Get Smart: Use Simulation to Accelerate API Testing

Joy Ruff, Product Marketing Manager

Wilhelm Haaker, Director, Solutions Engineering

The Drive for Continuous Software Delivery

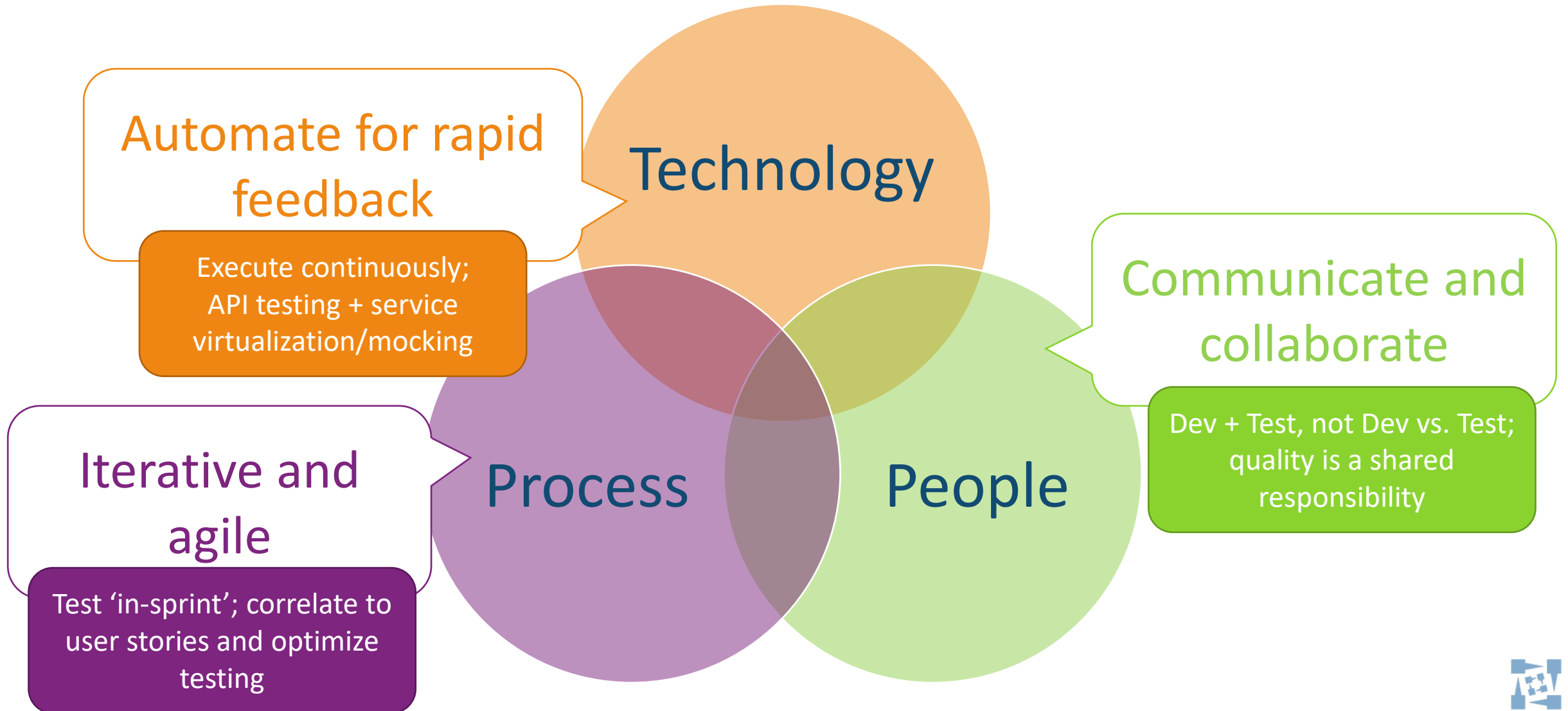| Reduce time to market	Movement towards service platforms	Customer-centric development
• "Get there first" and validate market with a minimal viable product (MVP)	• API-powered 'as a Service' markets open new business opportunities, e.g., Open Banking Initiative	• Iterate for faster feedback and ensure the accurate delivery of what customer wants & needs

The Old Way vs. the New Way

What does it mean to modernize software development?

1990s		2020s
Waterfall	→	Agile + DevOps
Manual Builds	→	Continuous Integration
Build Servers	→	Cloud, Docker, Kubernetes
Mainframe	→	Microservices
Desktop UI	→	Web, Mobile, and API
Release 1x per year	→	Release 4x per year, 2x per month … or Continuously
Manual testing	→	Automated and Continuous
Test at the end of the release cycle	→	Shift-left to in-sprint and shift-right into production

A Successful Modernization Effort Combines...

