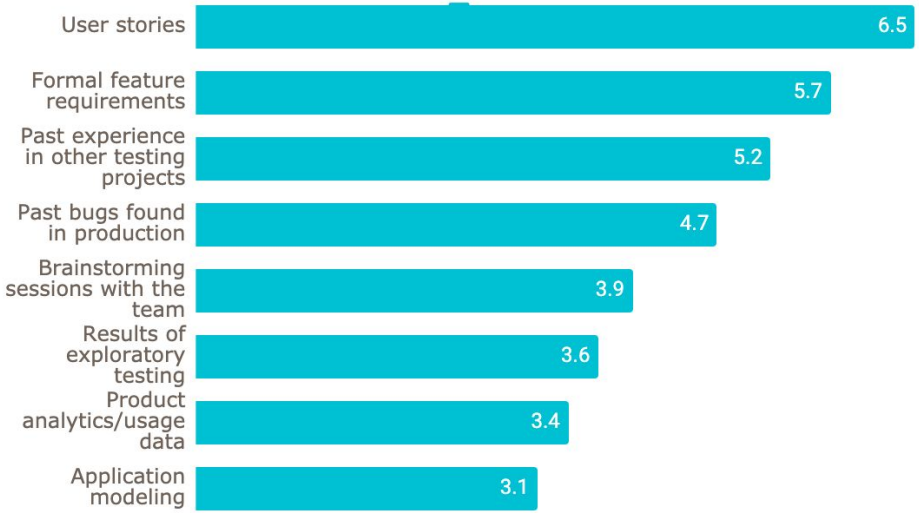


Across the industry, teams de-prioritize data and modeling metrics in favor of more subjective methods of deciding test cases

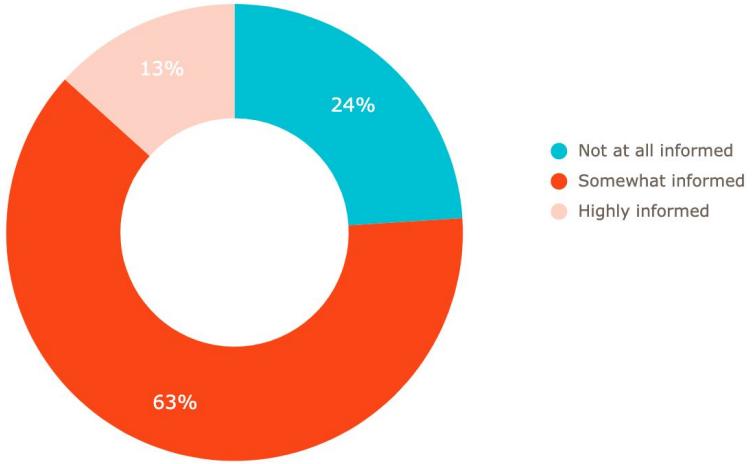
The overwhelming favorite for deciding which tests to run was user stories, followed by formal feature requirements.

Taken together, past experience with other projects and bugs found previously in production ranked higher than both, highlighting how significantly experience impacts testing protocol.

Rank the following sources in order of importance in deciding what E2E tests to run or write:



How informed are top priority E2E test cases by product analytics and/or usage data?



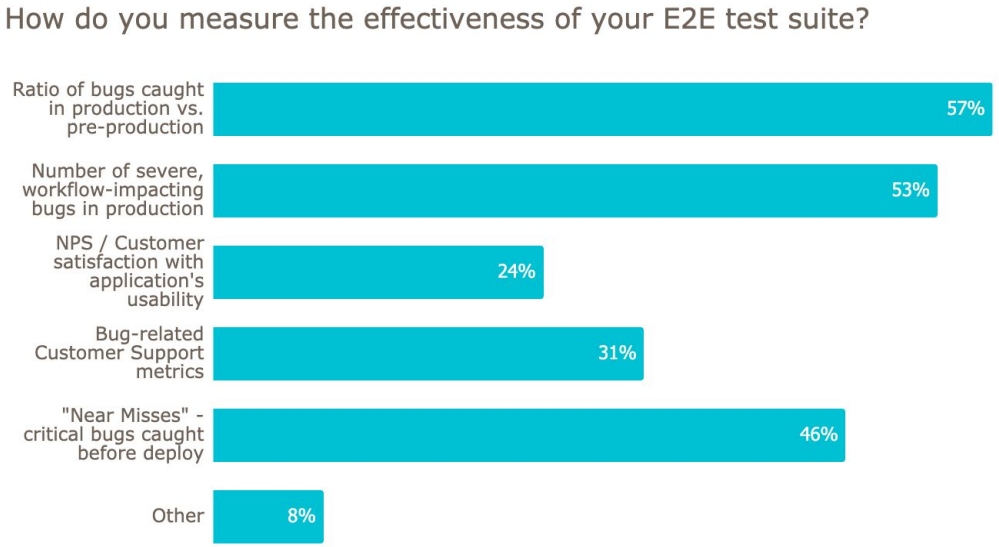
Few teams have successfully incorporated analytics and customer usage data into developing test suites

