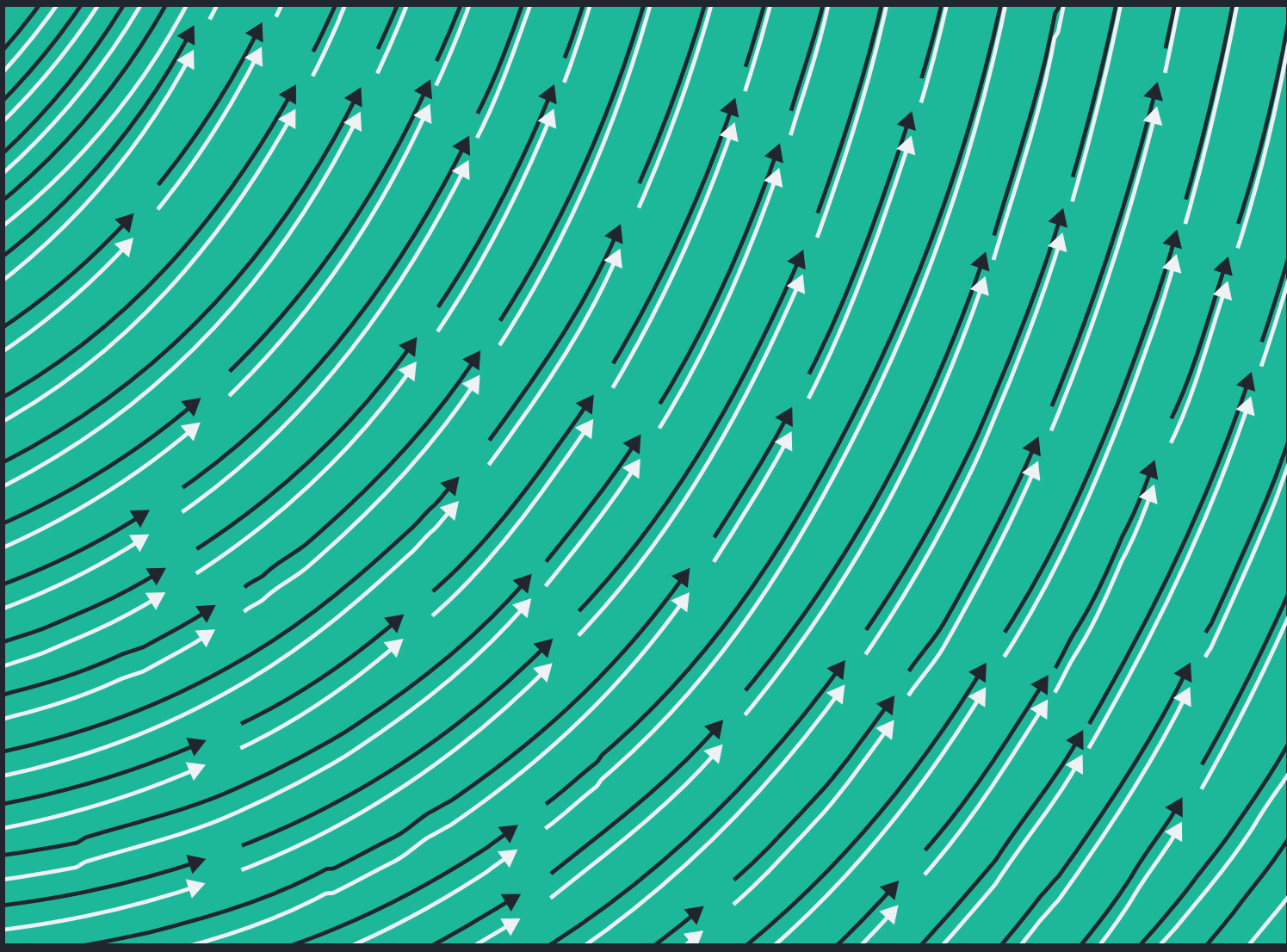
# Accelerate Your Digital Transformation with Continuous API Testing



Continuously Improve DevOps, Agile Development, and CI/CD Pipelines with Continuous API Testing

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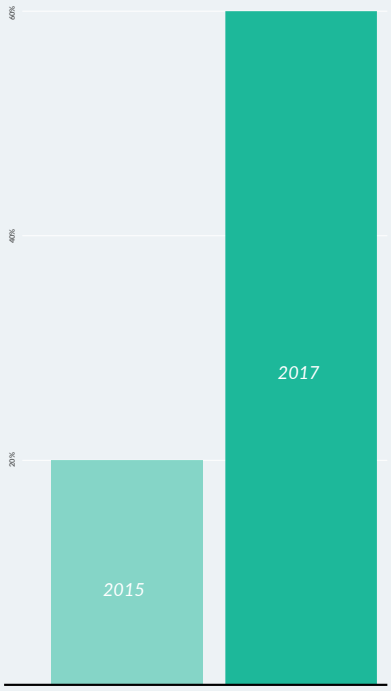
# Contents