Technology

Process

People

Automate for rapid feedback

Execute continuously; API testing + service virtualization/mocking

Communicate and collaborate

Dev + Test, not Dev vs. Test; quality is a shared responsibility

Iterative and agile

Test 'in-sprint'; correlate to user stories and optimize testing

Quality at the Executive Level

2020/2019 Annual Reports & Investor Conferences

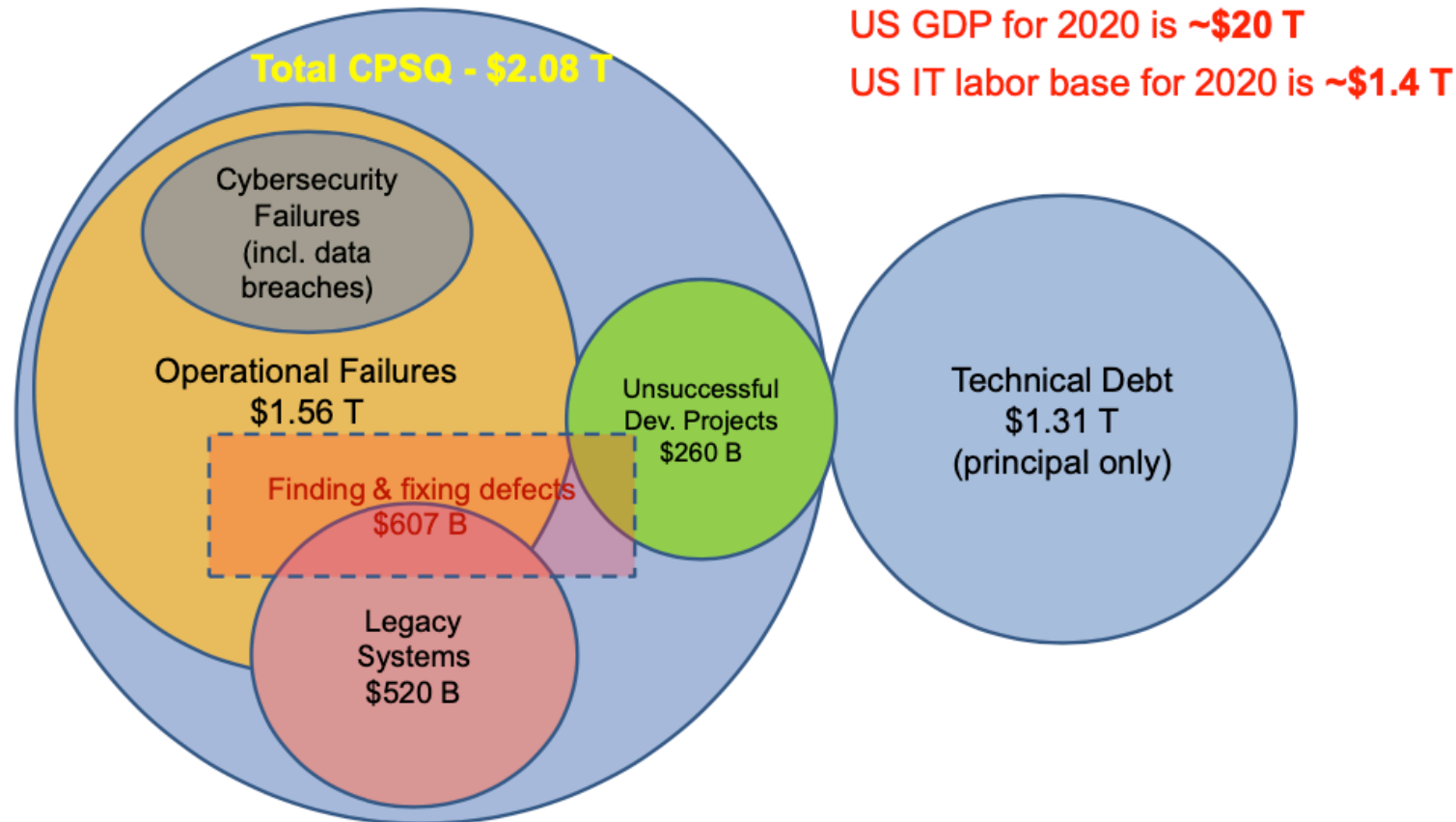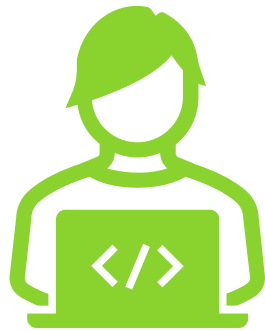| Walmart	UnitedHealthcare	CVS Health
If the technology-based systems that give our customers the ability to shop with us online do not function effectively, our operating results, as well as our ability to grow our eCommerce business globally, could be materially adversely affected.	*... if our technology products do not operate as intended, our business could be materially and adversely affected.*	*Our business success and results of operations depend in part on effective information technology systems and on continuing to develop and implement improvements in technology.*

The Cost of Poor Software Quality in the U.S.

**A 2020 Report:** impact of poor software quality on the United States economy ... approximately $2.08T

US GDP for 2020 is ~$20 T
US IT labor base for 2020 is ~$1.4 T

Total CPSQ - $2.08 T

Cybersecurity Failures (incl. data breaches)

Operational Failures $1.56 T

Finding & fixing defects $607 B

Legacy Systems $520 B

Unsuccessful Dev. Projects $260 B

Technical Debt $1.31 T (principal only)

Quality Drives Both Development Teams and the Business

Industry surveys and analyst reports

» Quality targets: the top 2 metrics Development teams use to track process and success

  » #1 increased test coverage, increased defect remediation

  » #2 reduced defects in production, reduced time to remediation

  » Plus #3 features/user-story completion
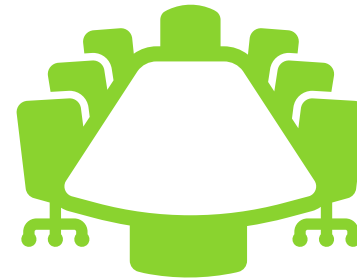
» Business leaders looking at quality as strategic business requirement

  » 48% consider quality improvement in top 3 priorities

  » 68% business leaders seek better speed **and** quality

The Forrester Tech Tide™: Continuous Software Delivery, Q1 2021

"Continuous software delivery (CSD) is critical to firms' ability to win, serve, and retain customers."