Product analytics or usage was ranked very low in terms of importance when deciding on which E2E tests to run or write (see previous slide), and does not appear to be a deciding factor for most teams.

Most QA teams rely on their own understanding of their application, rather than their users' direct priorities, to determine what tests cases should take priority.

Bug tracking, rather than customer satisfaction, is widely seen as the primary means of measuring the success of the E2E testing cycle

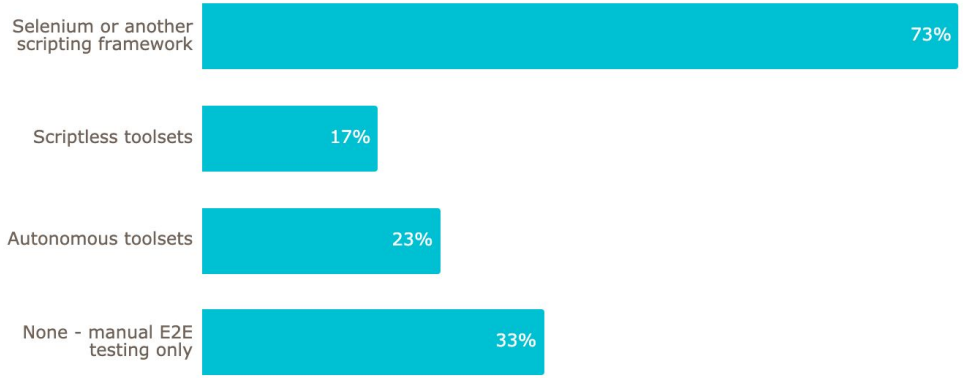
Overwhelmingly, teams measure the effectiveness of their E2E testing suite by the raw metric of how many bugs are caught, especially bugs that are caught in production or pre-production. Far less important are customer-focused metrics.



E2E Testing Approaches & Frameworks

What frameworks do QA teams favor? How many tests do they run and how long do they take?

What E2E/regression test frameworks are you currently using?



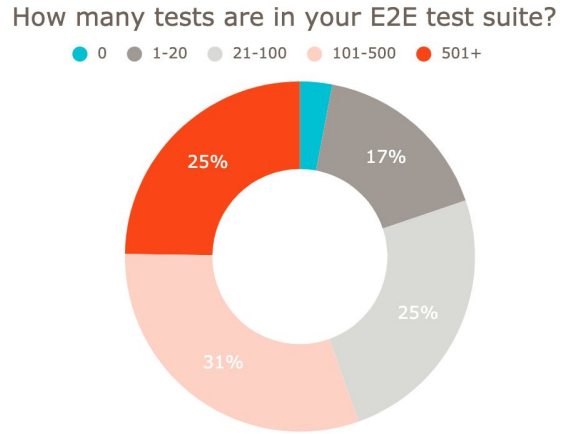
Adoption of scriptless or autonomous E2E toolsets is still in the very early stages

Selenium or other scripting frameworks remain the clear favorite for a majority QA teams, however, scriptless and autonomous tools are growing in market share.

Notably, however, one in three teams is still relying on manual E2E testing alone, ten percent more than are using autonomous toolsets.

