

Qualysoft

WHITEPAPER

# DEVOPS TESTING



ENSURE THE QUALITY OF CODE

AND THE FUNCTIONALITY OF THE SOFTWARE



# Testing in DevOps

Ensure the quality of code and the functionality of the software, at each phase of the development lifecycle.

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## Intro

Testing is important for software development and operations (DevOps) for sustaining its primary role, bringing together the previously separated functions of Dev and Ops. As we know, DevOps delivers major and simultaneous benefits of improved efficiency, quality, and employee satisfaction.

DevOps testing is important because „testing early, often, and at each stage of the software development lifecycle“ are prerequisites for „quick and reliable releases“. It’s a culture where software developers, testers, and operation engineers work together to add value to the product, enhance its quality, and sustain faster delivery. DevTestOps ensures continuous feedback about application issues from testers to developers during all the stages of product development. This reduces the business risks and the possibility of finding defects at later stages.

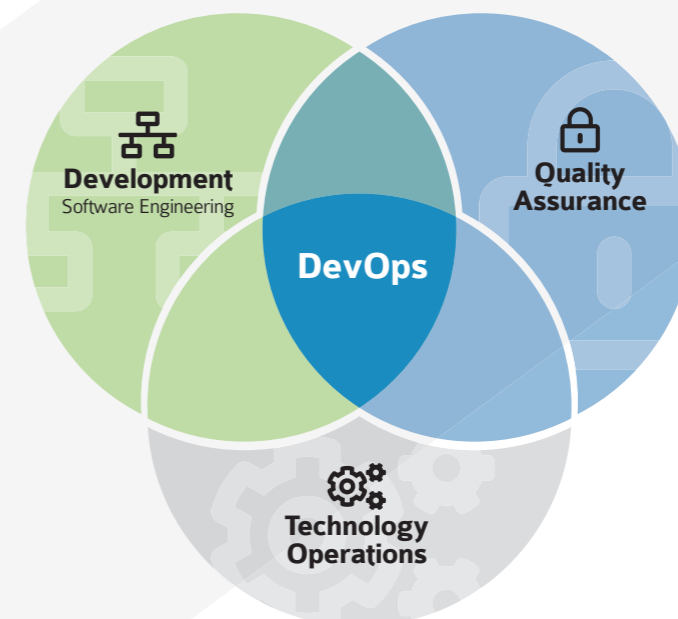
The old idea of independent QA teams doing most of the testing after development but before release doesn’t work in DevOps. In cross-functional teams, everyone is responsible for the quality of the entire product.

To be successful in Dev, QA, or Ops roles, you must understand continuous testing and DevOps test engineering best practices. Without this knowledge, local optimizations may fall short of an effective end-to-end continuous delivery pipeline.

## What Is Testing in DevOps?

DevOps is a software engineering culture and practice that aims at unifying software development (Dev) and software operations (Ops). DevOps is a mix of tools and practices that increase the ability to deliver products smoother, quicker, and bug-free.

Gartner describes DevOps as „a change in IT culture, focusing on rapid IT service delivery through the adoption of agile, lean practices in the context of a system-oriented approach. DevOps emphasizes people (and culture) and seeks to improve collaboration between development, operations, and quality assurance teams.“



## So, what is testing in DevOps?

It involves a DevOps testing environment by using specific practices and tools. Traditional testing tools may cause bottlenecks and delay development timelines in DevOps development cycles, which are faster and shorter. Therefore, DevOps testing requires automation tools that can automate testing and management of testing.



The goal is to speed up software delivery, reduce costs, and minimize the complexity of managing testing requirements. Automated testing technology is created to automate the management and tracking of both manual and automated tests. It allows testing to be performed at the same fast speed as DevOps software development.

## Automated Testing and DevOps Facts



Here are just three examples that demonstrate the value of automated testing in DevOps.

- Eliminating silos among development, testing & operations, allowed NETFLIX to deploy codes to production 1000 times per day.

(Source: Article - How we Built Continuous Delivery at Netflix by Dave Hahn and Andrew Spyker)

- Automated testing can save organizations significant amounts of time and money. A company with 100 developers can save up to \$1.2 million annually by adopting DevOps practices and automating its testing process.

