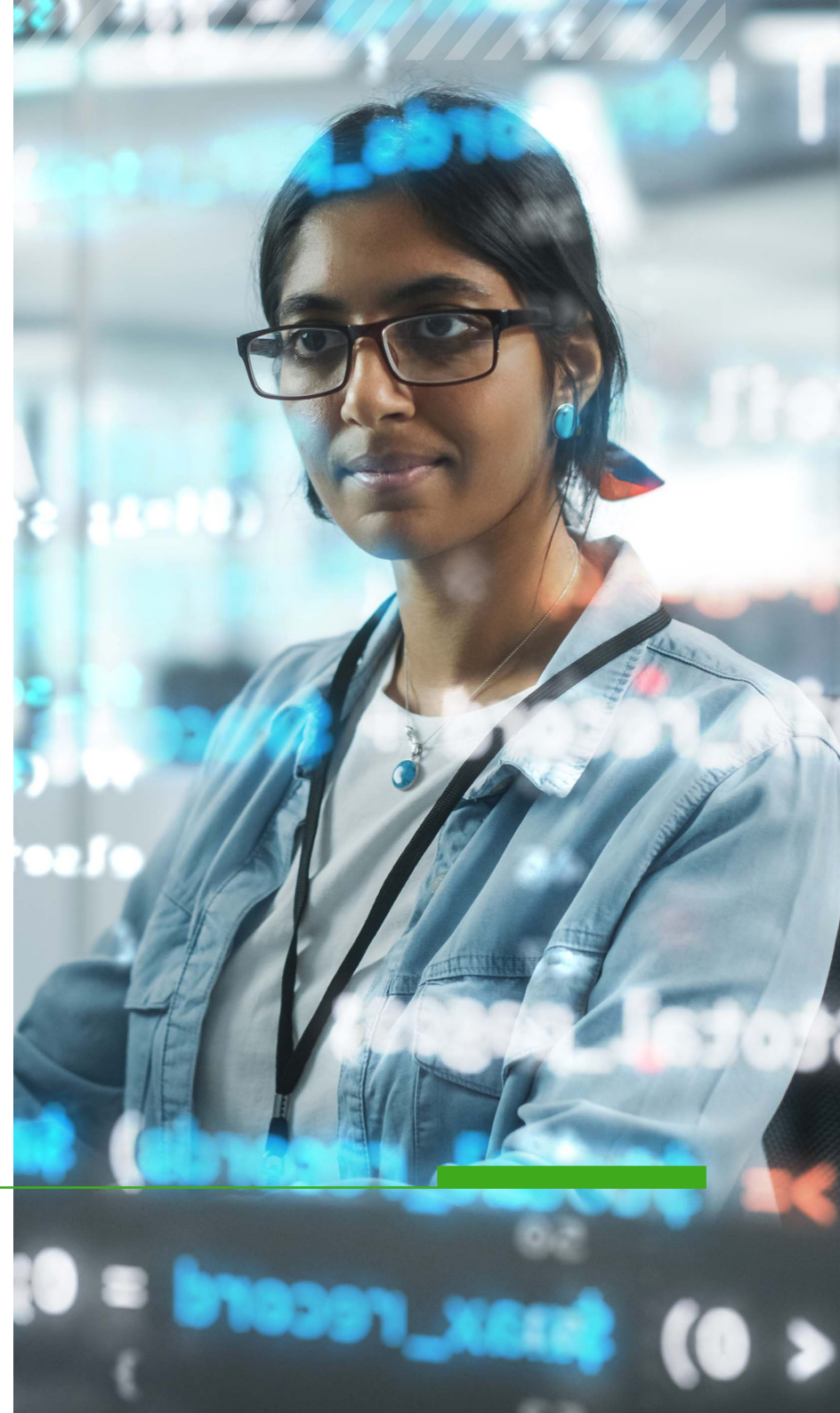




DIGITAL TRANSFORMS PHYSICAL

# The Future of Software Quality Assurance

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# Overview

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**Over 2020, the COVID-19 pandemic and the shift to remote work accelerated digital transformation across industries and professions as well as a proliferation of new online businesses. As a result, software development teams are under immense pressure to scale their operations and get products to market faster than ever.**

The Quality Assurance (QA) function within the software development ecosystem has inevitably had to evolve to keep up with this increasing pace and growing focus on product quality.

