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Boost Testing Effectiveness With AI-Infused Tools And Quality Management Practices

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Executive Summary

As market demand for new and better software increases, developers and their testing ecosystems struggle to keep up. Most organizations use manual testing or traditionally automated testing, which use tools or frameworks that offer GUI-automation or API-automation tool capabilities. These organizations strive to improve their quality management habits and processes, and their ability to track and measure quality. They need to do more than just increase the level of automation and test more frequently though; they must test smarter, leveraging testing technology and empowering testers to test with more precision and informed insights.

Organizations need to look to AI-infused testing and test management to evolve their practices, keep up with expanding market demands, and deliver better quality and innovative software faster. These tools optimize the level of design and execution automation, while also optimizing the overall testing process, helping testers test smarter and managers control quality and risk better.

In December 2021, Micro Focus commissioned Forrester Consulting to evaluate the state of software testing and quality management practices at enterprises in the financial services, healthcare, and retail sectors. To explore this topic, Forrester conducted an online survey of 316 software testing technology decision-makers across North America and the United Kingdom, including 226 decision-makers whose organizations use only traditionally automated testing and/or manual testing and 90 decision-makers whose organizations use these traditional methods and AI-infused testing. We found that AI-infused testing is helping companies speed delivery, increase productivity, improve quality, and maximize efficiency.



Key Findings

Current software testing needs improvement. Testing is a critical part of the software development lifecycle and any delays would result in a supply chain bottleneck. Unfortunately, modern testing technology and practices need improvement. The bulk of testing is manual, and testers can't do the functional and non-functional test automation that they need. Research shows that current technology doesn't serve the various testing personas well enough, too.¹

Decision-makers want intentional, efficient, and effective testing. Firms are looking to improve their ability to determine a testing strategy so they can achieve ever-growing quality targets. They need to plan testing better, improve the test process, identify quality risks, and optimize testing. While they are evolving their application development organization, these changes mean that testing ecosystems are expanding and test volume is growing. Testers need help with identifying what to test, testing quickly, and testing strategically.

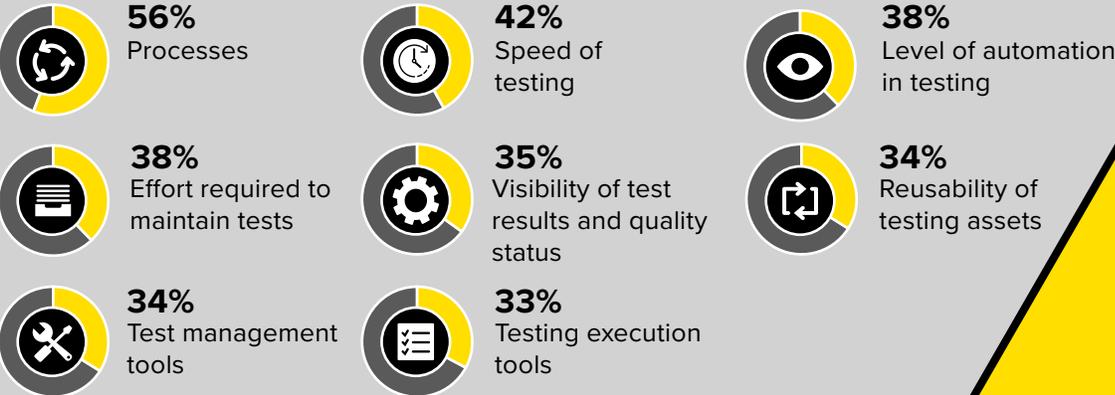
AI-infused testing and test management create a compelling competitive advantage. Decision-makers at firms that use AI-infused testing are more satisfied with test management, maintenance, and execution. These decision-makers are testing smarter, empowering testers to find and fix defects faster, accelerating delivery, and making employees happier. Those who hesitate to adopt AI-infused testing will continue to fall behind, while those who change will realize technical and financial benefits.

Traditional Software Testing Tools And Practices Fall Short

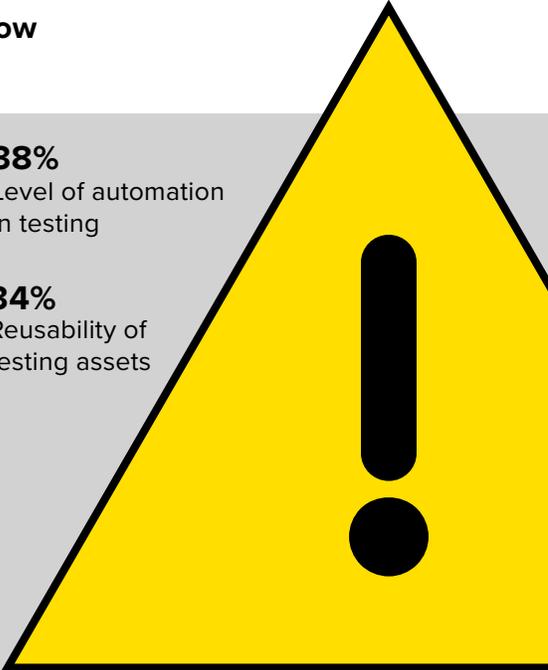
Software testing is a crucial step in any software development process. It's key in ensuring that software does the right thing in production, but also performs correctly and provides a great customer experience for the user. One way to ensure high-quality software development is with agile practices. In 2021, agile was the top inquiry for Forrester Application Development and Delivery analysts. Most — if not all — Forrester clients are on a journey of trying to scale agile. But true agility can't come without DevOps, which has also been on the rise in the past few years.