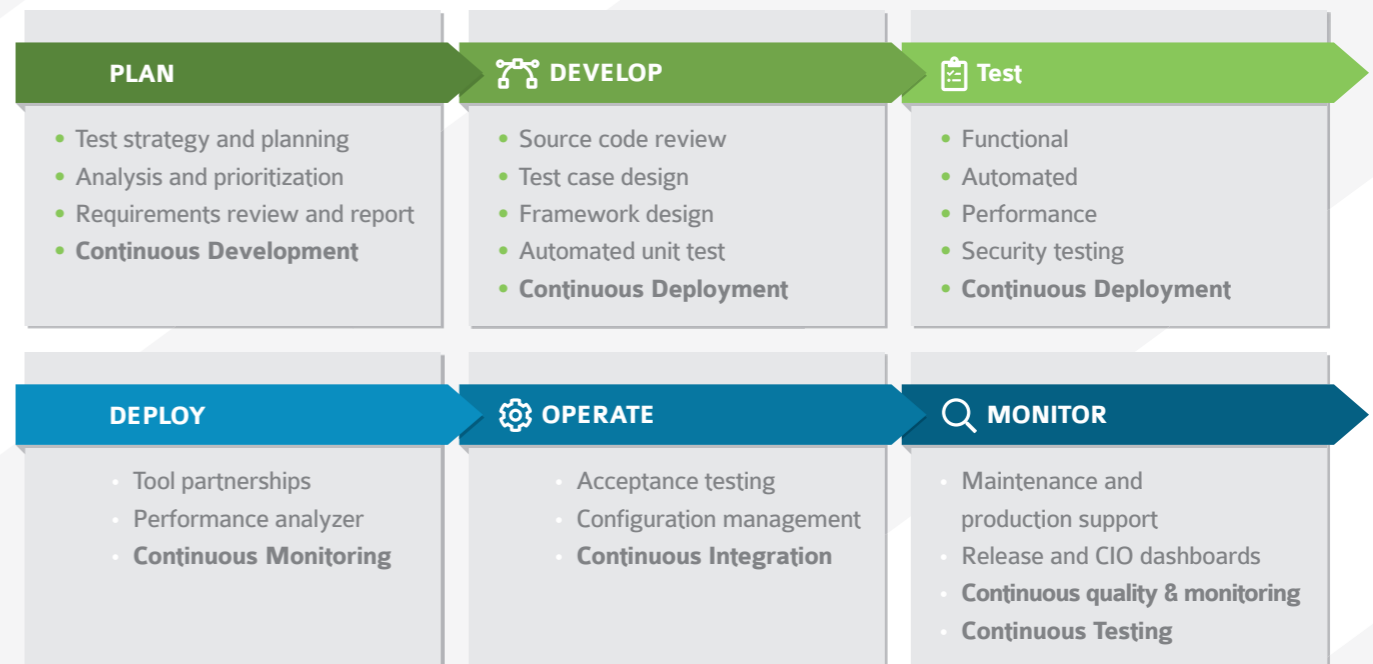
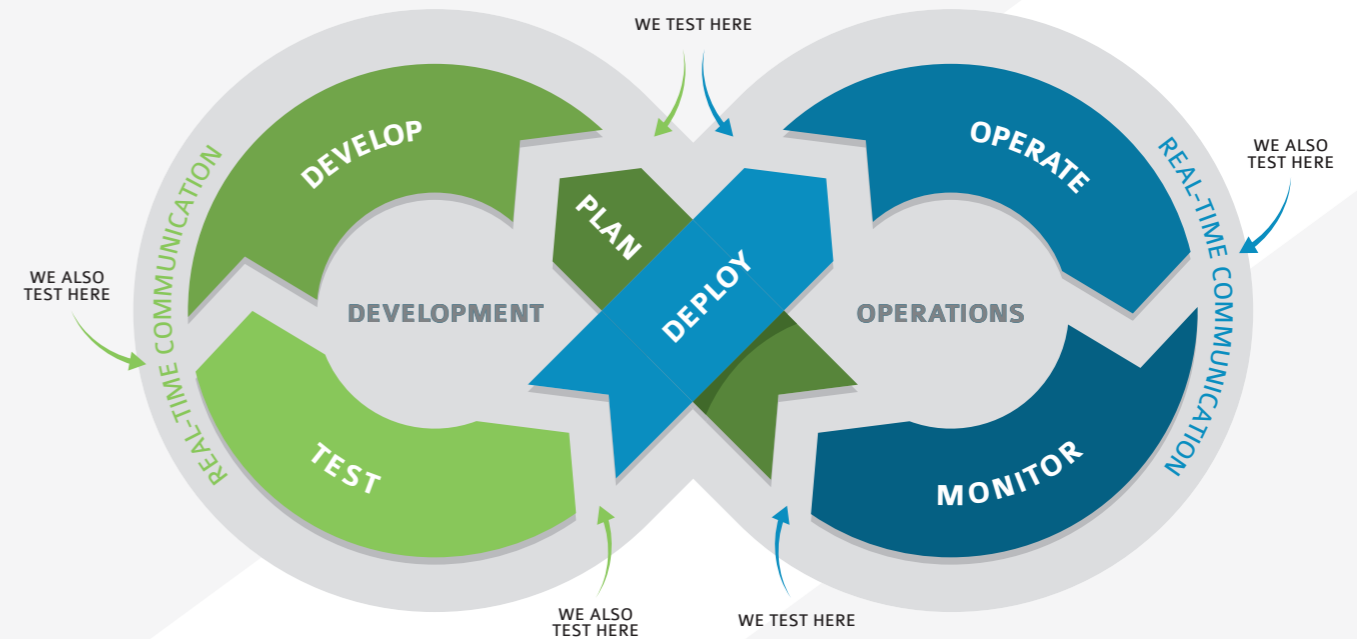
(Source: Article by Capgemini World Quality Report 2021)