In previous years, Quality Assurance analysts mainly focused on testing and finding defects in products, while operating separately from the software development lifecycle. Nowadays, with Agile gaining traction, QA has evolved from functioning independently and has become an integrated part of the software delivery team. Instead of acting as a gatekeeper for bugs and defects in the code, as well as procedural quality parameters, QA engineers are now also responsible for implementing engineering best practices, coaching team members of other teams to embrace a quality control mindset and innovate using technologies like Artificial Intelligence and Machine Learning. Meanwhile, progress in test automation is constantly moving forward while QA practices are increasingly integrated in every step of the software development lifecycle.

In other words: QA is by no means a backroom discipline anymore. It is now considered a strategic driver of business growth and needs to be structured and supported as such. With the pressure to deliver and end-users increasingly demanding quality,

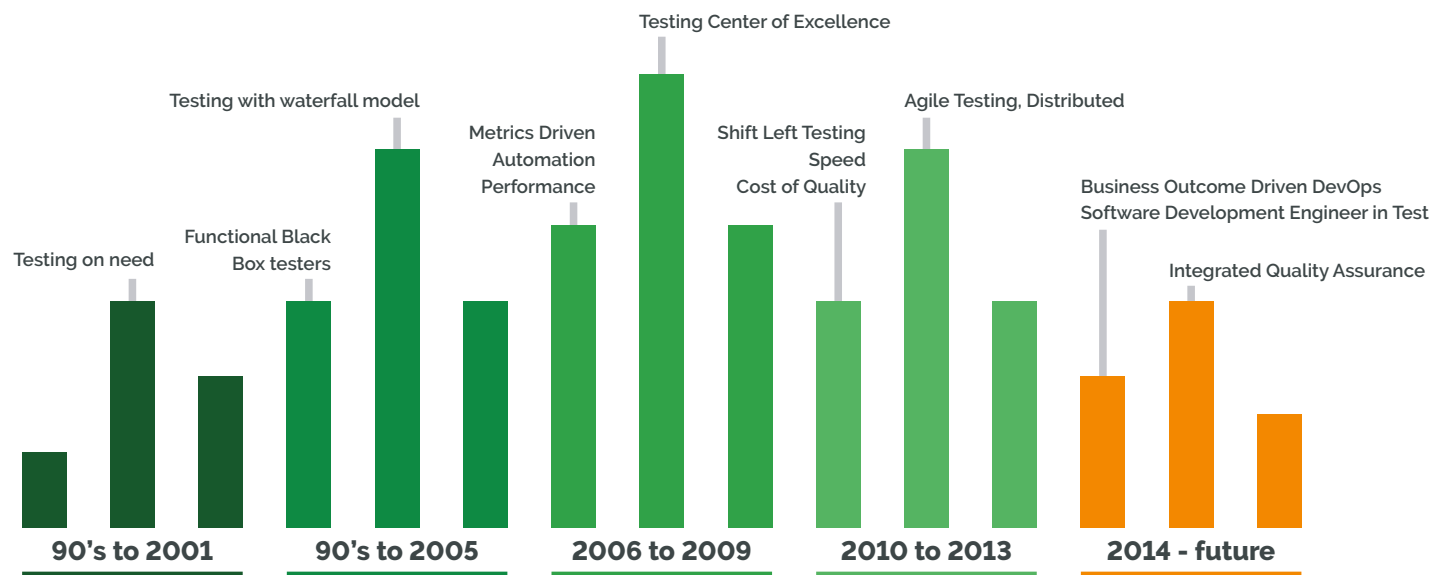
QA analysts and business leaders can ensure consistently high standards by staying on top of software testing trends and equipping themselves with the right tools to overcome challenges in the field.

Read on to discover the most important trends you should know about for software QA, the challenges Quality Assurance teams face, and the areas of opportunity that lie ahead for the taking!

# QA Trends in Software Development

## 1. A change in size, scope, and attitude

It is common industry knowledge: testers often feel that they don't get enough recognition for the value they provide to their organizations. However, as the profession matures — with more QA analysts staying in the field for longer periods of time — and market needs change, so does the business perception of the role. Over the last couple of years, companies have transitioned to informally viewing testers like quality advocates who have the potential to greatly affect business growth. ►



So, it probably shouldn't come as a surprise that according to the [State of Testing Report 2020](#), the amount of smaller testing teams has decreased from 47.5% to 42% since 2019. This indicates an overall increase in average testing team size and suggests that companies have realized testing is a business-critical function. In other words, dedicated testers are vital to the success of software development.