Agile, DevOps practices, and automation technologies disrupt traditional testing, requiring testers and testing technology to meet new demands. The need for testers to go faster has grown considerably for application development teams that want to deliver software frequently and continuously. If testers did not have enough time to do the testing they needed to do in the past, it is only getting worse with modern application development. In fact, less than 40% of surveyed respondents at firms using traditional automation or manual testing were satisfied with the reusability of testing assets, test management tools, and test execution tools — key ingredients to testing faster (Figure 1).

Figure 1
Satisfaction With Traditional Testing Tools And Practices Is Low
(Showing “Very satisfied” and “Satisfied”)



Base: 226 NA and UK software testing technology decision-makers who use only traditional automation/manual testing
Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021



Those decision-makers, who influence modernizing organizational testing approaches, defining new testing practices, and organizing integrated product teams, need to look for tool capabilities that can support the modernization process. This study uncovered what those new needs are and how the technology can help. In a nutshell, the technology must:

- **Increase test automation to address broader coverage.** Sixty-three percent of respondents at firms that use traditional testing agreed that current testing technology doesn't provide the types of test automation needed for functional testing (e.g., GUI-led automation, API-led automation). Within non-functional testing, over 56% agreed that their organizations' technology doesn't provide the necessary test automation types for tests, such as integration testing or load and performance testing, while 73% said their organizations' tools don't provide the types of test automation necessary for tests like security testing. Testers need to leverage technology to automate testing whenever and wherever they can to save time, without sacrificing business and technical coverage.
- **Empower testing personas to make data-informed testing decisions.** Application testing ecosystems will only get more complicated and distributed as more testing personas get involved. Yet nearly two-thirds of respondents agreed that their organizations' testing technology doesn't serve the testing personas they need to leverage for testing with over half agreeing that their testing technology doesn't serve their technical, business, and developer testers very well. These testing personas can be better supported in two ways: 1) they can test more by automating more tests and 2) they can make better testing decisions specific to their roles with the right data intelligence.

Nearly two-thirds

of respondents agreed that their organizations' testing technology doesn't serve the testing personas they need to leverage for testing.



Firms Want To Improve What And How They Test

Firms want to do more with their testing. They want to increase testing effectiveness to improve software quality in production, testing efficiency to do more with less resources, and automation to do it all in an automated way (see Figure 2). In light of this, decision-makers are making changes to their software testing organization.

Figure 2

Top Software Testing Priorities At Organizations Using Traditional Testing



Base: 226 NA and UK software testing technology decision-makers who use only traditional automation/manual testing
 Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

The three most common changes surveyed respondents were making include:

- Federating testing by embedding testers in software product teams to define and execute product testing, and also creating a centralized test center to set standards, select tools, and provide teams with consulting and services.
- Increasing the amount of testing to increase overall quality.
- Increasing the frequency of running automated tests.

These changes suggest that testing is becoming more complex and test volume is increasing. But working hard is not enough; firms need to work smarter. To do that, our study found that testers at companies with traditional methods of testing need help with:

- **Identifying what to test.** Testers currently waste valuable time figuring out what to test and testing the wrong things. In fact, 77% of surveyed decision-makers noted their organizations waste time testing functionality that users don't use much in production and 73% agreed their organizations have a lot of redundant test cases and it's hard to maintain them (see Figure 3). Testers need help sifting through the noise and should be able to prioritize their testing. Nearly 60% of respondents agreed that their organizations want to identify and optimize what they should or should not test when software changes happen, especially when software changes are constrained by budget, time, and resources. Conducting the right testing will go a long way in preserving valuable resources, boosting employee confidence and morale, and freeing up bandwidth for more creative testing.

Figure 3

Decision-makers Want To Do More With Their Software Testing

(Showing “Strongly agree” and “Agree”)



We spend a lot of time on testing functionality that users don't use much in production.



We're struggling to stabilize our continuous integration (CI) automation pipelines and quickly differentiate between failures (e.g., code, test, environment issues).