» "As companies **digitally retool** themselves to compete more effectively for customers, their software delivery approach shifts **from large infrequent releases to smaller releases at more frequent intervals.**"

» **The Customer Needs To Be The Center Of Continuous Software Delivery**

   » Development teams need to put the customer at the center of their work ... to drive the connection between customers' needs and software delivery.

» **Testing Tools Must Be A Key Area For Investment To Achieve Continuous Delivery**

   » As firms continue to break down apps into microservices and increase speed, they need to focus on testing APIs and automate testing wherever possible.

FORRESTER®

Diego Lo Giudice
Vice President, Principal Analyst

Christopher Condo
Principal Analyst

Accelerate the Successful Delivery of Software Projects

Reduce the cost of Quality, Security, and Compliance

Test Earlier
- Shift left to in-sprint testing where it is quicker, cheaper, and easier to remediate the problem

Test Faster
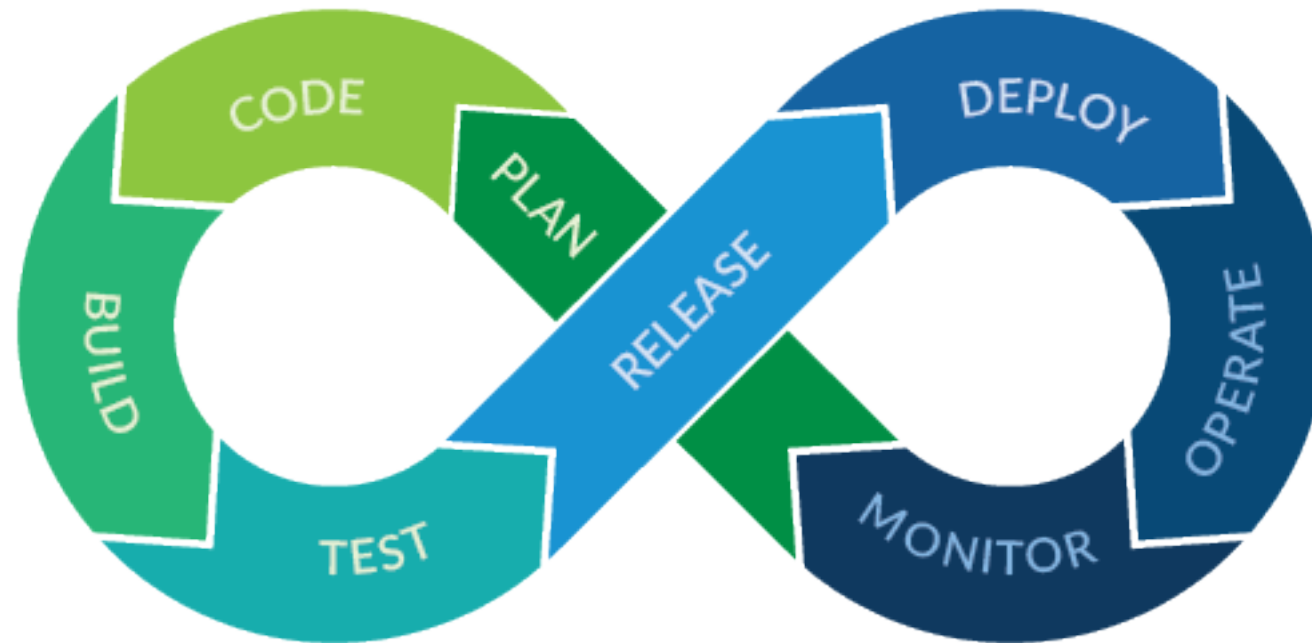- Automate and execute continuously to get immediate feedback when defects are introduced

Test Less
- Focus and spend less time creating, maintaining, and executing test scenarios. Reduce the cost of test infrastructure.