Meanwhile, the same report demonstrates a slow but consistent decrease in the percentage of testers who only do testing, all the time. Especially in smaller companies, testers are increasingly expected to take on differing responsibilities, like:

- **Security testing**
- **Aspects of CI/CD (Continuous Integration/Continuous Development)**
- **Writing user stories**
- **Customer/sales support**
- **Writing code**
- **Production deployments**

As the field and the professionals in it mature, so does the scope of the role itself.



### Insider tip

**The “Whole Team Testing” movement is no longer a theoretical idea. Organizations now often expect their testers to act as consultants, educating other roles – like programmers, product managers, and customer support – on the importance of testing, ensuring team-wide adoption of the mindset and best practices, while integrating their activities within the development framework of whichever methodology is being used.**

**With leadership buy-in and the support of their colleagues, this allows testers to scale their expertise across the organization.**

## 2. The convergence of Agile and DevOps

Another driving factor of continuous delivery is the convergence of two similar and complementary methodologies: namely Agile and DevOps.

In contrast to the traditional approach of completing each step before moving on to the next phase, Agile emphasizes self-organizing teams, incremental delivery, and iterating on parts of the product as you go along instead of trying to put it all together at the end. Changing the way the project is managed serves to eliminate bottlenecks and enable developers to quickly respond to changing demands or requirements.

**Where they overlap:** Both Agile and DevOps are popular choices amongst development teams and have a significant amount of overlap and impact on the QA process. They intersect at a key point: an increased focus on collaboration and the delivery of quality products in a timely manner. When following a traditional V-model approach, QA would commence functional and regression testing only after the deployment of a build in their environment.

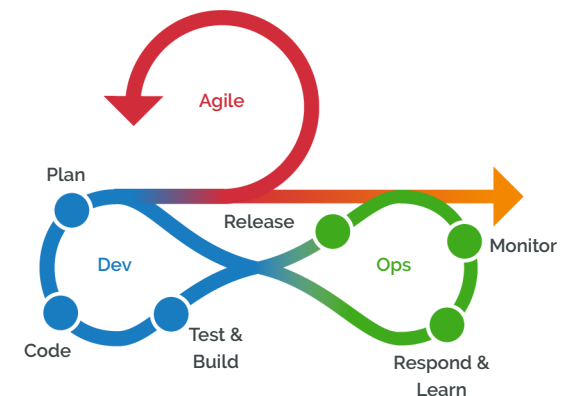
Now, QA teams tend to align their tasks and processes with the DevOps cycle instead. This means that they need to:

- **Automate their test cases**
- **Work with developers to ensure full code coverage**
- **Achieve “triple nine” (e.g. 99.9%) coverage on functional testing**
- **Make sure that the deployment of QA boxes is automated**
- **Standardized testing environments**
- **Carry out pre- and post-testing (and cleanups)**

Finally, QA professionals will also come to expect more input from other team members as well, which aligns with the increasingly integrated nature of the role with the rest of the development lifecycle. This usually results in a product of higher quality that goes to market much faster.

### Insider tip

**Agile focuses on increasing stakeholder collaboration and providing an iterative, incremental approach to software delivery as an alternative to the sequential Waterfall / V-model development processes which were traditionally used in the past, while DevOps provides a development environment and aims to integrate software development and IT processes to shorten the systems development lifecycle and to ensure the efficient operation of high-quality software.**





### 3. Automation is the name of the game

Slowly but surely, testing has progressed from being a 'nice to have' to a major area of focus in QA. Automated testing refers to the use of software tools by QA teams to perform detailed and consistent software tests automatically in order to help:

- **Scale their resources**
- **Test substantially more code**
- **Improve software quality faster**

It also frees up Quality Assurance engineers to dedicate more time to manual testing which can't be automated at this stage. Some enterprising uses of automation include Machine Learning techniques applied to object recognition and AI-based self-healing scripts which adapt to changes by automatically changing scripts during run time. Additionally, when AI is integrated into production, zero-touch automation can be programmed to identify missing test cases, perform them, and gather data from them.

Looking ahead, respondents in the [World Quality Report 2020-21 \(WQR\)](#) rated the automation techniques they would be likely to use in 2021:

- **Test environment virtualization came in first place at 16%**
- **Followed by robotics automation for test activities at 11%**

Interestingly, model-based testing, which ranked highest in 2019 at 17%, dropped down to 9% this year.

That being said, it is only a few organizations that have reached this level of automation maturity within their software development operations. There is a lack of necessary skills to configure and maintain such levels of automation, and testers have too many incompatible or partial solutions at hand. Moving forward, it is likely that testers and test managers will be on the hunt for a platform that does it all so that they too can make strides in this area.