# Executive Summary

## Companies are being pushed to transform and innovate faster than ever.

The need to stay ahead of new startups and technologies is leading to a mass shift in how work is done. This is best evidenced by the 36 percent spike from 2015 to 2017 in the adoption of Agile Development at enterprises according to Forrester. This has signaled a "critical mass realization" of the need for immediate digital transformation. CIO senior writer, Clint Boulton, states, "Digital transformation [can be defined] as a euphemism for [a CIO's] modernization efforts: moving from legacy architectures, on-premises systems and waterfall development to API-driven microservices, the cloud and agile[1]."




*Widespread Adoption of Agile Development*

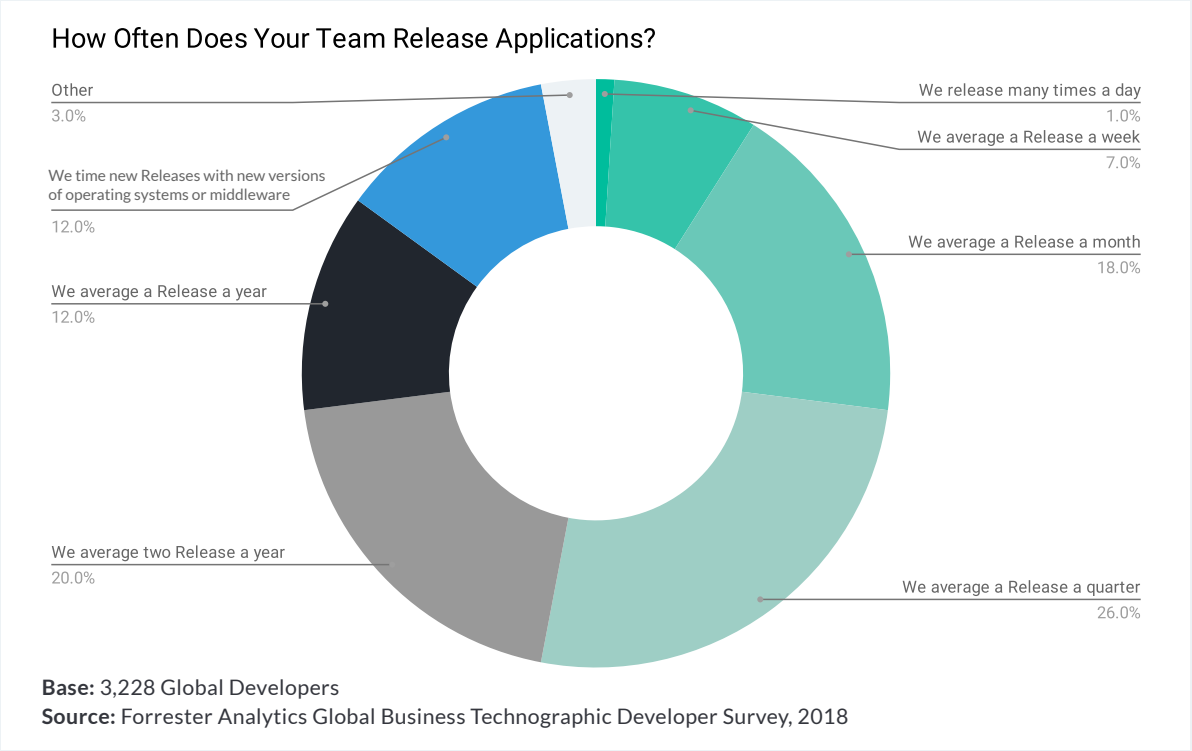
At the heart of digital transformation is speed—the acceleration of release cycles for software features and APIs. With faster releases, developers can plan and build digital products in a nimble fashion that responds more promptly to constantly changing business cases. After all, customer preferences and loyalties are less stable than ever, and innovative competitors can disrupt instantly.

The potential ROI of increasing release speed and being first-to-market is captured in a Forrester analysis of the potential revenue impact of improving customer experience (CX). Improvements of just one point in the Forrester CX Index Score could translate into annual revenue growth as high as $873 million for automakers, $332 million for hotels, $244 million

[1]Boulton, Clint. (2018, Dec 11). CIO.com. "What is digital transformation? A necessary disruption". https://www.cio.com/article/3211428/digital-transformation/what-is-digital-transformation-a-necessary-disruption.html

for retailers, $124 million for banks, and more[2]. Additionally, many enterprises benefit immensely from internal APIs that help to modernize and improve collaboration, productivity and innovation.