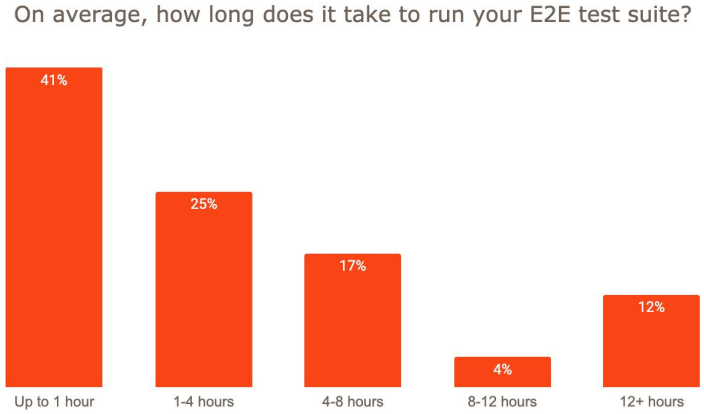
More than half of testing professionals have 100+ E2E tests in their test suites

Around half of QA professionals run less than 100 tests in their testing suite, and the other half run over 100 -- with 25% having more than 500 tests in their suite.

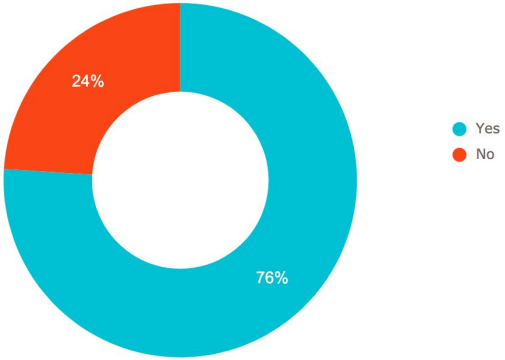


The majority of test suites take longer than an hour to run, making their use difficult for supporting CI/CD

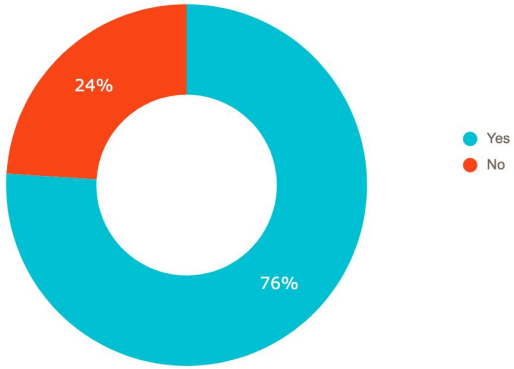
Nearly 60% of surveyed QA cycles require multiple hours to run, inhibiting their use in continuous deployment, where much shorter runtimes are necessary to support many-times-per-day deployments.



Do you use Continuous Integration (CI) as part of your deployments?



Are you kicking off testing with CI?



Despite long E2E test cycles, quality leaders are still integrating testing into the CI process

Continuous integration is a key part of deployment for most QA teams, with three-quarters of teams using and kicking off testing with CI.

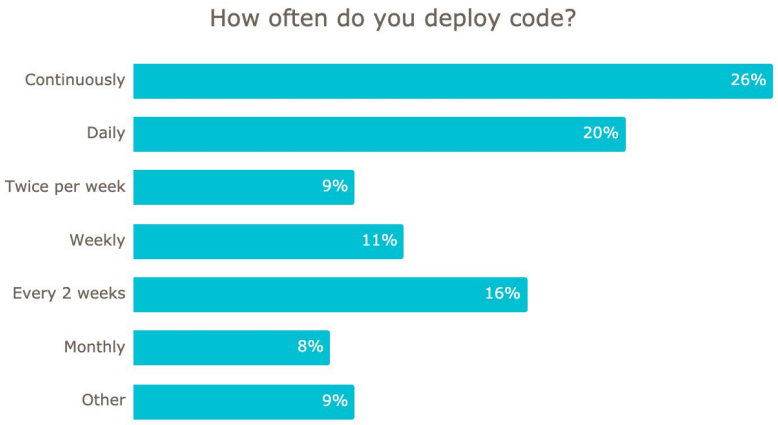
The dominance of CI suggests the need for surveyed QA leaders to make efforts to reduce test runtimes.