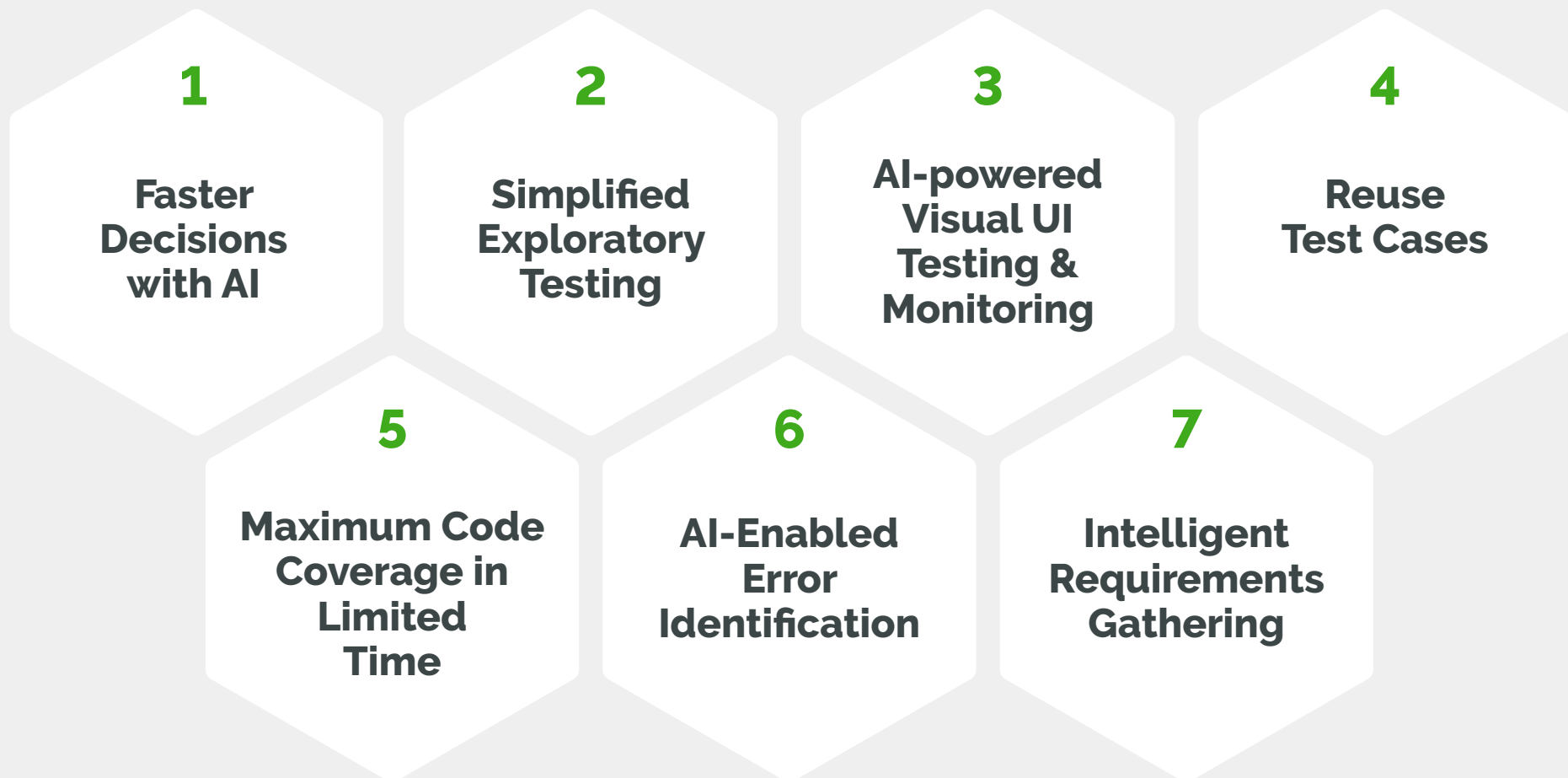
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**“Test automation is moving forward too, and is becoming more intelligent and comprehensive. In some cases, the pace of change has been hampered by legacy practices, budget constraints, and skills gaps, but nonetheless, the momentum has been encouraging.”**

— Sathish Natarajan, Group VP, Head of Digital Assurance and Quality Engineering, Capgemini North America – World Quality Report 2020-21

## Features of AI-driven QA / Test Tools

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# Challenges and Opportunities Ahead

## 1. High expectations, low visibility

### The challenge

Now that the scope of QA engineers has changed, there is an expectation that they come armed with developer-type skills, evangelize quality control across the organization, and promote user experience centrality. However, QA professionals don't typically tick all these boxes in terms of their curriculum: traditionally their roles weren't as technical as they are now. Coordinating manual and automatic testing plus coaching others and implementing new technological approaches with AI and Machine Learning is a big ask from a single employee.