We want to bring more analytics-based insights to our risk-based testing approach instead of relying on intuition.



We have a lot of redundant test cases developed over the years, and it's hard to maintain them.



We would like to identify and optimize what we should or should not test when software changes happen.



We would like to identify and optimize what we should or should not test when software changes are constrained by budget, time, and resources.

Base: 226 NA and UK software testing technology decision-makers who use only traditional automation/manual testing
Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

- **Managing growing complexity, scale, and continuous integration (CI) pipelines.** Testers struggle to test quickly when there are software changes, because their testing isn't automated enough and they don't have the right testing assets. Seventy-five percent of respondents struggle to stabilize their CI automation pipelines and to quickly differentiate between failures. CI could help resolve issues before developers delve further into the development cycle, but testers need to automate tests to tap into CI benefits. Unfortunately, 54% of respondents felt stuck at current levels of automation testing and struggle to improve, finding it hard to write and maintain automation scripts. Furthermore, 69% agreed that their organizations struggle with test data management and want to create synthetic data quickly and easily, while meeting General Data Protection Regulation (GDPR) and compliance regulations. Testers, equipped with ready scripts and reusable testing data assets, can more proactively, effectively, and quickly test and identify issues to address.

- **Optimizing testing strategy and risk.** Testers need help improving their testing strategy and would benefit from more testing intelligence based on analytics and better test management. Seventy-five percent of decision-makers want to optimize their testing strategy to maximize business coverage and reduce risk, while 74% want to maximize technical coverage and reduce technical risk. Rather than rely on intuition, 73% percent of respondents agreed they want to bring more analytics-based insights to their risk-based testing approaches. Because of time constraints, testers need to prioritize testing activity on what matters most to the business and, because nobody can afford 100% test coverage, they want to make sure they can focus on the highest business and technical risk areas.

Rather than rely on intuition,
73% of respondents
agreed they want to bring more
analytics-based insights to their risk-
based testing approaches.



Firms Using AI-Infused Tools Test Smarter And Deliver Faster

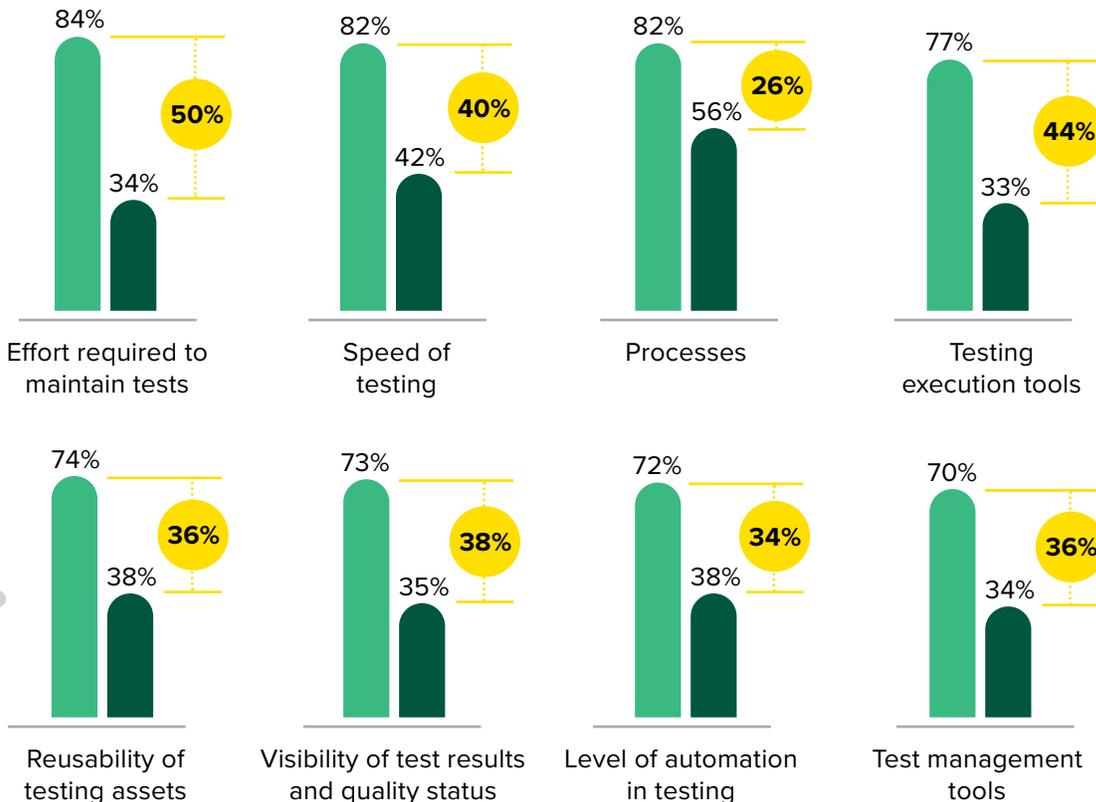
Decision-makers at organizations that use AI-infused testing were nearly twice as satisfied with testing at their organizations compared to their counterparts at firms that use more traditionally automated or manual testing. Over 70% were satisfied with test management tools, test execution tools, and testing asset reusability (see Figure 4).