- The use of automated testing in DevOps can also improve software quality and reduce the risk of defects. According to a report by Tricentis, organizations that have adopted DevOps and automated their testing process report a 90% reduction in the number of critical and major defects in their software.

(Source: Tricentis Continuous Testing Report 2020)

## How Does Testing in DevOps Work?

Testing in DevOps involves breaking down the traditional siloes between development, QA, and operations teams. Testing is no longer a separate activity that happens after development. Instead, it's aligned with development, creating a faster feedback loop. This allows each team to see how their work affects the whole delivery cycle.



The „DevTestOps“ manifesto was created to guide testing in DevOps teams, which incorporates the agile methodology and the agile manifesto. **It outlines the principles for testing software thoroughly and at scale:**

- ✓ Continuous testing over testing at the end of the cycle
- ✓ Product coverage over code coverage
- ✓ Embracing all testing activities over automating everything
- ✓ Testing what gives value, based on customer usage, over testing everything
- ✓ A whole team approach to testing is preferred compared to testing in siloed testing departments

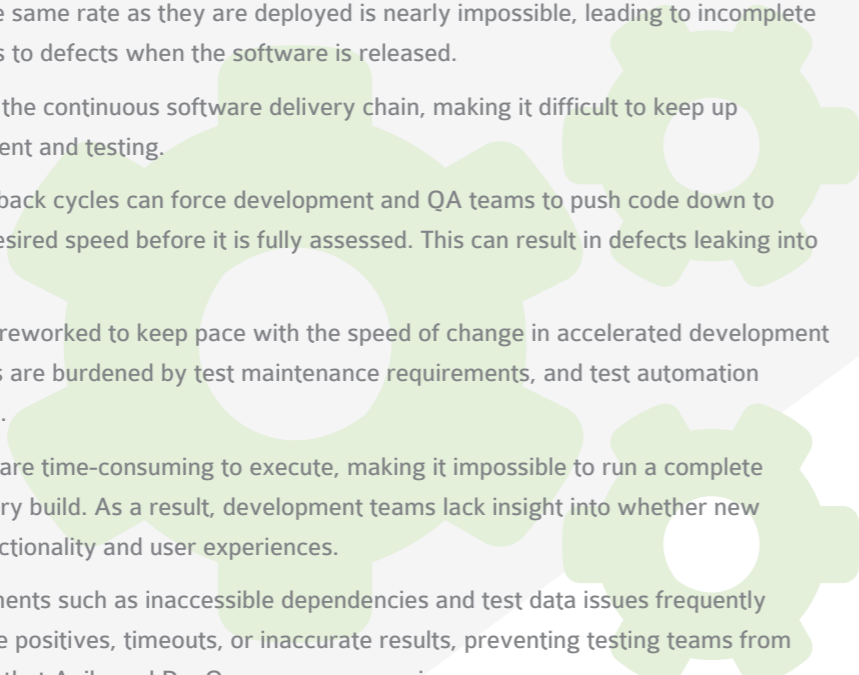


By leveraging these DevTestOps practices, teams can ensure regular deployments with minimal disruptions, as well as greater visibility into the state of software development, leading to higher product quality.

### Challenges That Arise in DevOps Testing

Many organizations have adopted Agile and DevOps, but few have automated their testing technology. This means that their DevOps testing processes and tools remain outdated, even as they invest heavily in technology to transform their development processes. Multiple challenges can surface when trying to incorporate testing into DevOps.

1. Testing code and fixes at the same rate as they are deployed is nearly impossible, leading to incomplete or rushed testing. That leads to defects when the software is released.
2. QA teams can fall behind in the continuous software delivery chain, making it difficult to keep up with the speed of development and testing.
3. Long and conventional feedback cycles can force development and QA teams to push code down to production to achieve the desired speed before it is fully assessed. This can result in defects leaking into the software.
4. UI tests must be frequently reworked to keep pace with the speed of change in accelerated development timelines. As a result, teams are burdened by test maintenance requirements, and test automation efforts are often abandoned.
5. Traditional testing solutions are time-consuming to execute, making it impossible to run a complete regression test suite for every build. As a result, development teams lack insight into whether new changes impact existing functionality and user experiences.
6. Instability and test environments such as inaccessible dependencies and test data issues frequently cause incomplete tests, false positives, timeouts, or inaccurate results, preventing testing teams from delivering the fast feedback that Agile and DevOps processes require.



**Automated testing is essential for integrating QA into the DevOps workflow.** Without effective automated testing, streamlining processes across the CI/CD pipeline will be challenging. Automated testing is, therefore, a critical driver of DevOps success.

### Setting Up Test Automation

**Test automation** involves executing automated tests throughout the software delivery pipeline to quickly assess business risks associated with each candidate for the software release. **It solves the challenges of fast-paced development and delivery by:**

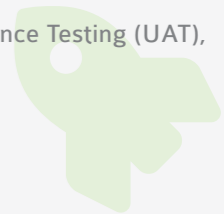
- ✓ Focusing on risk assessment to determine whether a release candidate is too risky to proceed through the delivery pipeline.
- ✓ Emphasizing the user experience to protect it in accelerated development processes.
- ✓ Seamlessly integrating testing into the software delivery pipeline and DevOps toolchain.
- ✓ Including end-to-end testing that assesses the end-user experience across all technologies.
- ✓ Reducing false positives with modern test frameworks.
- ✓ Continuously reviewing and optimizing the test suite to eliminate redundancy and maximize risk coverage.