### The opportunity

Organizations need to:

- **Experiment with the way their QA teams are set up**
- **Evaluate the operational structure within software development**
- **And invest in upskilling their QA analysts**

Their efforts will pay off: automation technology has the potential to drastically reduce costs and the time required for manual testing, ensuring a faster path to market. ►

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**“The level of automation is still below 20%, and that is a true concern. When we look at the overall maturity of how QA testing is being executed in agile environments, this is still holding us back.”**

— Mark Buenen, Global Leader for Digital Assurance and Quality Engineering, Capgemini Group – World Quality Report 2020-21



They should also invest time and resources in projects which will help shed light on the work of their testers. 35% of project managers in the WQR say they're helping their DevOps teams optimize testing by implementing quality 'smart' dashboards in order to make their efforts more visible. Continuing and building initiatives like this one would be a great step in the right direction, in tandem with the ongoing education of their QA teams.

## 2. Security matters: the rise of DevSecOps

### The challenge

With the amount of data growing exponentially by the minute, security testing has become a top priority for businesses that are concerned with questions of information privacy and security.

A Forrester study called **Better Security And Business Outcomes With Security Performance Management** revealed that 82% of stakeholders agree that the perception and maintenance of security is extremely important for client and partner relations. With a consensus that the early introduction of security

testing is now the best approach, testers are increasingly expected (and sometimes pressured) to get involved in exhaustive penetration testing to mitigate risks like:

- **Data breaches and cyberattacks**
- **Weak spots in the security architecture**
- **Harmful downtime periods**

And finally, the overall reputational damage which comes from security incidents, which can be severe, last for years, and incur noncompliance fines of millions of dollars according to Data Protection Regulations like the GDPR, HIPAA, and othersmore.

That being said, integrating security into the software development space hasn't been as successful as predicted by experts. This is on the one hand due to limitations in the tools and training available to testers, and on the other hand, a cultural issue. Since testers don't come from security backgrounds and are typically more focused on delivering features, they don't feel entirely comfortable taking ownership of matters of security yet. Organizations still routinely outsource penetration testing processes.

### Insider tip

**Although more and more organizations report having the necessary automation tools in place to support this innovation, that doesn't mean they have the manpower and structure to make them effective.**

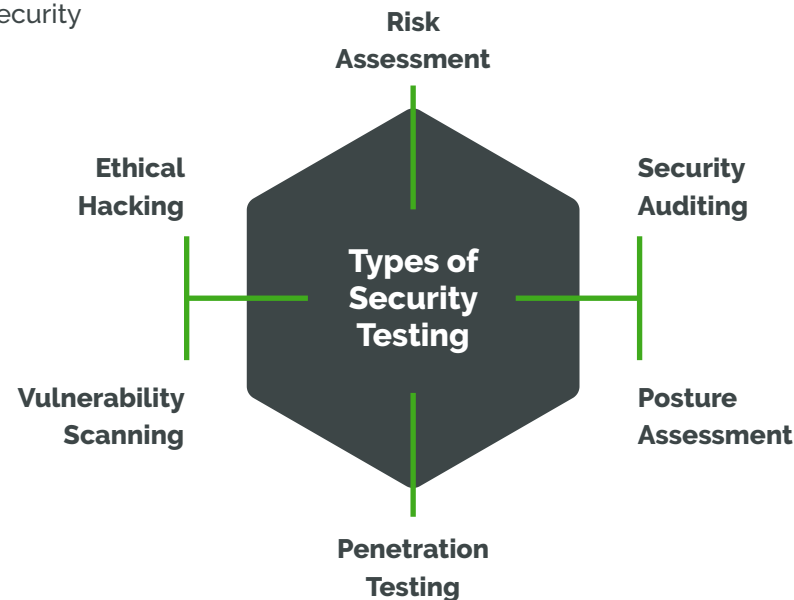
**The tools may be getting more impressive, but it is often the case that employees are not fully equipped to leverage them. The WQR states that 52% of organizations polled feel they don't have the right skills inhouse to take advantage of the automation resources at hand.**

### The opportunity

In order for testers to accept security as a core responsibility, two things need to happen. First, current tools need time to improve to better facilitate the integration of these functions. This will create more opportunities for integration and automation across the board.