Figure 4

Decision-makers At Firms Using AI-Infused Testing Are Twice As More Satisfied With Tools And Practices

(Showing “Very satisfied” and “Satisfied”)

- Uses AI-infused testing
- Uses traditional automation/manual testing*
- % difference



Base: 90 NA and UK software testing technology decision-makers using AI-infused testing

*Base: 226 NA and UK software testing technology decision-makers who use only traditional automation/manual testing

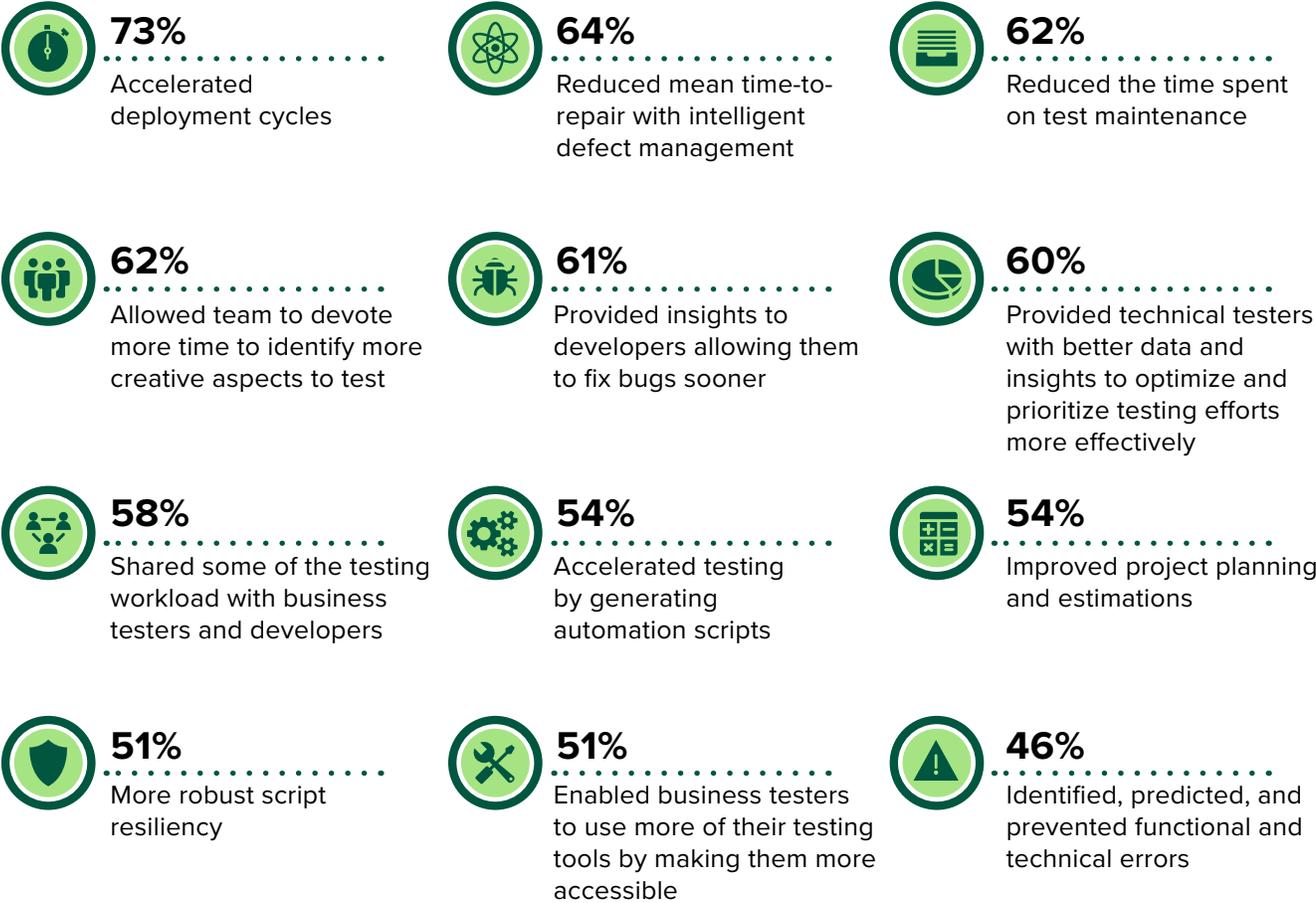
Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

The study found that AI-infused testing provides efficiencies and insights that allow firms to:

- Automate and test more.** AI-infused testing generates automation scripts and automates more testing areas, accelerating testing and allowing testers to test more. With AI-infused testing, 77% of respondents noted their organizations achieved greater business coverage and 67% have improved test automation coverage. Respondents reported an average 12.1 percentage point increase in test automation coverage overall. Sixty-two percent of respondents said their companies not only spend less time on test maintenance, but also devote more time to identifying more creative aspects to test (see Figure 5).