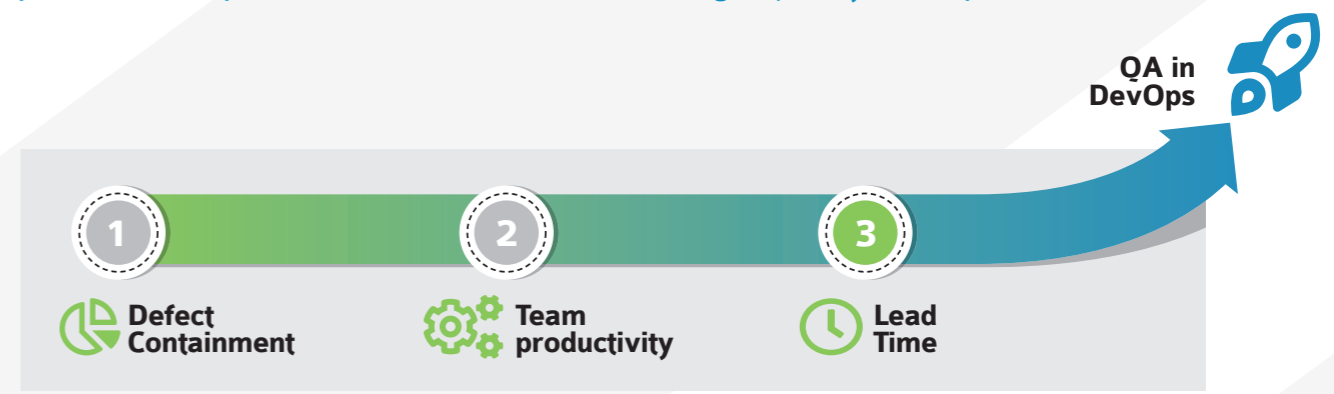
### Getting Quality Assurance (QA) started with DevOps

If you're looking to get QA started with DevOps in your organization, here are three metrics you can measure to kick-start the process:

- ✓ **Defect containment** - Aim to log a maximum of 95% of defects in QA, User Acceptance Testing (UAT), and production.
- ✓ **Team productivity** - Keep the backlog reworks to a maximum of 10%.
- ✓ **Lead time** - Aim to push code to production every day.



**By focusing on these metrics, you can set up continuous integration, continuous testing, and continuous feedback processes that help teams build better software faster, making the journey of DevOps worthwhile.**





## DevOps Testing Strategy

It involves a DevOps testing environment by using specific practices and tools. Traditional testing tools may cause bottlenecks and delay development timelines in DevOps development cycles, which are faster and shorter. Therefore, DevOps testing requires automation tools that can automate testing and management of testing.

### 1 AUTOMATE USER BEHAVIOR, NOT JUST TEST CASES

To prevent problems in production, it's better to focus on automating user behavior rather than just test cases. This can be achieved by using **Test-Driven Development (TDD)** or **Behavior-Driven Development (BDD)** which can help to increase the quality of testing and the amount of code covered by tests. It can also promote collaboration among teams.

### 2 OPTIMIZE THE TEST ENVIRONMENT

Along with the right automation test scripts, an **optimized test environment is vital**, including user conditions, relevant test data, and handling varying peak times, product requirements, etc. This helps identify and mitigate quality issues early in the process.

### 3 ANALYZE CRITICAL TEST DATA

Analyzing vast amounts of test data is essential to identify patterns, trends, and root causes of issues to make informed decisions.

### 4 MEASURE CONTINUOUSLY

Continuous measurement of Key Performance Indicators (KPIs) related to software quality is crucial for DevOps maturity. Some of the KPIs include identifying defects by phase, stage, cause, functionality, trend, percentage of defects escaped to production, manual vs. automated testing defects, and tracing flaky test trends.

## Best DevOps Testing Practices

To implement an efficient testing process in the DevOps structure, here are a few tips:

### USE SMART AUTOMATION

Focus on finding automatable tests to help prevent defects in production. Tests like usability and post-deployment may be better tested manually.

### ADOPT AGILE ITERATION

Concentrate on fast iterations among teams to enable continuous delivery. Smaller and more agile developments allow thorough testing and faster deployments.

### ESTABLISH DEVOPS METRICS AND DOCUMENTATION

Establish clear metrics and documentation to ensure transparency and enable decision-making. Without proper documentation, it's hard to review and understand what's working in the DevOps structure.

### AUTOMATE END-TO-END

Automation is critical to driving release velocity and is a key step in implementing the type of testing that delivers higher-quality software faster.

### LEAVE ROOM FOR MANUAL TESTING

Certain bugs will be more easily found through manual and exploratory testing. Other scenarios don't lend themselves easily to automated testing.