Second, QA testers and project managers need to undergo a mindset shift. Since it's been historically difficult to get QA testers to agree to perform security tests, businesses usually give up and hire security experts to do the job instead. But if chaos testing and exploratory testing can gain momentum, so can security testing.

Of course, the right team structures, training, and tools need to be in place to facilitate this kind of collaboration across the board, especially since security testing often uses approaches that are unfamiliar to people without a software engineering background. But the benefits of putting QA in charge of security testing – and implementing it at the earliest stages possible – speak for themselves.



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**“This has to do with a lot of the testing tools—things like vulnerability assessment, software composition analysis, dynamic application security testing, interactive application security testing, static application security testing—all of these different types of apps security testing. I think we’re going to see more of that.”**

— Jay Lyman, principal analyst at 451 Research LLC.Report 2020-21

### 3. Fragmented tools equals fragmented testing

#### The challenge

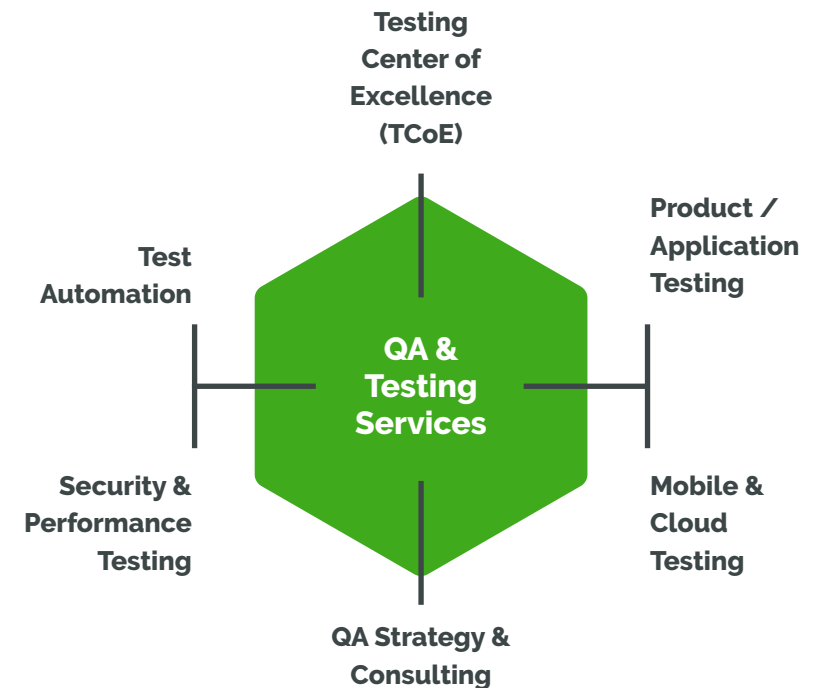
As more and more businesses look to streamline their testing efforts, the automation tool market is simultaneously growing. From robotic process automation (RPA) tools to different uses of AI, there are a myriad of options available.

But today's software testing applications have to cover a large variety of needs ranging from automated and manual testing to different programming languages. Testers and project managers are in distinct need of a comprehensive solution.

However, testers are often forced to juggle multiple partial solutions which only cover a subset of testing infrastructure and are not easy to integrate. Although the tools are significantly more sophisticated and have better user interfaces than they used to, it is very difficult for testers to get full oversight of product quality when using many different tools to complete their evaluation.

#### The opportunity

Now is the time to choose your toolkit wisely, more so than ever. There are multiple options out there depending on what you're looking for: some are open-sourced, some commercial, some are tools which specialize in test automation, RPA, or Application Lifecycle Management platforms. ALM apps can be a good choice for businesses looking to manage all software QA activities across a single platform where you can manage requirements, developments, risks, testing, and operation in the same place, with traceability ensured. Due to its integrated nature, this tooling approach greatly supports the successful implementation of an Agile+DevOps framework.



Find out how these quality-focused innovators use our tools



#### Resources

World Quality Report 20-21

State of Testing Report 2020

QA's role broadens: 5 takeaways from the World Quality Report

Test automation tools: Top trends and challenges

Better Security And Business Outcomes With Security Performance Management

The Future of Quality Assurance

What to expect in 2021: 7 top trends in quality assurance and testing

Evolution of quality assurance – from an independent function to an inclusive function

What is Software in QA Testing? By Tiempo Development



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