

TEST AUTOMATION TRENDS IN 2021

Research paper



TABLE OF CONTENTS

INTRODUCTION	3
TREND 1: More and even more automation	4
TREND 2: Accessibility testing	5
TREND 3: Cloud-based solutions testing	7
TREND 4: Cloud-based collaboration testing tools	8
TREND 5: AI-based software assistance	9
TREND 6: Don't Just Automate, Orchestrate	10
TREND 7: Observability	11
TREND 8: API end-to-end monitoring	12
TREND 9: AI Data tools	13
TREND 10: Playwright	14
CONCLUSION	15
ABOUT QATESTLAB	16
REFERENCES	17

TEST AUTOMATION TRENDS

in 2021

Automated software testing solutions do a significant portion of the work otherwise done by manual testing.

And the trend towards it has become a steady direction of QA development today.

The key benefits of automation in 2021 are no longer just known, but acutely obvious to developers:

1. Speed up the checking process and release of large projects
2. Detect defects earlier in the software development life cycle
3. Reduce the risk of finding software bugs in production
4. Reduce time and money expenses for manual testers
5. Increase the speed of delivery
6. Achieve maximum test coverage
7. Avoid the human factor



↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

INTRODUCTION

Test automation has come a long way over the past 15 years. The goals and role of the service in IT processes have changed: once it was implemented only to reduce testing time, and now it is added to ensure optimal test coverage and more efficient use of test cases.

Thus, introducing this service into the development cycle today, companies pursue a complex and important goal — to get a high-quality software product, and as quickly as possible.

In 2020 respondents of the World Quality Report have referred to the need to automate from end to end — from build through to deployment. It's an indication of how the topic of test automation has moved on since 2019 (according to WQR 2019 61% of respondents emphasized that they encountered difficulties in implementing it on projects and 65% of respondents said that applications change too frequently for them to keep up).

The trend toward test automation continues to escalate, with 68% of respondents in 2021 saying that they have the automation toolsets that they need, and 63% saying they have enough time to build and maintain automated tests.

But only 18% are automating their user acceptance tests and unit testing. While that's an increase of 3% over last year, the overall test automation rate of 15% leaves considerable room for improvement. Many organizations have not been able to get the level of return of investment from automation initiatives they would have wished. This is because most frameworks lack the cognition they need to self-heal.

Due to some of the following trends, we might expect a significant increase this year.

We have prepared this research paper so that you have up-to-date information at your fingertips about what awaits test automation in 2021. It is based on current trends and the expert opinion of our specialists.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1 More and even more automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 1: More and even more automation

The first trend is the most obvious one. Let's look back at the past year. The Covid-19 pandemic has definitely made its own adjustments to the plans and work processes of many companies. If someone was not going to go digital or constantly postponed it «until tomorrow», then from March 2020 it became obvious:

if you are not online, then you simply do not exist.

Everyone urgently needed websites, applications, and software, as it turned out to be almost the only channel of communication with customers. And the growth in the number of software and applications has increased the amount of QA testing needed.

In 2020, developers had to adapt themselves. In 2021 the speed of release of software products to the market became an integral part of the competition. As a result, it is much harder to maintain quality when you need to cover an average of 300,000 pages and screens daily for a typical app.

Test automation can significantly speed up the release of a software product and reduce the cost of a test iteration.

Despite companies' budgets still show us that QA is not in skyrocketing demand, a successful digital transformation depends on the contribution of QA.

Right now we have a situation when with ever-decreasing budgets, QA teams continue to be pushed to do more with less. The global pandemic has pressed organizations to accelerate their digital transformation initiatives, which has pushed teams even harder.

The result is that organizations are reevaluating their approach to QA, increasing their adoption of cloud infrastructures, and putting extra emphasis on security.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2 Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 2: Accessibility testing

2021 will see a jump in companies investing in accessibility testing to improve their customer experience. Information technologies have long become an integral part of our life, and making them available to as many people as possible is a must.

Accessibility Testing is defined as a type of Software Testing performed to ensure that the site, application, or operating system being tested is usable by people with disabilities like hearing, color blindness, old age, and other disadvantaged groups. It is a subset of Usability Testing.

Individuals who have disabilities are relying on digital services more than ever before for everyday activities (remote work, education, healthcare, banking, shopping, etc.).

There are additional programs and extensions for browsers that help people to view pages, to perceive information in any way, visually or by ear. Examples of such software are:

Speech Recognition

Anywhere — converts the spoken word to text, which serves as input to the computer.