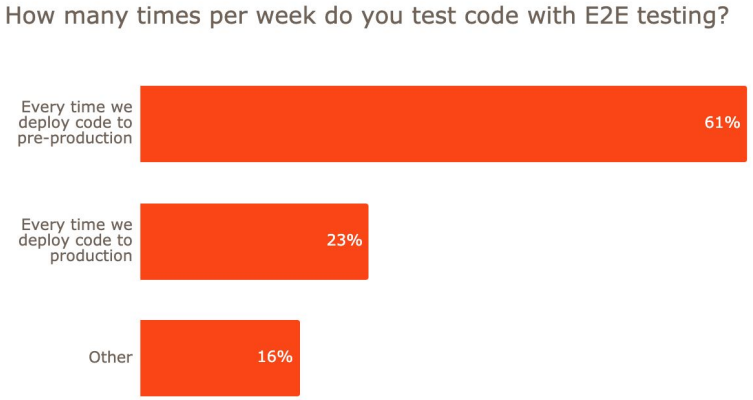
Despite long test runtimes, QA leaders must still cope with high-frequency deployments

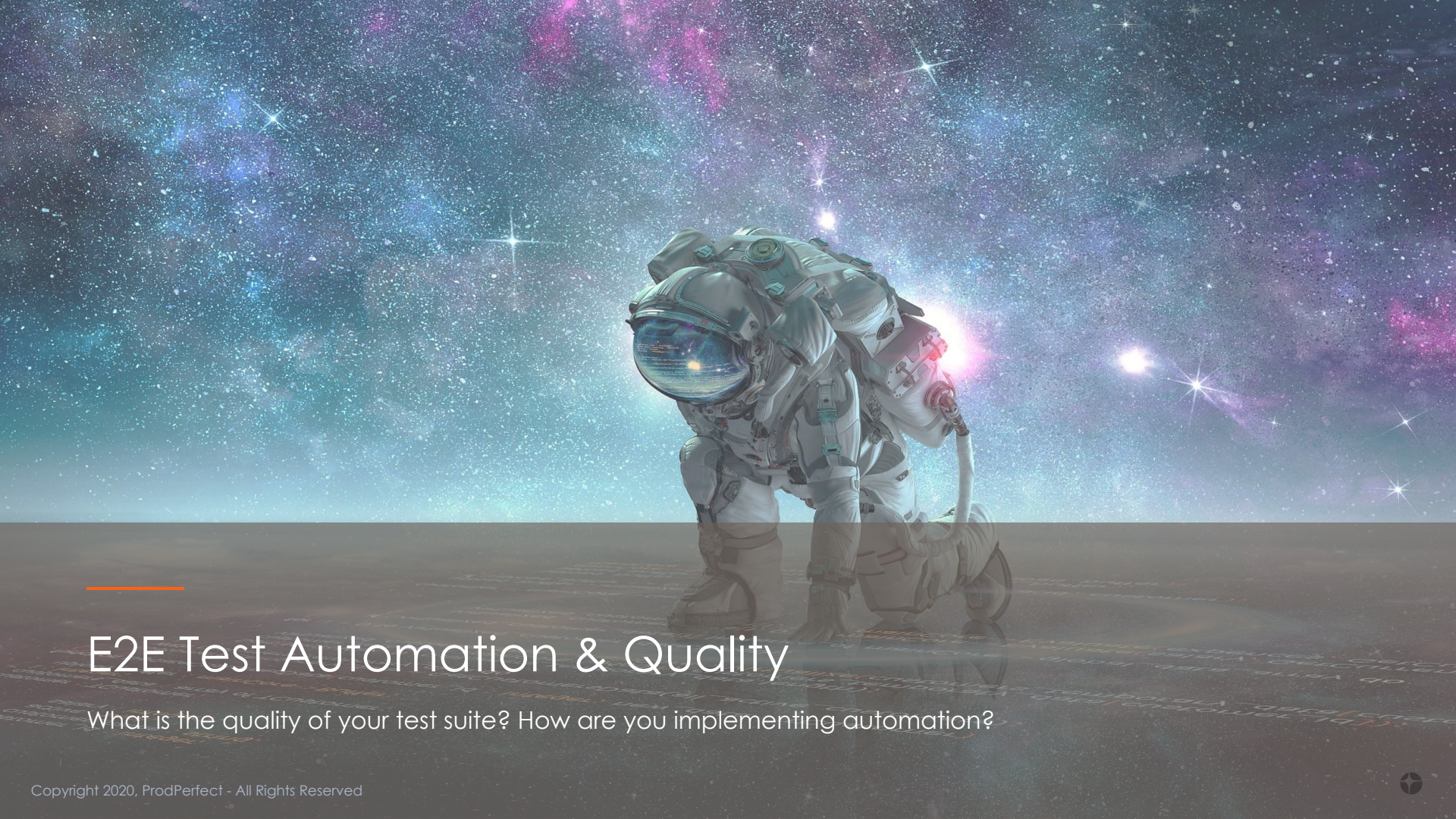
We observed wide variability in responses. However, though a majority of teams deploy code twice per week or or more, almost half deploy weekly or less often. Many teams vary their deployment based on project or platform. It apperars that E2E runtimes may be slowing deployment frequency.