While the benefits of digital transformation may connect with business leaders, **many development teams continue to schedule releases only a few times per year.**




**Base:** 3,228 Global Developers
**Source:** Forrester Analytics Global Business Technographic Developer Survey, 2018

***A Majority of Software Development Teams Still Release Less Than Four Times a Year***

In this brief, learn about the key challenge that holds many enterprises back from fully activating their Agile Development. Also, gain an introduction to continuous API testing and continuous API quality, and learn how they are fueling faster digital transformation at large enterprises and technology consulting services providers. By instituting the right methods for an Agile + DevOps workflow, organizations can deliver on the promise to "innovate faster."

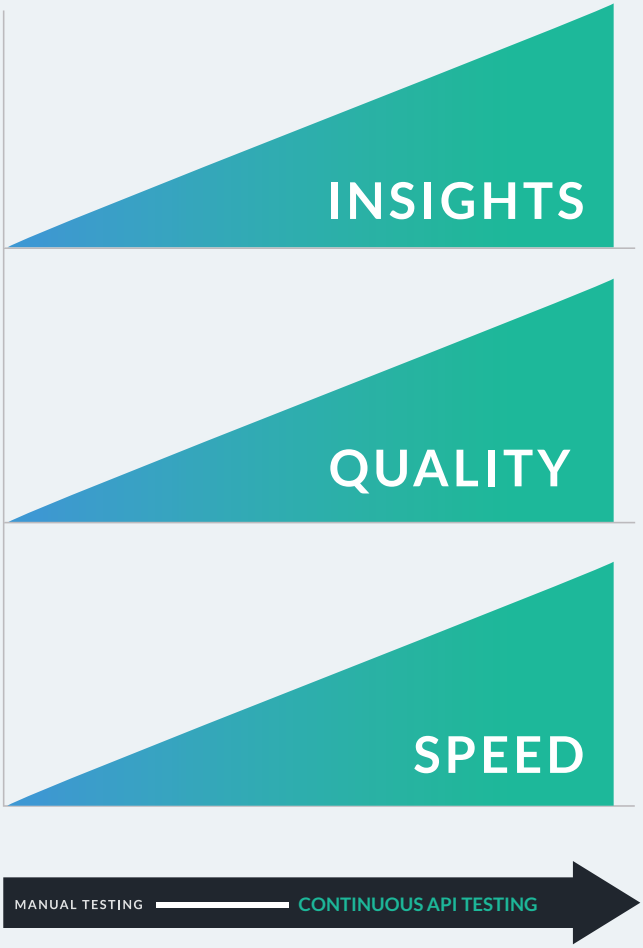
[2]Forrester (2018). "Make The Case For Agile And DevOps-Driven Digital Transformation." https://www.forrester.com/report/Make+The+Case+For+Agile+And+DevOpsDriven+Digital+Transformation/-/E-RES115535?objec-tid=RES115535

# Quality-At-Speed

## Agile Development is inextricably linked to DevOps.

While Agile Development solves the challenges of compressing waterfall processes into agile sprints, DevOps solves many of the headaches in orchestrating teams to work in agile sprints.

At the onset of Agile + DevOps, developers and QA teams run into the pivotal challenge of digital transformation: **maintain software quality while increasing delivery speed**. Until the quality-at-speed challenge is solved, your Agile + DevOps process must be continually improved upon. Strategies to overcome the quality-at-speed challenge require instant feedback from sprint teams based on accurate and granular metrics. Formerly, developers and QA testers would work in silos using their own software and workflows. Not much seemed to be wrong with that paradigm; products were planned in discrete waterfall phases with ideation leading to builds and then testing. However, with release cycles shrinking from quarterly (or longer) periods, to the rapid SCRUM sprints of Agile Development, all stakeholders involved in product development must be able to collaborate seamlessly. **That means silos must be eliminated to allow for continual feedback loops and metrics that reveal a complete picture of the development lifecycle.**