The Key to Ensuring Quality @ Speed

Continuous execution of 'all' tests during each stage of the SDLC


Immediate and ongoing feedback

Building a Scalable Test Automation Strategy

Focus on complex and time-consuming, late-cycle, end-to-end testing

Establish broad coverage of easier to diagnose, and focused, API and Unit Tests

Automated UI Tests

API Tests

Unit Tests

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Easier to scale, easier to automate
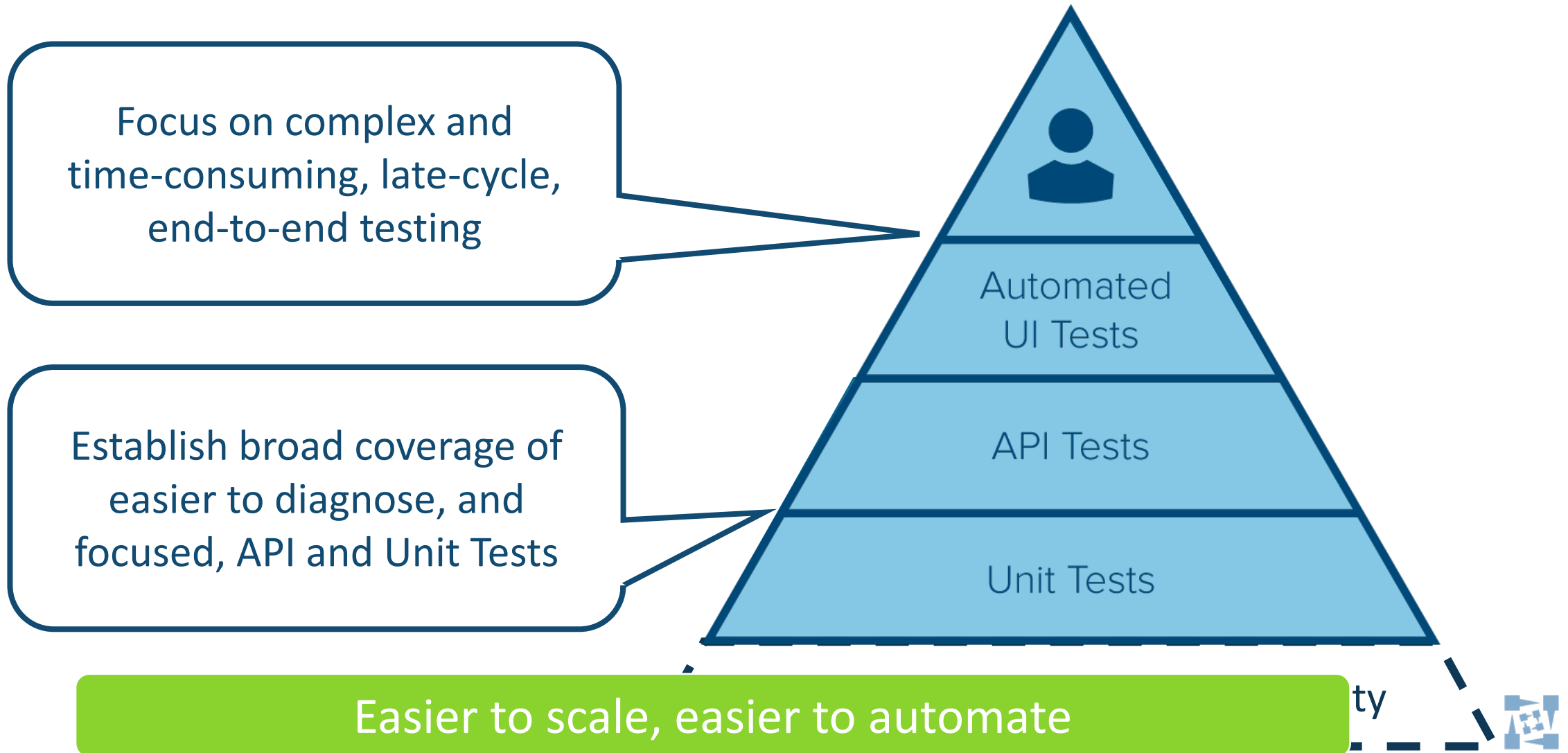
How are Organizations Testing?

Quick to define, time-consuming to execute, complex test environment, **hard to maintain automation**
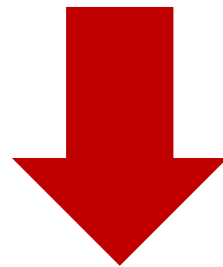
Quick to execute, simple test environment, easy to automate but **more technical expertise required**