Dalton for Google Chrome — software allowing people with different kinds of color blindness (color vision deficiency) to see more colors.

Snap and Read Universal — reads both accessible and inaccessible text aloud from websites, Flash websites, images, Google Docs, eBook Readers, Kindle Cloud Reader, email, PDFs, web-based tests, and more.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2 Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 2: Accessibility testing

That means you should do software testing the accessibility of all the software processes your team is developing.

Basically, all these features that help to adapt, are hidden in tags and attributes, in the page markup, in the layout. Videos in such applications must necessarily support subtitles. Also, developers and designers should take into account that for people with visual impairments, you need to use certain sizes, fonts, contrasting colors.

Automation testing is done in the following way: items are selected from the document, which must be adhered to when developing the application and tested. First, they test with automatic tools and browser extensions: we used aXe, Lighthouse and Wave. Check code, contrast, font size, etc. After checking, such tools give out gross inconsistencies and recommendations for improvement.

So 2021 will see a jump in companies investing in accessibility testing to improve their customer experience.

To stay around accessibility testing you can follow the next experts: **Crystal Preston-Watson, Marie Drake, Aparna Gopalakrishnan, and Manoj Kumar.**



↓ Click the section to jump ahead

INTRODUCTION

TREND 1
More and even more automation

TREND 2
Accessibility testing

**TREND 3
Cloud-based solutions testing**

TREND 4
Cloud-based collaboration testing tools

TREND 5
AI-based software assistance

TREND 6
Don't Just Automate, Orchestrate

TREND 7
Observability

TREND 8
API end-to-end monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 3: Cloud-based solutions testing

The most powerful impact of the pandemic has been on legacy organizations that hadn't yet made the move to the cloud. That made it hard for employees to work from home, especially in the manufacturing and financial service sectors. According to analytical data, Cloud spending rose 37% to \$29 billion during the first quarter of 2020.

This trend will persist in 2021, as the transition to virtual work underscores the urgency for scalable, secure, reliable, cost-effective off-premises technology.

Moving towards Cloud-based software development means that it is time to learn as much as possible about its testing.

Automation will be a crucial driver for this transition.

With the need for more automation, companies will begin using Cloud-hosted, Web, and mobile application automated testing platforms like Sauce Labs to run against all the different devices that customers are using to interact with them.



So you need to automate functional tests and non-functional testing, including:

- _ security testing;
- _ performance testing;
- _ accessibility testing;
- _ Chaos Engineering;
- _ penetration testing;
- _ robotic process automation (RPA).

Moving to the Cloud will also open the door for more Cloud-based automation tools and collaboration tools to embrace the culture of Agile development for remote teams.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 4: Cloud-based collaboration testing tools

Collaboration is an aspect that every organization strives to achieve and it does not come easy because it is highly tool-dependent.

Having all your digital automation assets living on the Cloud makes it easier for everyone to access and collaborate on automation in one central location. There is also an ability to create custom add-ons to share with your team rather than starting coding from scratch.

Here are some examples of such tools that will help your team in 2021:

[_Asana](#) is a cloud-based platform where all the members of your testing team can log in from anywhere, as long as they have a working internet connection. The dashboard has three panels that give you access to all the data related to your project.

[_Wrike](#) will help you to break your task into smaller fragments. Thus, the test lead can easily track each member's work progress and team contribution.

[_Jira](#) is a packaged tool that allows the user to create a task and assign them to the members of a testing team based on its priority.

[_Slack](#) allows users to segregate discussions into different categories based on the purpose or department.

[_Igloo](#) — Digital Workplace Solution that gives you the opportunity to create a customizable project. Access to that project can be made public or private.

[_Applitools' Ultrafast Visual Grid](#) farms out screenshot jobs to a grid of browsers in the Cloud.

[_TestProject.io](#) is a test platform that has made collaboration and community one of their firm's core principles. It provides having all digital automation assets living on the Cloud and makes it easier to collaborate on automation in one central location. There is also an ability to create custom add-ons to share with your team rather than starting coding from scratch.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
**AI-based software
assistance**

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 5: AI-based software assistance

When the world will customize to Cloud-based development, there will also be an increase in AI Cloud platforms like Amazon Web Services (AWS), Microsoft Azure, Google Cloud, and IBM Watson Cloud.

Although some want to ignore it and some embrace it, artificial intelligence for software testing is no longer a curiosity, but a necessity. Some specialists even say that this trend is topmost in 2021.