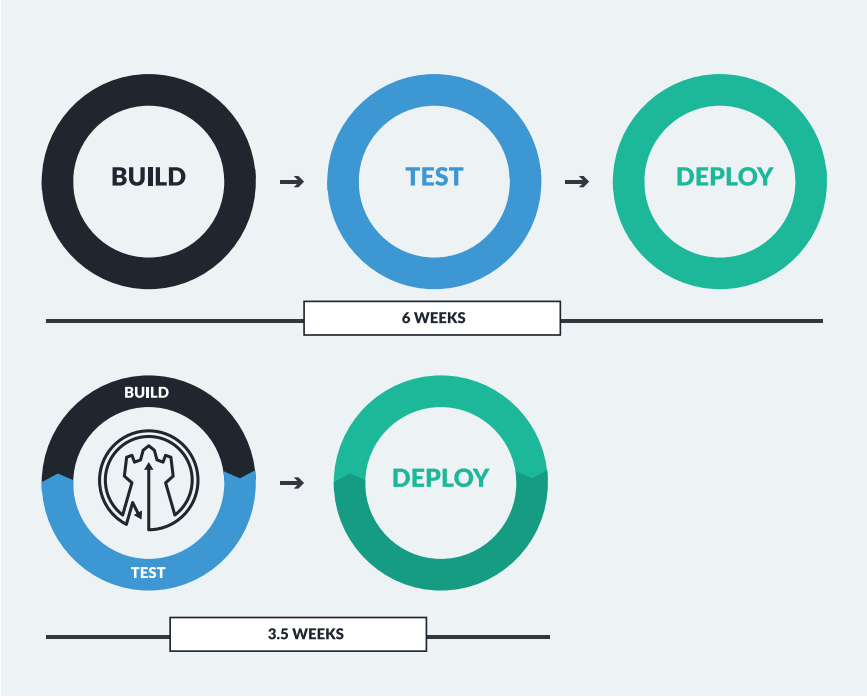



**In a study from Forrester,** "The Definitive Software Quality Metrics for Agile + DevOps" (featured on DZone[3]), the firm identified several important characteristics of enterprises running successful Agile + DevOps initiatives:

- Transform software testing into continuous testing by adopting core practices that include automating end-to-end functional testing
- Integrate QA testers into cross-functional teams
- Automate software quality processes as a "critical business differentiator"
- Implement automation for key testing and QA processes, such as test case design, functional test automation, test data management, and more.

The same study recommends that enterprises should "shift testing left [earlier in the development lifecycle] by using the API foundation of modular coding practices. Manual testing can't keep up with the pace at which modern organizations need to move."

By moving testing left, the discrete waterfall phases of build and test transform into a parallel process. **Instead of building APIs and then testing them, QAs can mock APIs in parallel with developers building them**, and create end-to-end tests before those APIs are released. This method of parallel development and QA leads to accelerating release speeds without increasing risk.




[3]Dunlop, Cynthia. (2018, Aug. 08). DZone | DevOps Zone. "Forrester Study: Continuous Testing Separates DevOps Leaders From Laggards" https://dzone.com/articles/forrester-study-continuous-testing-separates-devop-1

# The Journey to Continuous API Testing

**In 2018, the United States Postal Service (USPS) was caught exposing the private data of 60 million users due to an API flaw.**

Security expert, Brian Krebs, noted:

> *In addition to exposing near real-time data about packages and mail being sent by USPS commercial customers, the flaw let any logged-in usps.com user query the system for account details belonging to any other users, such as email address, username, user ID, account number, street address, phone number, authorized users, mailing campaign data and other information*[4].

[4]Krebs, Brian. (2018, Nov. 21). "USPS Site Exposed Data on 60 Million Users." https://krebsonsecurity.com/2018/11/usps-site-exposed-data-on-60-million-users

The flaw was not the result of a massive security issue at the USPS. It was, simply, a functional issue.

> *Many of the [USPS] API's features accepted 'wildcard' search parameters, meaning they could be made to return all records for a given data set without the need to search for specific terms. No special hacking tools were needed to pull this data.*

A hacker did not exploit an exotic vulnerability. The API was simply released with an extremely harmful error that was quickly found. A basic functional test to examine wildcard searches, and to confirm that results match the API request would have caught this vulnerability.

The new reality that almost every modern app is a composite app only exacerbates the API flaws that are at the root of the quality-at-speed challenge. In the Forrester report, "Build The Right Software Better And Faster With Agile And DevOps Metrics," the analysts describe composite apps as:

> *Complex networks of applications and services that communicate with one another to provide customer experiences. All the parts need to come together for customers to benefit, but all the parts are developed and delivered at different speeds. While Agile and DevOps practices help delivery teams be responsive, [development] leaders and stakeholders struggle to understand release health and status for composite applications*[5].

With the services in composite apps using APIs for integration, it is only through API testing that enterprises can sufficiently understand the release health of composite apps. According to MarketsandMarkets™, today's global API testing market size is forecast to grow from $384 million to $1.1 billion by 2022.[6] As enterprises increasingly embrace the new paradigm of Agile + DevOps + API Testing, concerns rise about how to migrate from manual testing and unit testing to advanced API testing automation.