Most teams use E2E testing with every deployment to pre-production

Testing professionals are consistent here, with almost two thirds testing code every time they deploy to pre-production. A small but significant minority uses E2E testing conditionally or not at all.

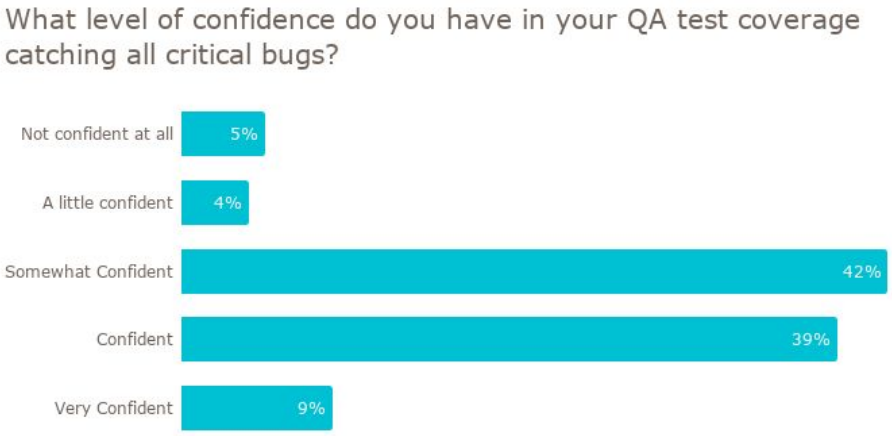


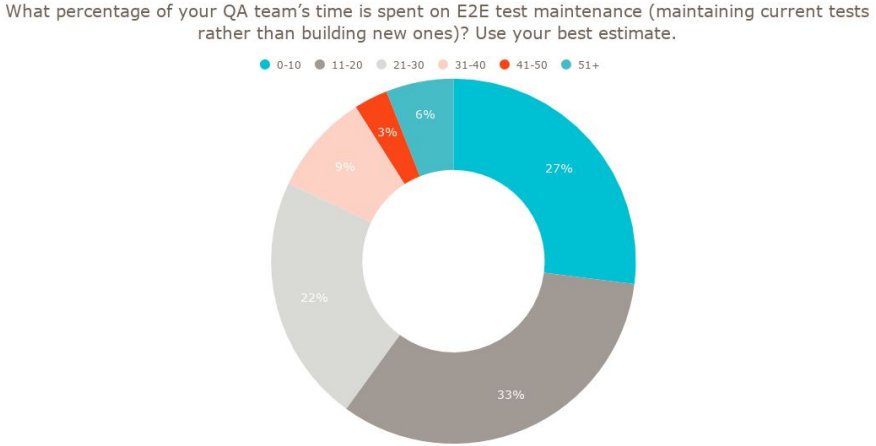




E2E Test Automation & Quality

What is the quality of your test suite? How are you implementing automation?





E2E test coverage confidence is mediocre and confidence is not high

The vast majority of QA leaders are not confident in their QA coverage. Less than ten percent are very confident in their testing regimen.