Almost 90% of respondents of World Quality Report 2021 claim that testing with AI and testing of AI are the biggest areas of growth planned in their organizations, and 80% intend to increase the number of AI-based trials and proofs of concept.

Smart, AI-powered techs like conversational artificial intelligence (AI) chat-bots or customer sentiment analysis, machine learning, and speech recognition technology can help the user experience.

So learning more about Qaops testing of chatbots, speech, and ML-powered software will be an advantage for you.

A QA test-specific example of this type of tech is **IBM Engineering Requirements Quality Assistant (RQA)**.

It can improve your requirements process by:

- _Reducing the cost of defects;
- _Reducing the cost of manual reviews;
- _Using the INCOSE Guide for Writing Requirements to help train junior engineers;
- _Speeding time to market by catching requirements errors early in the engineering process;
- _Leveraging Watson natural language processing to assess your requirements for quality.



↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 6: Don't Just Automate, Orchestrate

2021 shows the tendency of evolution from automation scripting to automation pipelines and continuous testing.

Many engineers make the mistake of thinking that because they have scripts, they're automated. But to be truly automated, every action needs to be automated and driven by your pipeline.

A CI/CD pipeline is a series of steps that must be performed in order to deliver a new version of the software. **Continuous integration/continuous delivery (CI/CD)** pipelines are a practice focused on improving software delivery using either a **DevOps** or **site reliability engineering (SRE)** approach.

QA specialists in 2021 should not only automate but orchestrate the pipeline. This is critical. By automating and creating reusable objects, you can get to the point of using your pipeline as a service. Imagine reusing this particular pipeline for every application within your process, so you could have hundreds, even thousands, all using this pipeline and all these objects underneath that are all reusable objects. It's a pretty picture, isn't it?

The steps that form a CI/CD pipeline are distinct subsets of tasks grouped into what is known as a pipeline stage. Typical pipeline stages include:

_Build — The stage where the application is compiled.

_Test — The stage where code is tested. Automation here can save both time and effort.

_Release — The stage where the application is delivered to the repository.

_Deploy — In this stage code is deployed to production.

_Validation and compliance — The steps to validate a build are determined by the needs of your organization. Image security scanning tools, like **Clair**, can ensure the quality of images by comparing them to known **vulnerabilities (CVEs)**.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7 Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 7: Observability

Observability is often explained in terms of control theory, as understanding the state of a system only through its outputs. Others explain it as being built for unknown unknowns. The most practical definition is that observability allows you to connect effects with causes across many different services, domains, and scales.

It's well known that organizations of all shapes and sizes are investing in DevOps-driven, agile development methodologies in the hopes of driving faster release cycles and delivering higher-quality software to their customers.

For years, the focus was on execution: make sure the firewall works; make sure the servers are backed up, etc. But as implementations matured, organizations shifted their focus beyond mere execution and began prioritizing observability — that is, the ability to see, in real-time, what's happening, where the potential risks lie, and how to mitigate those risks proactively.

Observability isn't a tool and it isn't telemetry; it's an approach to having an accurate and fact-based model of application behavior to inform human decision-making.

In other words, having an observable system means you have the instrumentation you need to understand what's happening in your software.

Observability focuses on developing the application to have the rich instrumentation you'll need, not to poll and check it for thresholds or defined health checks, but to ask any arbitrary question about how the software works.

You can't predict what information you're going to need to know to answer a question you also couldn't predict.

Using a tool like the new **Selenium Grid** should help get you real-world, hands-on experience with it.

Another good tool for continuous, preproduction observability is **Deep Factor**. It observes billions of application events at runtime. This tool provides security performance and behavior visibility integrated into your CI/CD pipeline to find and fix runtime security, compliance, and behavior risks in custom and 3rd party code within DevOps pipelines.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
**API end-to-end
monitoring**

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 8: API end-to-end monitoring

This year, that trend will continue and expand into needing to understand how to automate an API test and leverage it for monitoring purposes.

If you provide an **API**, it is your responsibility to **monitor** it for uptime, performance, and function.

Because one API can affect so many applications/components, changing or deprecating that API can cause widespread failures that you may not be able to predict, particularly if that API has been made public. Once you've made your API available to other developers, either in a controlled fashion to trusted partners or in a public way to anyone with a developer/production key, you take on a responsibility to ensure that nothing affects the API's performance. Factors like server load, the amount of data coming down (you always want paged results, for example), level of encryption, the quality of the controller code, etc., all affect the quality of the API and its performance.

Of course, you should test all of that before putting your API into production, but just like any other important feature, you should also monitor those factors after you deploy. It's when your customers are banging on it in new and different ways that problems surface.