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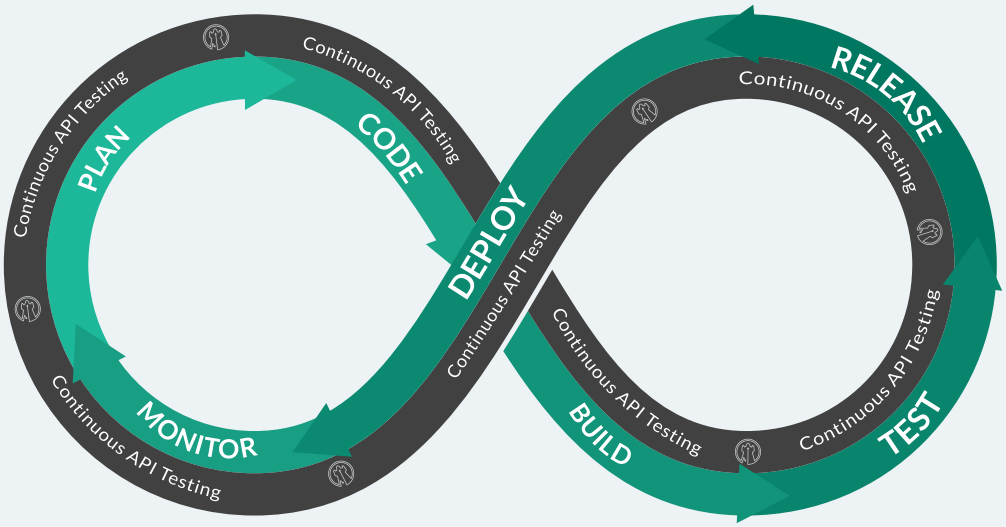
[5]Giudice, Diego, et al. (2018, Nov. 29). Forrester. "Build The Right Software Better And Faster With Agile And DevOps Metrics." https://www.forrester.com/report/Build+The+Right+Software+Better+And+Faster+With+Agile+And+DevOps+Metrics/-/E-RES117742#figure3

[6]MarketsandMarkets™. (2016). "API Testing Market by Component (API Testing Software/Tools and API Testing Services), Deployment Type (Cloud Based and On-Premises), Vertical, and Region - Global Forecast to 2022". https://www.marketsandmarkets.com/Market-Reports/api-testing-market-227082545.html

# CI/CD Toolchain

If one of the main purposes of using advanced API testing automation is to derive immediate metrics during Agile Development, API testing must be able to underwrite the entire software development lifecycle. In doing so, enterprises can implement valuable development strategies including Continuous Integration and Continuous Delivery.

***Software Development Lifecycle***




*"Test automation is grabbing increasing attention because it's a core requirement to effectively support Agile teams, continuous integration, and continuous delivery approaches."*

—Forrester[7]

As part of the modern CI/CD toolchain, API testing automation can catch bugs that UI testing might miss, or can't catch at all. Alongside a UI testing strategy built around Selenium, API testing can identify API level errors that are causing UI bugs. APIs live in many places and fulfill many functions that do not involve the UI. That means API testing can sometimes run in more places than UI testing. For instance, API testing can test communication between microservices, or anything that doesn't involve what is rendered to the DOM (Document Object Model). API testing can also help solve bugs before they become late-lifecycle bottlenecks. Developers can use API testing to trace the business logic or infrastructure-related issue that is causing Selenium or another UI testing tool to spot a bug. The synergy of UI and API testing can help enterprises save significant time in diagnosing and resolving bugs, which otherwise might only have been solved slowly through trial and error.

[7]Giudice, Diego, et al. (Updated 2017, July 6). Forrester. Vendor Landscape: Continuous Testing Services For Agile And DevOps Environments. https://www.forrester.com/report/Vendor+Landscape+Continuous+Testing+Services+For+Agile+And+DevOps+Environments/-/E-RES129352#dialog-1547700559707-dialog

# Product Overview: API Fortress

**API Fortress empowers developers and testers with API testing automation capabilities, critical for unlocking safe digital transformations.**

Manual testing for APIs not only is not sufficient anymore, but even in the past, it was extremely inefficient. APIs are difficult for humans to test. API Fortress was built from the ground up to solve API testing for DevOps, Agile, and CI/CD collaborative workflows. With the flexibility of the API Fortress platform, which can be deployed in the cloud or on-premises, enterprises can fill any gaps in their API testing practices across the software development lifecycle.

## Microservices and Containers

The increasing popularity of containerization technologies (such as Docker, Kubernetes, LXD) provided a final push to the microservices pattern to become the state of the art in modern enterprise scale applications. With the increase of microservices, the growth of the APIs which allow them to communicate with each other has been unavoidably exponential.

API Fortress validates those communications. Multiple services can be tested in the scope of a single test, with each payload being validated along the way. If the microservices are containerized, API Fortress can still validate communications after a port has been exposed through which microservice functions can be accessed. As long as containers communicate via HTTP, API Fortress can continually test how they engage each other.

## Key Benefits

### QUALITY AT SPEED

**Save time and reduce business risk:**
Close the loop on testing by adding API testing to your existing website and mobile application testing. Ensure your deliverables are supporting the business case by verifying the APIs in parallel with web and app interfaces.