Automated
UI Tests

API Tests

Unit Tests
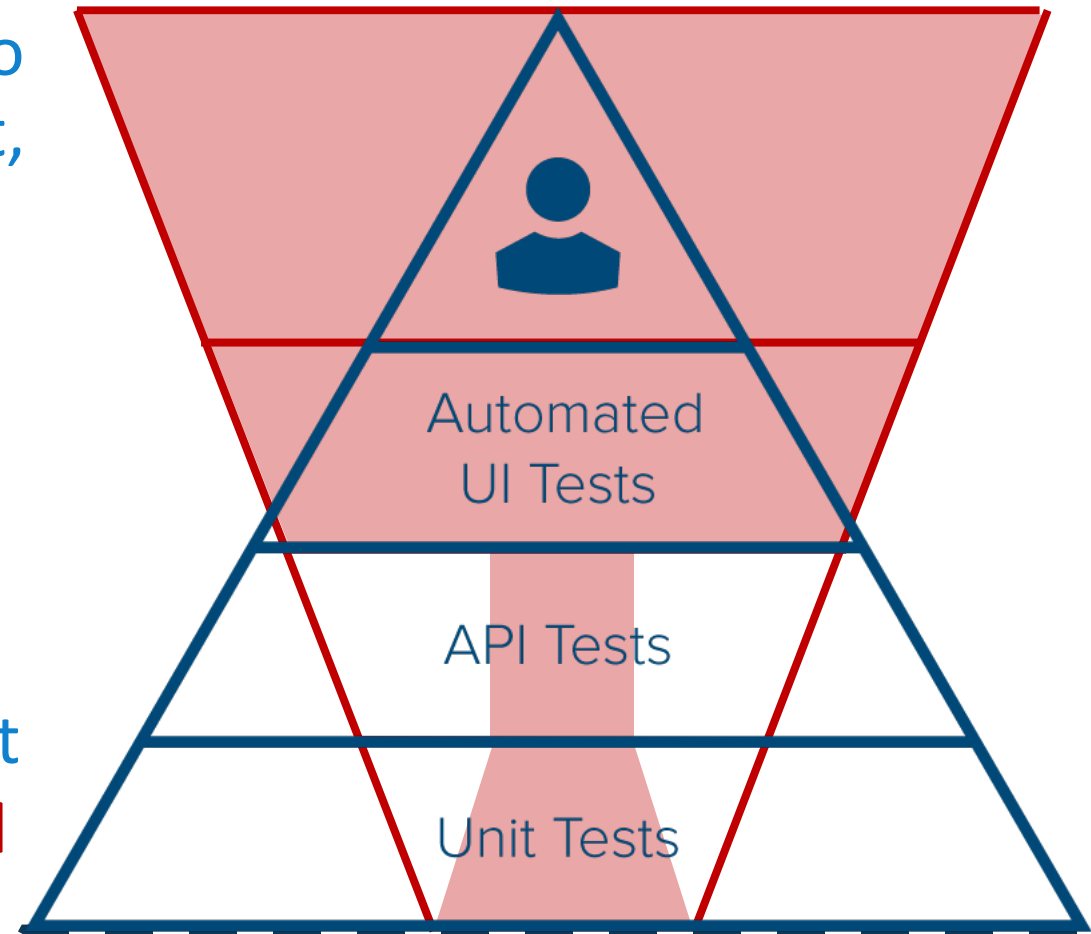
Organizations are still struggling to adopt automated testing

3 Obstacles to Continuous Testing

Why do organizations typically struggle with automated testing?

Expertise

- Limited resources available and/or existing resources adopting new practices

Execution

- Automation instability/reliability and execution time of test automation grows

Environment

- Unavailable, uncontrollable, and constrained system dependencies

Expertise of the Team

Limited resources available and/or existing resources adopting new practices

UI automation is difficult	• Selenium is the de facto industry standard but creating maintainable tests is a new 'skill' to master
API testing is a new practice	• Fast automation but understanding HOW an API is used requires both technical and domain knowledge
Nonfunctional testing requires experts	• Specialized tools require recreating test scenarios and lead to late-cycle defect discovery

Solution: Simplify Test Automation

Record and create	• Leverage the Page Object Model to create reusable, maintainable and understandable test scripts
Record and model	• Create real-world API test scenarios by recording manual and automated UI interactions
Reuse, shift left, and execute continuously	• Reuse existing test artifacts to efficiently scale both load testing and security penetration testing as part of your DevOps pipeline

Optimizing Execution

Automation instability/reliability and execution time of test automation grows

Solution: AI-powered Test Execution

Changes introduce instability into test automation	• Time spent maintaining test automation to ensure reliable and stable feedback
Time to execute the test suite	• As test automation increases, so does time required to execute and deliver feedback
Visibility into the impact of test failures	• Understanding the impact of test failures on the quality of the application

Detect, adapt, update	• Identify, and respond to changes, in UIs and APIs then help testers with what needs to be 'fixed' in the test
Optimize execution and focus on change	• Correlate changes in code and requirements with test automation – and only execute those tests for in-sprint feedback for a 70% reduction in build time
Correlate to business requirements	• Traceability back to user stories/ requirements, as well as code coverage, provides real-time visibility into the quality of the value stream

Controlling the Environment
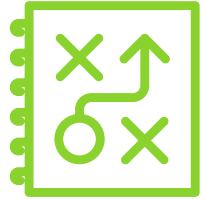
Unavailable, uncontrollable, and constrained system dependencies

Waiting for access to shared systems	• 3rd party services or internal legacy systems with limited/scheduled access, e.g., mainframe
Delayed access due to Agile bottlenecks	• Delivery not coordinated/aligned across the teams or the value stream
Uncontrollable and unsafe test data	• Containerized and cloud deployed but no ability to control data, behavior, or performance

Solution: Service Virtualization

Record and simulate	• Capture, model, and provision simulations of live systems
Deliver prototype first	• Model behavior based on contract descriptions or payload examples
Synthetic data + performance profiles	• Model and generate safe test data with performance characteristics to validate SLAs