Figure 5

“What technical benefits has your organization realized with AI-infused testing?”



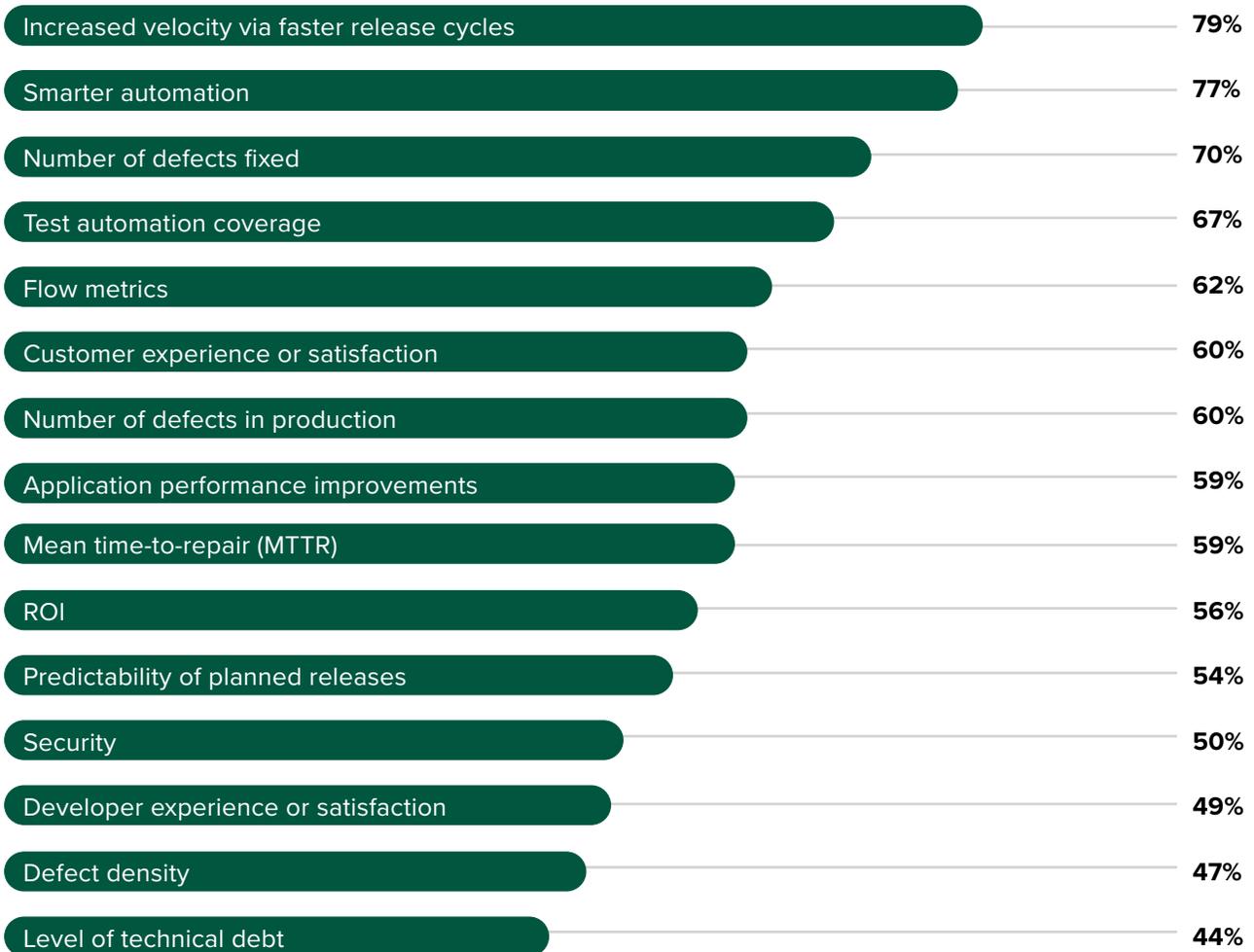
Base: 90 NA and UK software testing technology decision-makers who are using AI-infused testing
 Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

- Decrease defects for better quality software.** AI-infused testing can help testers analyze and identify bugs and necessary repairs, predict future failures, and fix defects. Sixty-one percent of respondents said that AI-infused testing provided the insights developers needed to fix bugs sooner, so it's no surprise that 64% reported reduced mean time-to-repair (MTTR) with intelligent defect management. Seventy percent said that AI-infused testing helped improve the number of defects fixed, with 60% saying it improved the number of defects in production (see Figure 6).