**Accelerate time-to-value:**
With mocking and then test generation, the “shift left” strategy for API testing allows QAs to start the work of writing tests before the APIs are live—saving weeks from every deployment timeline.

## FLEXIBILITY

**Implement without disruption to existing workflows:**
Easily integrate API Fortress via REST API (or command-line tooling) with major CI/CD tools, test case managers, version control systems, tracking tools, and more.

**Deploy in the cloud or on-premises:**
Use the cloud version for simplicity in platform control, or deploy the on-premises solution for complete ownership of the platform, data, and tests, from behind your own firewall.

## SIMPLICITY

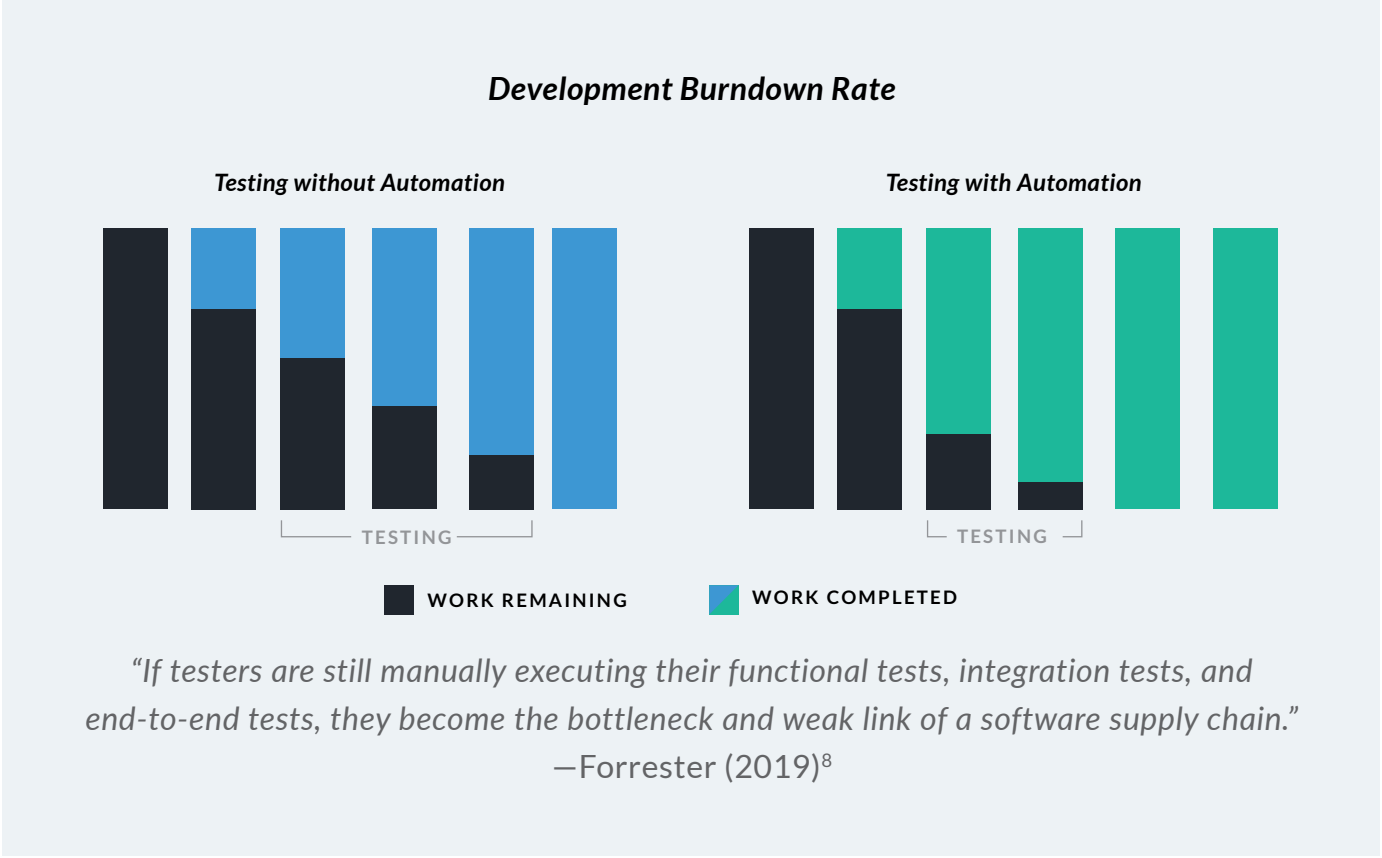
**Cross-team collaboration:**
Connect technical and non-technical resources through a single platform. Test generation and a drag-and-drop GUI make using the platform simple, and command-line tooling and APIs give engineers the flexibility to work how they are most comfortable. Then every stakeholder can use the dashboard and status pages to get real-time feedback on the health of every release, keeping entire organizations on the same page. Additionally, event APIs can export data from API Fortress to other analytics platforms.