Sauce Labs recently acquired the **API Fortress** tool. It provides Continuous API testing and monitoring that unifies functional, integration, and load testing across internal, partner, and third-party APIs.



↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9 AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 9: AI Data tools

Machine Learning (ML) and Artificial Intelligence (AI) are spreading across various industries, and most enterprises have started actively investing in these technologies. With the expansion of volume as well as the complexity of data, ML and AI are widely recommended for their analysis and processing.

The artificial intelligence global market is expected to reach \$190 billion by 2025. The bright future of this technology allures every entrepreneur. In fact, when we think about the technologies that are going to rule in the future, the one name that comes to our minds is — Artificial intelligence.

All this Cloud-based activity, automation script logs/report/results, and observability produce a ton of data.

How to deal with it?

In 2021 we will see more QA/automation engineers using tools and languages that work efficiently with AI and data like **R**, **Python**, and **Apache Spark**.



Python is the favorite language for software developers to create applications that have artificial intelligence, machine learning, etc features embedded in them.

It is flexible, stable, and includes predefined libraries & frameworks. This language possesses the features to build dynamic, complex, and competitive AI-enabled apps.

TIOBE index named it the top programming language of 2020.

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

**TREND 10
Playwright**

CONCLUSION

ABOUT QATestLab

REFERENCES

TREND 10: Playwright

To 10th TREND it becomes obvious that testers in 2021 are pushed to create software very fast, but with quality both the need. To do that, you need a way to validate your code without slowing down the development process. And that is the reason why headless testing which is faster and easier to execute has become more popular.

Services that may facilitate automation inevitably become popular. One of them is **Microsoft Playwright**.

Arjun Attam, the program manager on the Playwright JS team at Microsoft, says that they created Playwright explicitly for the web automation space.

Microsoft Playwright JS is an open-source, JavaScript-based, cross-browser automation library for end-to-end testing. It allows automating **Chromium**, **Firefox**, and **WebKit** with a single API. The Playwright is built to enable cross-browser web automation that is ever-green, capable, reliable, and fast.

What end-to-end tests are for? They control the browser and imitate user actions. For example, you have described custom scripts and want them to be tested with every version of the product. Checking all scenarios for all versions manually is more expensive and longer than automatically.

In 2020 Testim introduced **Playground**, which is a free recorder for Puppeteer or Playwright to create UI tests as code.

Checkly also has a headless recorder Chrome extension for recording browser interaction and generating Puppeteer and Playwright scripts.



↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

CONCLUSION

The key direction for 2021 in automation is in searching for a balance between manual testing and automated testing. After all, autotests allow you to carry out more checks, but they are not able to identify unpredictable defects.

Despite the challenges, IT professionals increasingly understand the role of this service for their businesses and strive to create reliable and stable automation solutions. And this is impossible without a comprehensive understanding of the possibilities, and most importantly, the trends in this area.

We hope that this research paper will be useful for those who are just thinking about introducing automated tests into the production process, as well as for those who are already testing products in this way and will be able to get new ideas for themselves, as well as determine the vector for further development.



↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

ABOUT QATESTLAB

QATestLab is a leading software testing provider with more than 15 years of experience.

It helps companies and product owners assess the quality of their software to ensure a great customer experience and profitability.

With more than 250 QA engineers skilled in mobile app and web end-to-end testing, QATestLab can cover all the testing needs.

We test, automate, consult, and provide a test lab of 350+ real devices.

QATestLab helps to verify the quality of mobile apps by:

- _Implementing the automation testing processes;
- _Checking the performance of the existing and added functionality;
- _Assessing the compatibility of the app with various devices and third-party systems;
- _Testing if the app is user-friendly;
- _Detecting security vulnerabilities;
- _Performing and assisting with mobile test automation.

**CONTACT US TO START THE
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E-mail: contact@qa-testlab.com

Twitter: [QATestLab](#)

Website: qatestlab.com

↓ Click the section
to jump ahead

INTRODUCTION

TREND 1
More and even more
automation

TREND 2
Accessibility testing

TREND 3
Cloud-based solutions
testing

TREND 4
Cloud-based
collaboration testing
tools

TREND 5
AI-based software
assistance

TREND 6
Don't Just Automate,
Orchestrate

TREND 7
Observability

TREND 8
API end-to-end
monitoring

TREND 9
AI Data tools

TREND 10
Playwright

CONCLUSION

ABOUT QATestLab

REFERENCES

REFERENCES

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