Figure 6

“Which of the following reporting metrics have your AI-infused testing solution helped improve?”

● Significant/Moderate improvement

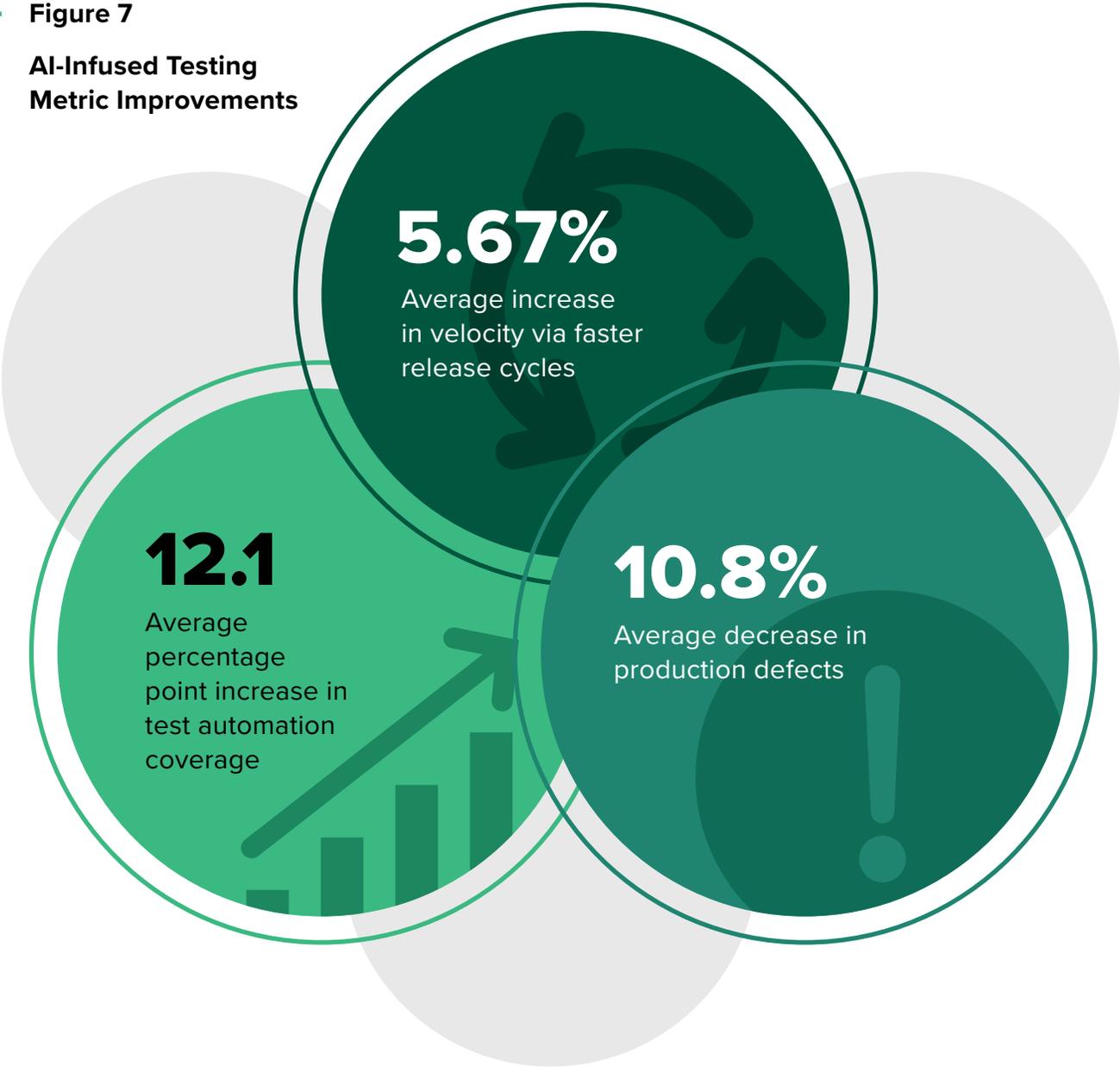


Base: 90 NA and UK software testing technology decision-makers who are using AI-infused testing

Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

There was a 10.8% decrease in production defects on average (see Figure 7). Identifying defects before the software reaches production means that there are less delays to its release. Addressing defects before the software reaches the customer provides a better product and customer experience. In fact, 68% of respondents experienced improved quality with AI-infused testing and 64% experienced an improved customer experience (see Figure 8).