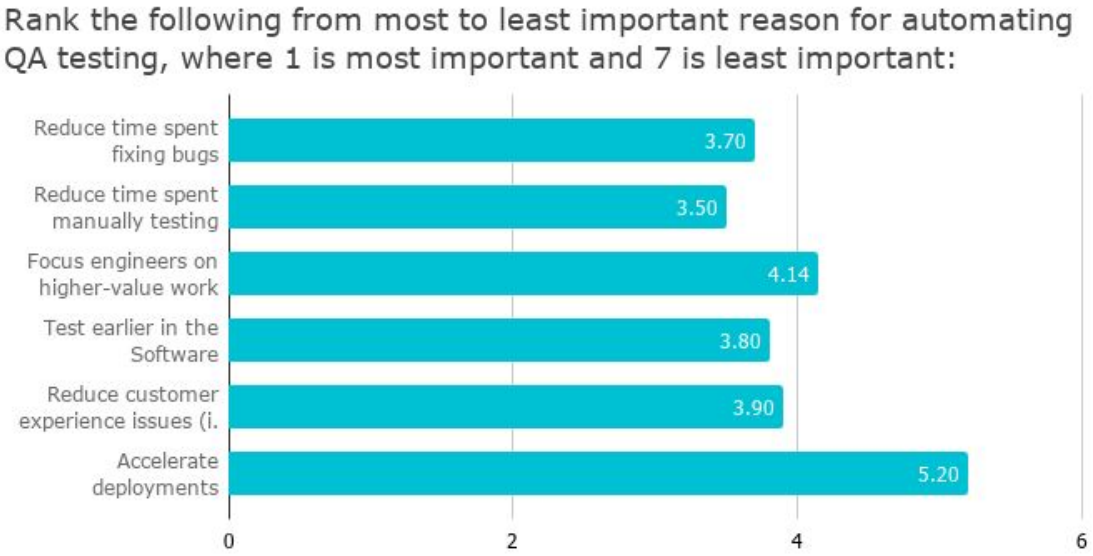
Despite the size of their test suites, most teams devote less than 20% of their time to maintenance.

Over half of testing teams spend less than 20% of their time on E2E test maintenance and only 9% spend more than 40% of their time.

This suggests tests suites may be ever-growing;; sufficient maturity is rarely reached to allow maintenance to become the predominant focus.

Accelerating deployments remains the biggest priority for QA leads

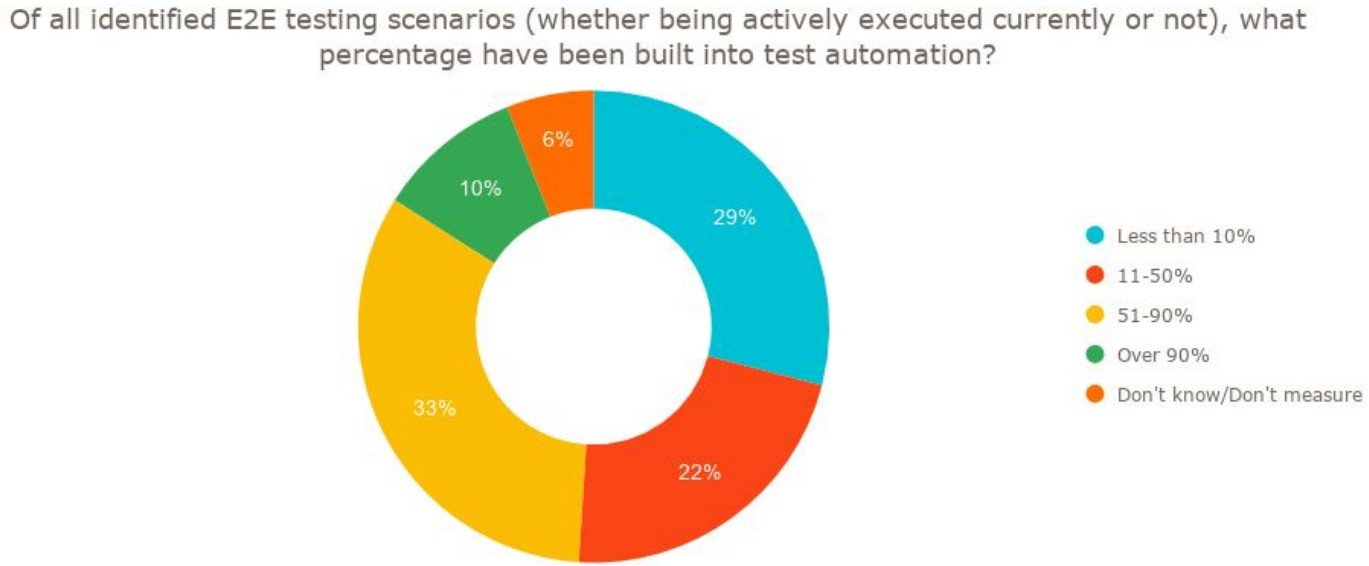
Far and away the most important reason that QA testing teams automate testing is to speed up deployment -- most other reasons are secondary.