## SUPPORT

**Learn to automate from dedicated specialists:**
Take your journey to API testing automation with API Fortress - built from the ground up to help accelerate digital transformation via continuous API testing. Build and improve your API testing strategy by leveraging our staff of professionals solely focused on continuous API testing since 2015.

# Competitive Edge: Continuous API Quality

API Fortress is a complete solution for automated API testing and monitoring for the entire API lifecycle - from design to launch. Generate API tests as early as design with spec files and mocking, and reuse those same tests at every stage of the lifecycle. Gain a single source of truth that eliminates redundancy. Scale your testing capabilities without needing to increase headcount.




*"If testers are still manually executing their functional tests, integration tests, and end-to-end tests, they become the bottleneck and weak link of a software supply chain."*
—Forrester (2019)[8]

## Generate Comprehensive and Scalable Tests in Seconds

API Fortress is the answer to QA teams asking, "How can we keep up?" With our platform, you can eliminate the hours and technical debt associated with your team creating a framework, writing tests, and then maintaining that test suite. Generate a functional test with a click, then spend your time refining that test with intelligence and business logic validation. Focus on the creative aspects of building end-to-end API tests.

[8]Giudice, Diego. Forrester. (2019, Jan 07). "The Path To Autonomous Testing: Augment Human Testers First". https://www.forrester.com/report/The+Path+To+Autonomous+Testing+Augment+Human+Testers+First/-/E-RES140733

## Bring Transparency to Your Organization

We have helped many customers remove the "silo effect" that can create bottlenecks in QA due to team members working on a problem in their own manner. By standardizing a single platform to handle all of your API testing needs, no team member is left behind. With better collaboration, teams can work smarter, more efficiently, and remove redundancies.

## "Shift Left"—Work in Parallel with Development Teams

Mocking on our platform gives you the ability to start creating an API test before the APIs are live. Have tests ready the moment APIs are live, and speed up the testing phase. You also don't need to depend on unreliable staging environments later in the development lifecycle. Create mocks and work with confidence.

## Eliminate Tech Debt

Every company working on a CI/CD plan is trying to hire automation engineers. There are not enough skilled engineers to fill all available roles, so the key is to do more with the team you have. API Fortress can be the foundation of your entire API automation suite. Eliminate the time and cost of building your own internal tools using unproven libraries with poor documentation. Use the platform as the foundation, and get your automation plan working within days instead of months.

## Flexible Deployments

**On-Premises:**

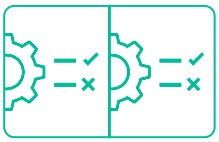
The entire API Fortress platform can be deployed 100% on-premises via Docker, along with orchestration tools including Docker-Compose, Kubernetes and Red Hat OpenShift. Benefit from an entire platform contained entirely within your environment, behind your firewalls. Retain complete test, data, and platform ownership for compliance and secure team collaboration.

**In the Cloud:**

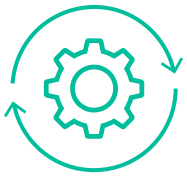
You can also use our hosted solution from secure AWS servers or other virtual private cloud services. You won't have to worry about updates, server outages, or administration. Your entire team can build and run tests from a secure cloud instance.

# HOW API FORTRESS WORKS

## CORE FEATURES



**Functional & End-to-End Testing:** Generate functional tests with a click, and easily create end-to-end tests that reproduce actual user behavior. Build tests in your own IDE, or with our drag and-drop GUI. Reuse assertions, tokens, keys, code snippets, and variables between tests. Receive notifications in your preferred method—whether email, Slack, Hipchat, etc. Every test generates a detailed report that is easy to understand and can be exported to PDF and shared.