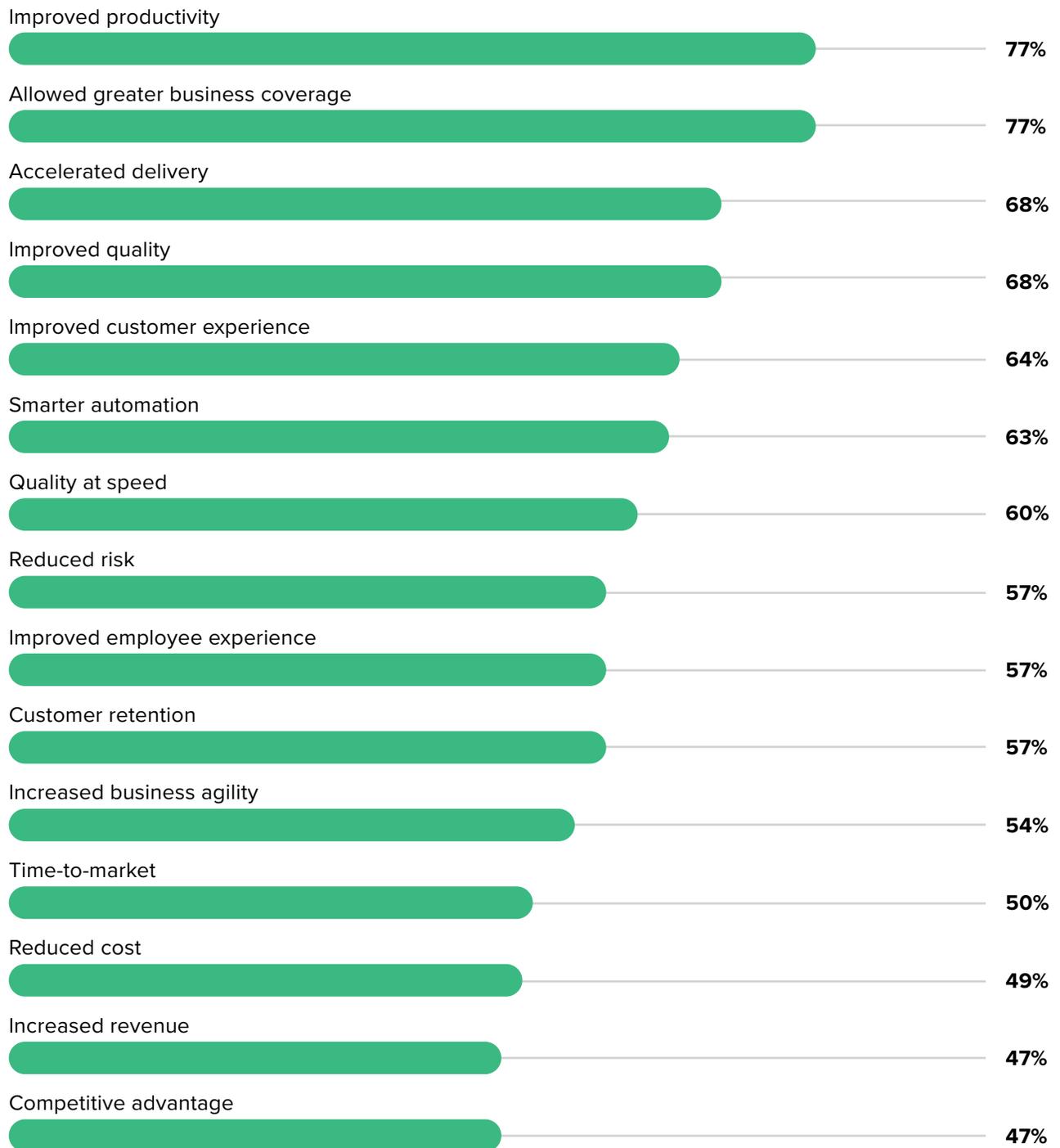
Figure 7
AI-Infused Testing
Metric Improvements



Base: 84 NA and UK software testing technology decision-makers who are using AI-infused testing
Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

Figure 8

“What business benefits has your organization realized with AI-infused testing?”



Base: 90 NA and UK software testing technology decision-makers who are using AI-infused testing

Source: A commissioned study conducted by Forrester Consulting on behalf of Micro Focus, December 2021

- **Test smarter and do more risk-based testing.**

Testers can achieve smarter automation and test better with AI-infused testing. Seventy-seven percent of respondents said that AI-infused testing has resulted in smarter automation. Sixty percent found that AI-infused testing provided technical testers with better data and insights to optimize and prioritize testing efforts more effectively. AI and machine learning (ML) can augment human tester intuition, leveraging hard data and insights to drive better decisions on what to test based on risk and time constraints. Fifty-one percent of respondents noted their organizations have found that AI-infused testing has made tools more accessible for business testers to use. In the future, decision-makers expect to further improve test execution and management by improving project planning and estimations and script resiliency with AI-infused testing in their arsenal.