### BUILD INDEPENDENT TEST CASES

By creating independent and self-contained test cases, it's easier to reuse them and execute them across different environments.

## Benefits of Testing in DevOps

1. **Early defects and bug detection:** Testing in DevOps enables teams to detect defects early in the development process. This means that issues can be addressed and resolved more quickly, reducing the risk of delays and other problems down the line.
2. **Accelerated time-to-market:** By integrating testing into the DevOps process, teams can deliver software faster and more frequently. This enables organizations to respond to changing market conditions more quickly and stay ahead of the competition.
3. **Improved collaboration:** DevOps testing requires close collaboration between development, testing, and operations teams. This collaboration helps to ensure that everyone is aligned on goals, timelines, and priorities, and can work together more effectively to deliver high-quality software.
4. **Increased efficiency:** By automating testing tasks and integrating them into the DevOps process, teams can improve efficiency and reduce the time and effort required to complete testing. This can help reduce costs, improve productivity, and deliver better outcomes.

## DevOps Testing Tools from Tricentis

Tricentis is a platform for continuous testing that offers solutions based on automation, codeless testing, and an AI-driven approach. The benefits are the following:

- ✓ **Enterprise-grade automation:** Achieve end-to-end test automation across any architecture or application stack at scale.
- ✓ **Codeless testing:** Automate testing with an AI-driven and model-based approach, while eliminating maintenance headaches.
- ✓ **End-to-end visibility:** Get complete visibility across all tools in the software delivery lifecycle, with centralized reporting to accelerate remediation.
- ✓ **Tools for the full testing lifecycle:** Collaborate between developers, testers, and business users on a common set of test cases, plans, data, and artifacts.
- ✓ **AI-powered solutions:** Test smarter and faster with advanced ML technologies such as Vision AI, Self-healing AI, and Risk AI to reduce the business risk of application changes.
- ✓ **Traceability:** Benefit from complete traceability and coverage of business requirements to production deployments with best-in-class tools, JIRA testing tools, and DevOps ecosystem integrations.
- ✓ **An open platform:** Get extensive support and orchestration of a broad range of open-source and commercial technologies.
- ✓ **Real-time analytics:** Gain visibility and insights into all testing activities from a central location.
- ✓ **Solutions for data integrity testing, smart impact analysis, performance testing, ServiceNow testing, and Salesforce test automation** are also provided.

## How to Get Started with DevOps Testing?

To get started with DevOps testing, it's important to understand that DevOps testing is more than just automating tests or integrating tools into the continuous delivery toolchain:

- ✓ Bring to the table a **DevOps test consultant** and a **DevOps test architect** to assess your current testing practices and define a recommended solution roadmap.
- ✓ The solution roadmap should **define a test strategy for the product**, including **test coverage, test creation, test execution, and metrics for monitoring performance**.
- ✓ **Select a pilot application** and implement test infrastructure, frameworks, and tools according to the solution roadmap.
- ✓ **Train cross-functional team members** on test creation methodologies and tools.
- ✓ After a successful pilot project, **expand the implementation** to more teams and applications.
- ✓ **Monitor progress** and **establish continuous improvement procedures** to refine your DevOps testing practices.

## Streamline your DevTestOps with Qalysoft

To it sum up, **DevTestOps improves the release cycles and streamlines product deliveries as requested by market and user requirements, with the best use of automation. At the same time, you don't have to make any compromise on quality, expenses, or any other dimension that facilitates product success.**

Regardless of how far you are towards implementing a DevOps culture within your company, adopting a targeted approach like the DevTestOps model can provide significant benefits. **But the success of DevTestOps depends on the quality of automation practices in the organization.** We enable even the biggest enterprises to automate the provisioning of environments and ease the process of deployments, configurations, monitoring, and testing.