Most teams have automated less than half of their testing scenarios

Of teams that have built E2E testing scenarios into their test automation, half have included 50% or less.

22% of teams either don't know or don't measure this at all.



E2E Test Monitoring & Performance

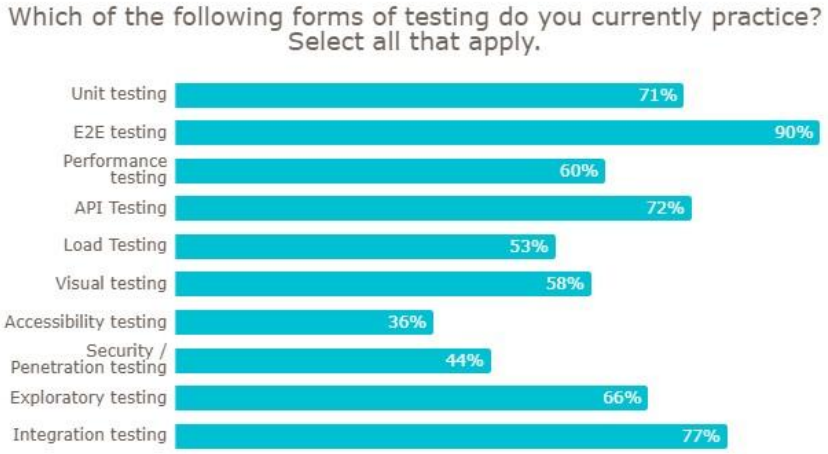
How do teams monitor their tests and measure performance?

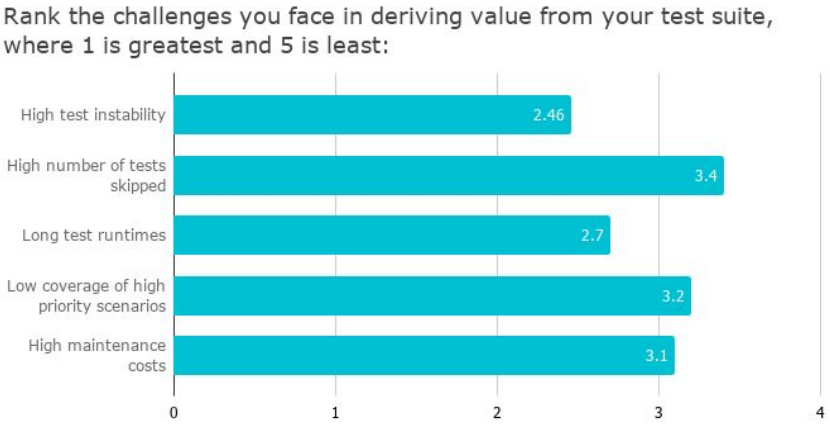
Significant gaps remain in unit, performance, load, visual, and security testing coverage

90% of teams practice end-to-end testing in some form but only 44% perform any sort of security or penetration testing, and barely 36% perform accessibility tests. Only 71% perform any unit testing at all.

Teams struggle to find value with their test suites in many areas

Testing professionals struggle the most with skipped tests, but almost as much with low coverage of high-priority scenarios and maintenance expenses.





Recommendations and Further Information

What's next?

Key Recommendations:

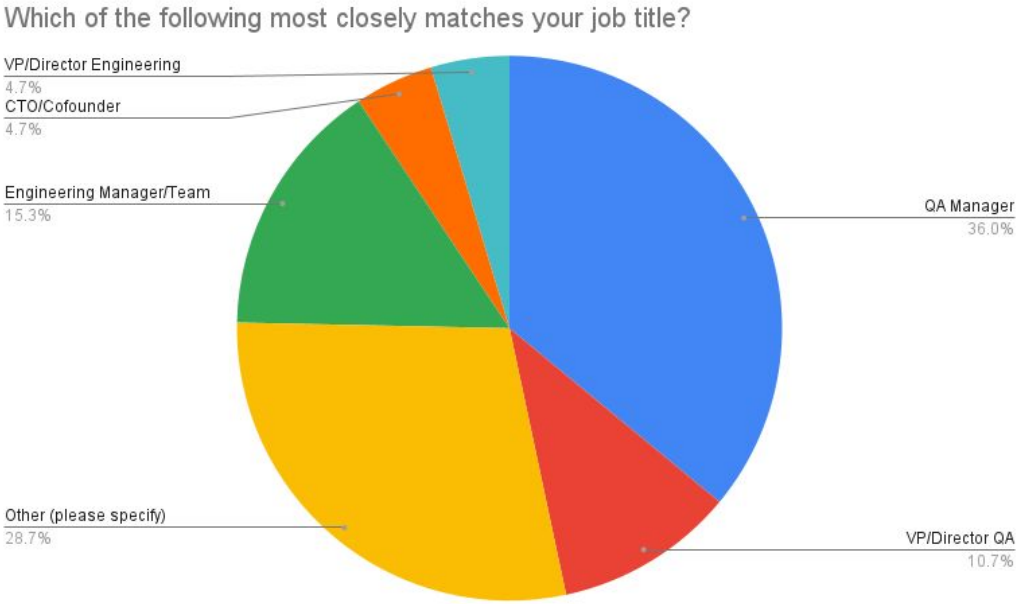
Adopt new technology. The challenges in QA testing are persistent and universal. Many studies and reports on the state of QA have repeated that QA leaders need to improve their talent, processes, and culture. The fact that these challenges are so universal means that the problem isn't the leaders or their management practices--it's the tools at hand.

Machine intelligence has come to QA testing, and there now exist both scriptless and autonomous E2E testing toolsets, some of which support or take over test case generation (as well as test scripting or maintenance).

These toolsets require less human effort, allow for shorter runtimes, require less maintenance, and in some cases provide objective, data-driven coverage metrics.

QA leaders should embrace and incorporate these new technologies, rather than simply continue to "try harder." Trying harder has not worked for 10 years; it is time to leave it, as a strategy, behind.

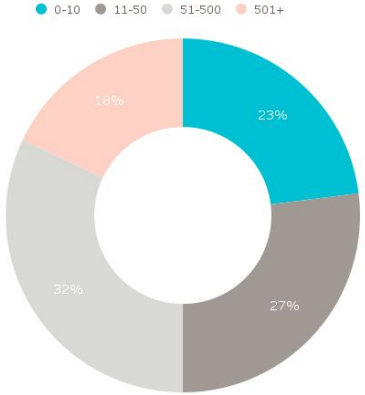
Demographic Information



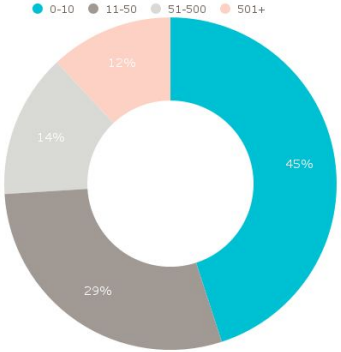
Demographics: Job titles

Demographics: Engineers and QA

How many total software engineers (all roles) does your company have?

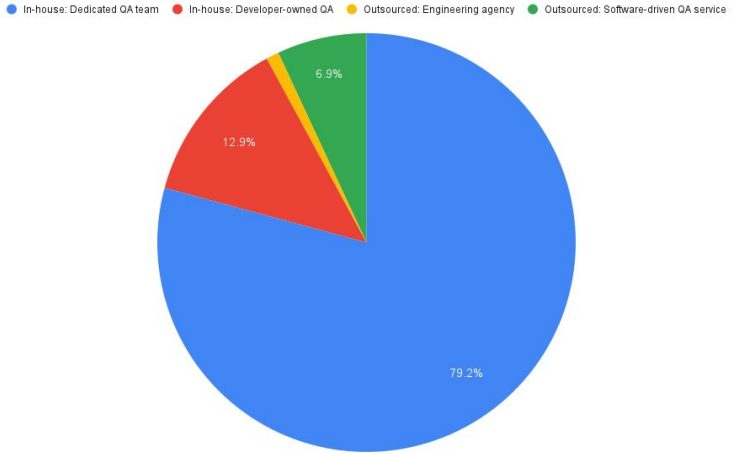


Specifically, how many QA engineers (a subset of the answer above) does your company have?



Demographics: Team structure and hiring plans

How is QA testing managed in your organization today?



How many people is your QA team planning to hire this calendar year?