- **Release software faster and more frequently.** With AI-infused testing, 73% of respondents accelerated deployment cycles and 79% have seen increased velocity via faster release cycles with a 5.67% average increase in velocity. With fewer defects and more quality software, organizations with AI-infused testing release software more frequently with 52% of respondents reporting their organizations releasing software at least once every month compared to only 36% of organizations that use traditional testing.

- **Have happier and more productive employees.** Nearly 90% of respondents agreed that adopting AI-infused testing allows testers to work on the more creative aspects of testing, improving their satisfaction with their day-to-day work and increasing productivity. Additionally, 70% agreed that adoption of AI-infused testing improves employees' likelihood to stay at the company.



77%

of respondents said that AI-infused testing has resulted in smarter automation.

Key Recommendations

Decision-makers at companies that use traditionally automated or manual testing and test management recognize the potential of AI-infused testing and quality management, but they hesitate to adopt it for a number of reasons. Half of respondents reported thinking that the technology is still too new, while 47% lacked the budget and 45% lacked the technical skills or knowledge to utilize it effectively. Adopting or improving something new is never easy, but testing can't stay where it is. With the relevance of software in all business types, it's become a critical success driver that no digital acceleration can do without.

Forrester's in-depth survey of software testing technology decision-makers about their organizations' software testing practices yielded several important recommendations:

Get on the AI-infused testing wave of enthusiasts.

Ninety-six percent of respondents who use AI-infused testing and test management at their organizations recognized that AI-infused testing and quality management is or will be a considerable competitive advantage to have in their organizations' toolbox. AI-infused testing will help increase business agility and revenue, improve time-to-market, and reduce costs.

Use the power of analytics and data insights.

You've got a lot of data to leverage that you can run analytics on, including log files, test failures, passed tests, test cases, use cases, and development and testing metrics. Use that data to run analytics and carve out insights to determine what to test next, what to automate next, and which automation you should run next based on a change, a new requirement addition, or even a fix. Impact analysis can speed your change management process. Use modern AI tools that can abstract complexity away so that your most common testers can make those well-founded decisions faster. Alternatively, get your data scientists closer to the testers to form better testing teams. Your technical testers might welcome some training on analytics, AI, and ML to get up to speed on insights-driven testing.

Prepare for it and do it in small steps.

Don't make the lack of technical skills, technology concerns, and organizational support from employees a hard stop. Research proves the use of AI-infused testing and quality management comes with numerous technical and business benefits. Ramp up an initial group of testers and help them understand what AI is about and how it can be used, leveraged, and what exists out there. Then, set them free to evangelize, support other testers, and coach teams. If you use external partners, reach out to them and find out if they have the right skills to help.

Testing takes a village and AI democratizes it for everyone.

As an enterprise, you will need multiple testing personas, depending on the type of applications or products you build. AI-infused testing tools is the future and all of the personas can get help from AI-infused testing tools. Developers can use AI-infused testing to improve code quality and reduce mean time to repair; technical testers can use AI-infused testing to optimize the test strategy; and business testers can use AI-based testing to test business functionality and user experience. Look for tools that can offer AI-infused testing to augment your testers' intelligence collectively.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 316 software testing technology decision-makers at organizations in the United States, the United Kingdom, and Canada within the financial services, healthcare, and retail sectors. Questions provided to the participants asked about their organizations' current software testing practices and tools. Respondents were offered a small incentive as a thank-you for time spent on the survey. The study began and was completed in December 2021.

Appendix B: Demographics

COUNTRIES	
United States	44%
United Kingdom	39%
Canada	17%

NUMBER OF EMPLOYEES	
1,000 to 4,999	56%
5,000 to 19,999	32%
20,000 and more	12%

INDUSTRY	
Retail	35%
Financial services	33%
Healthcare	32%

TITLE	
C-level	13%
Vice president	32%
Director	55%

RESPONSIBILITY LEVEL FOR QUALITY ASSURANCE AND TESTING	
Final decision-maker	50%
Influence and make decisions as a primary part of role	42%
Has strong working knowledge, but doesn't influence decisions	8%

RESPONSIBILITY LEVEL FOR APPLICATION DEVELOPMENT AND DELIVERY	
Final decision-maker	54%
Influence and make decisions as a primary part of role	36%
Has strong working knowledge, but doesn't influence decisions	9%

Appendix C: Endnotes

¹ Source: "The Path To Autonomous Testing: Augment Human Testers First," Forrester Research, Inc., January 7, 2019.

Note: Percentages may not total 100 because of rounding.

The background is a dark teal color with a complex, layered, wavy pattern that resembles a topographical map or a series of overlapping, curved planes. The pattern is more pronounced on the right side and fades into the dark background on the left.

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