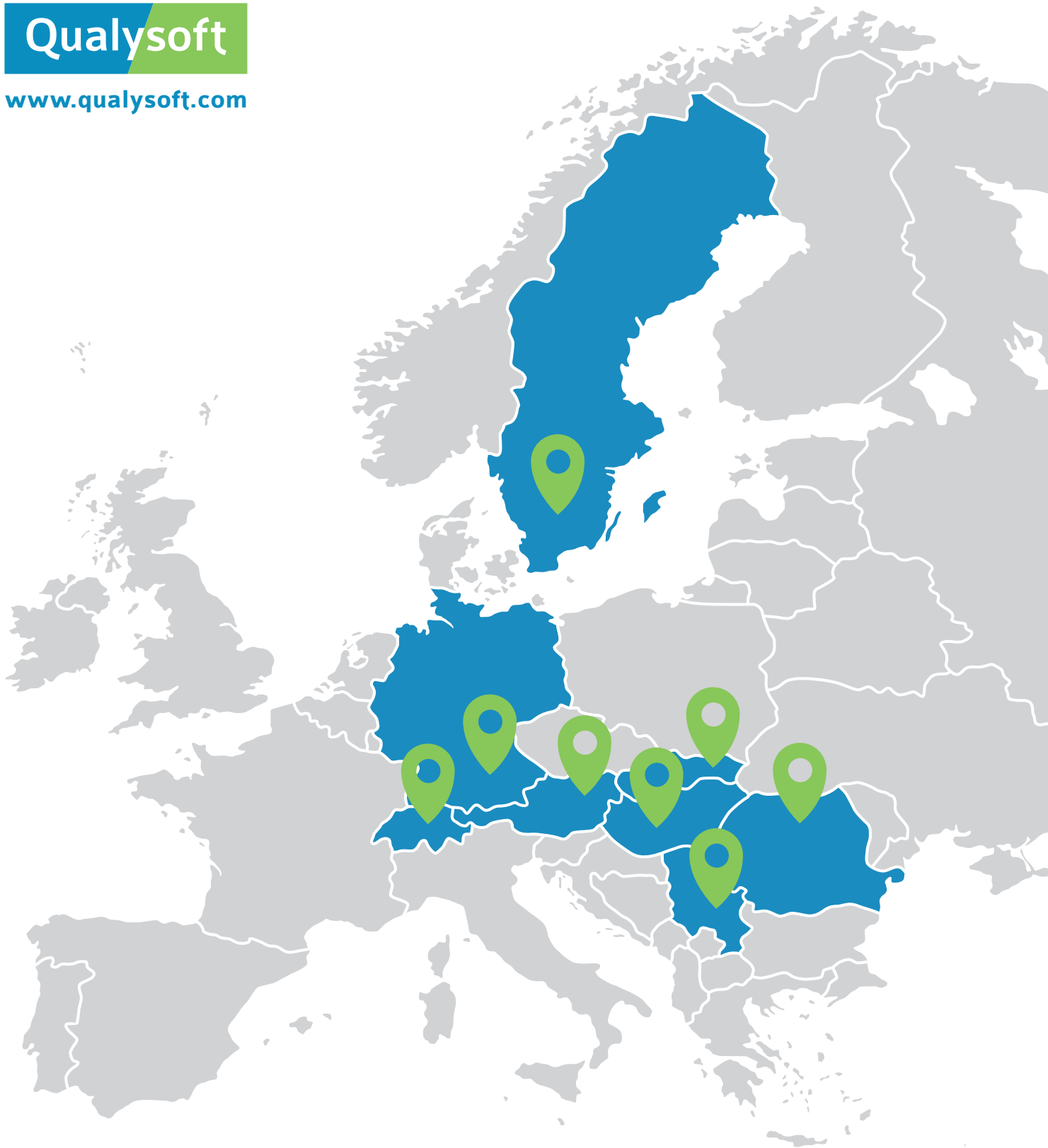
Therefore, one of the most important pieces of the puzzle is having expert guidance during the DevTestOps journey, including up-to-date knowledge of proven best practices and how to leverage tools for automated testing like Tricentis Tosca, Ranorex, or Selenium. **Qalysoft provides you with both technical and industry expertise, along with all the advantages of having a single testing platform for all your continuous testing.**



Get our experts to help you at every step of your **Software Development Life Cycle (SDLC).**

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