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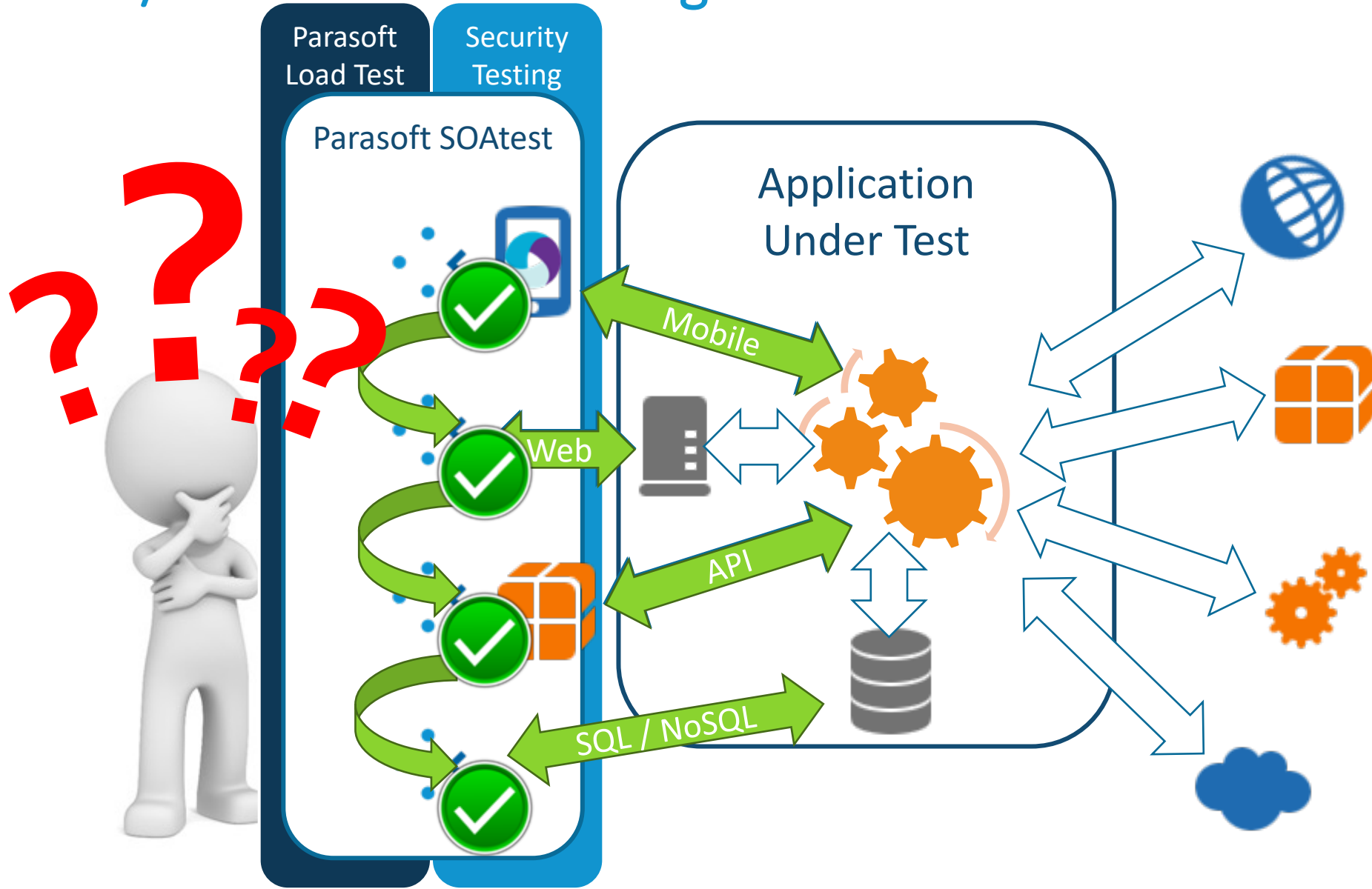
Environment