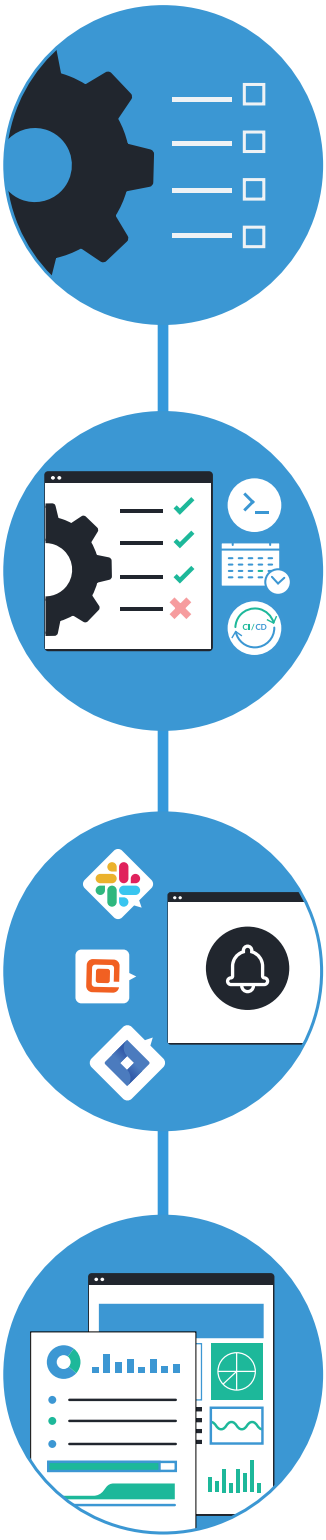


**API Testing Automation:** Trigger API tests automatically via any CI/CD platform—Jenkins, Bamboo, TravisCI, TFS, etc. You can also execute tests from your test case manager with built-in integrations for qTest, TestRail, and Zephyr. Finally, easily schedule test executions from the API Fortress GUI against any environment from any of our various global locations.

**API Mocking (Virtualization):** Record and create mocked APIs with a clean interface, and reuse them across your organization. Shift testing left and work in parallel with development. Don't lose time relying on unreliable environments, and build a mock you can use with confidence.

**API Load Testing:** Leverage your existing functional tests as load tests. Validate that your APIs work as expected under stress, both from a performance perspective, and from a functional aspect. Know exactly what to expect from your APIs when they are released to production.

# BASIC USE CASE



**1. Test Creation**
Generate a test from a specification file or payload, or from scratch in the drag-and-drop GUI.

**2. Test Execution**
Tests can be easily scheduled to run automatically. Either using our scheduling features, or using APIs and command-line tools as part of a CI/CD pipeline.

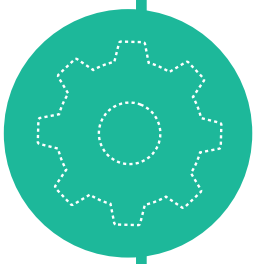
**3. Integrations**
Use your existing platforms to receive updates and notifications when something breaks. Out of the box support for platforms like Slack, Pagerduty, Datadog, qTest, TestRail, and many more.

**4. Reporting & Dashboards**
Detailed test reports, dashboards, and status pages inform every stakeholder in real-time of the quality of the APIs.

# ADVANCED USE CASE "THE DEVELOPER FLOW"

One of the main goals of API Fortress has been to enable nearly anyone in an organization to write and understand API testing. The Developer Flow empowers developers to adapt the API Fortress platform so that powerful API tests can be incorporated into existing workflows without unnecessary complexity, resulting in an efficient and consolidated model.

With the Developer Flow, developers and QA leaders can enable better adoption, organization, and customizability without impacting the original simplicity of the platform. With it developers, QAs, and operations can all work in sync.



**1. Mock APIs**

Mock APIs from spec files before they are finished being developed. This "shift left" allows the test team to work in parallel with development, and cuts weeks from delivering new features.

**2. Test Creation**

A test can be developed in a multitude of ways. You can generate a test from a specification file or payload in our GUI, or from our test composer tool called Forge. You can also write a test in your own IDE, with our simple XML language. API Fortress has a series of IDE plugins that extend the power of our test generator to your IDE.

### 3. Localhost Run

When tests are created against new code, you want to make sure the tests work as expected. Our local command-line program lives on your computer and allows you to execute the tests you're working on against any environment you wish to validate, including localhost.

### 4. Versioning

Let your API Fortress tests live alongside your application code, and version them with your favorite VCS in a similar fashion to your unit tests.

### 5. Test Execution

The platform offers unparalleled flexibility for test execution. After committing and pushing your tests to the repository, you can trigger API Fortress to pull the latest version of the tests and run them when:

- Tests get pushed to the Git repository
- A CI/CD pipeline promotes the code to a new environment
- The workflow requires it
- On demand

By leveraging a centralized, always up-to-date test executor with historical data, monitoring, and notification capabilities, you can maintain a single source of truth for your API health.

### 6. Integrations & Reporting

The platform integrates with any tools you choose for notifications and data. For example you can push test results in real-time to Splunk, get notified with Pagerduty, and embed our statuspage into your own website. API Fortress is built on open APIs, and gives you control over every aspect of your testing process.

# API Risk Assessment

Select enterprises and technology consulting service providers are eligible for a free Enterprise API Risk Assessment from API Fortress. We will generate a risk score report about the health of your internal and external APIs. Your assessment will include ideas about how to safely accelerate agile software development with continuous API testing.

**Get a FREE API Testing Assessment:**

**WWW.APIFORTRESS.COM**

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