- Unavailable, uncontrollable, and constrained system dependencies

Increasing Complexity of Testing Requirements
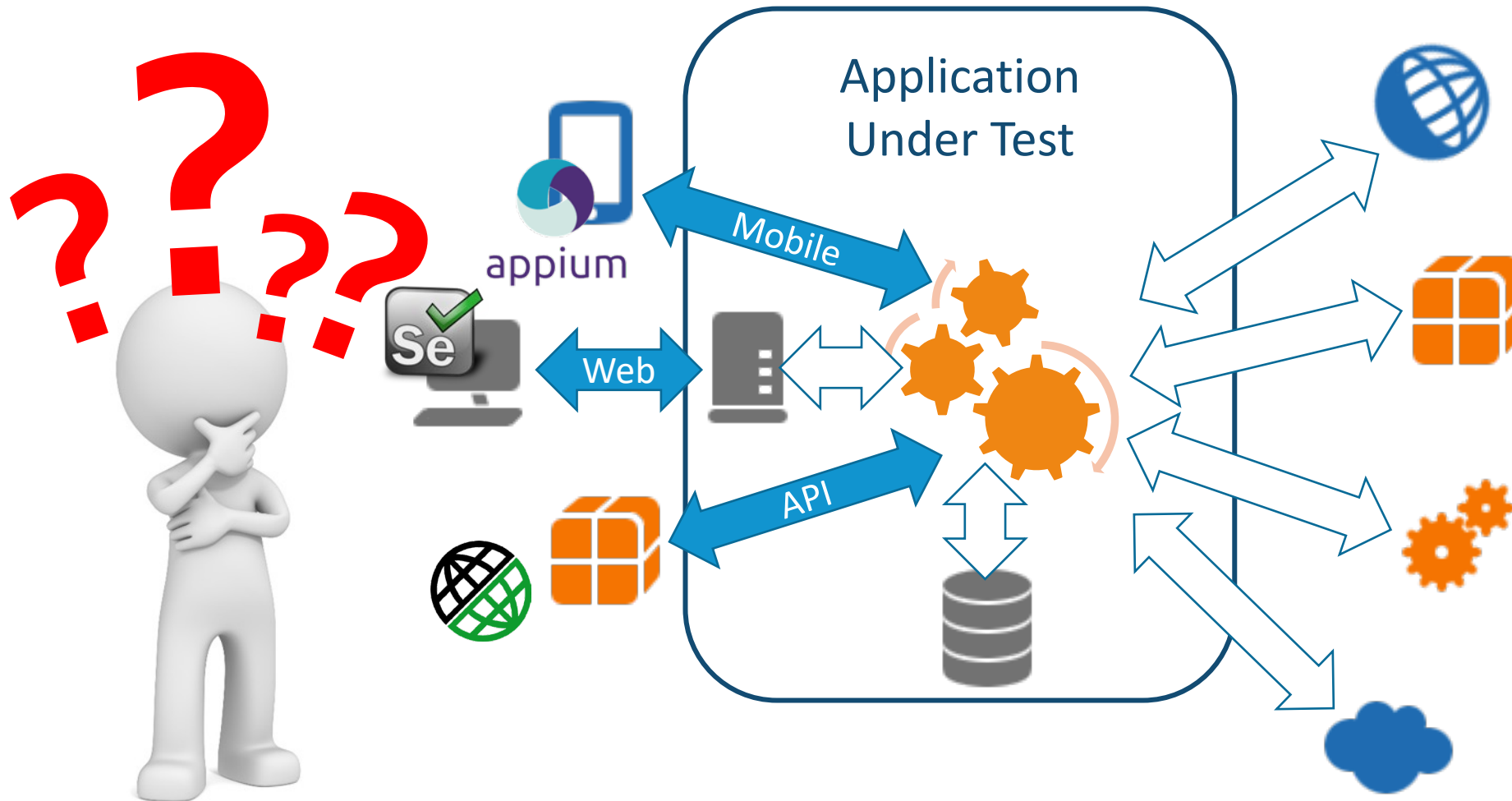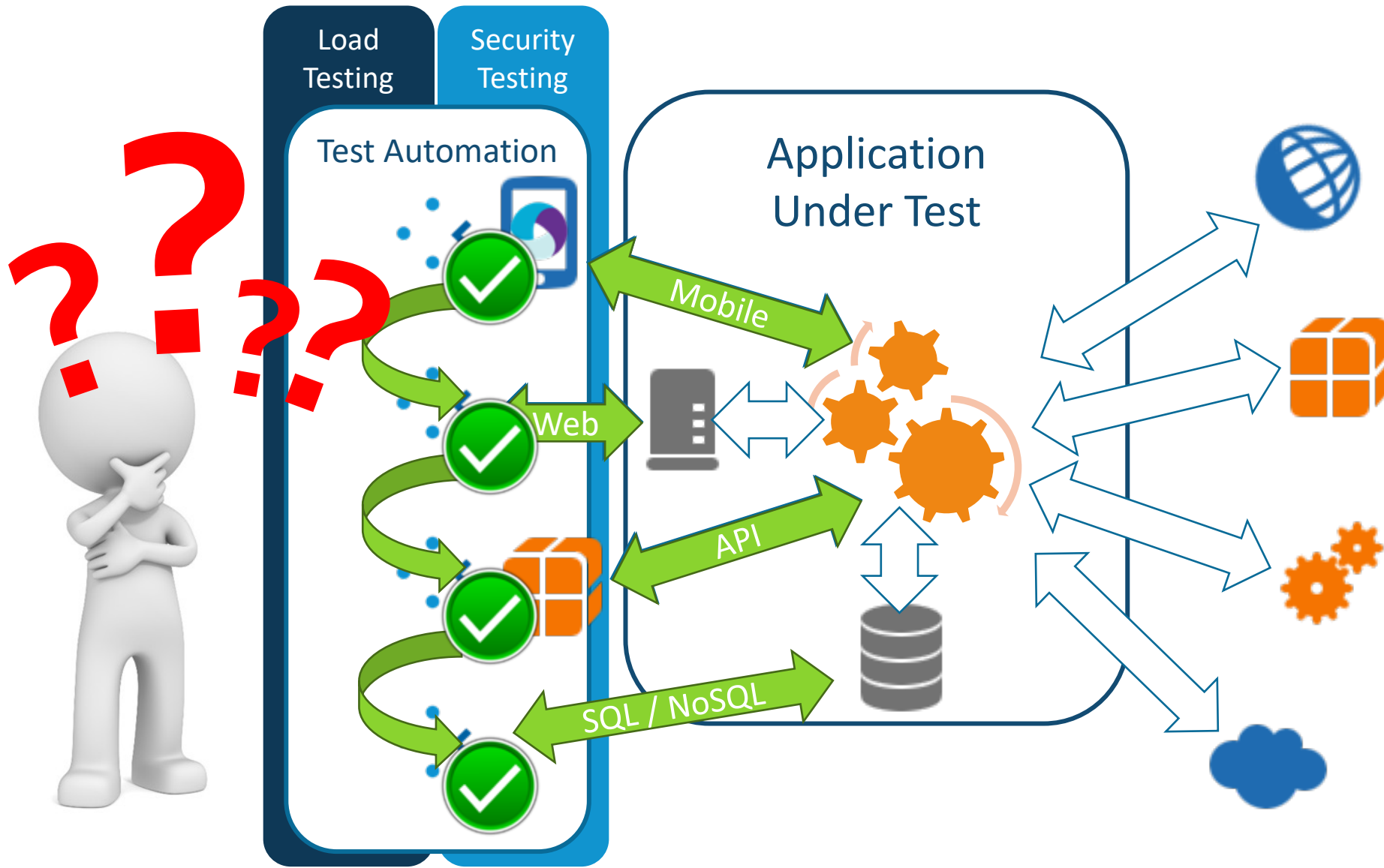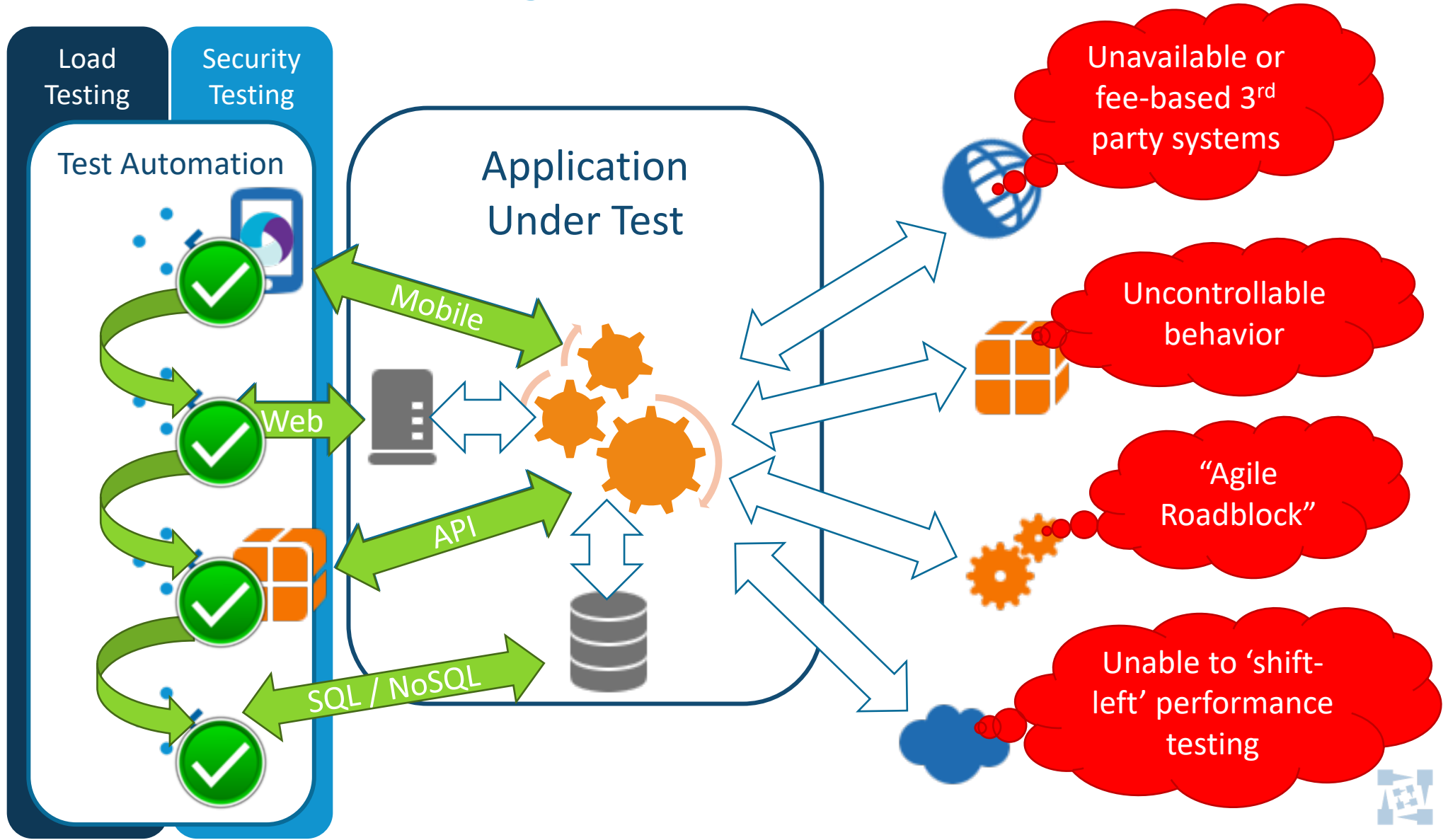
Omni/Multi-Channel Testing with Parasoft SOAtest

Parasoft Load Test

Security Testing

Parasoft SOAtest

Application Under Test

Mobile

Web

API

SQL / NoSQL

Demonstration

Extend Test Automation With API Testing

» Bootstrap API testing by leveraging existing UI tests & artificial intelligence

» Shift-left non-functional testing

» AI-powered test maintenance when APIs change

» Smart test execution, test only what is impacted by change

» Parasoft's Platform: Delivering Quality/Security/Resilience @ Speed

End-to-End Automated Testing

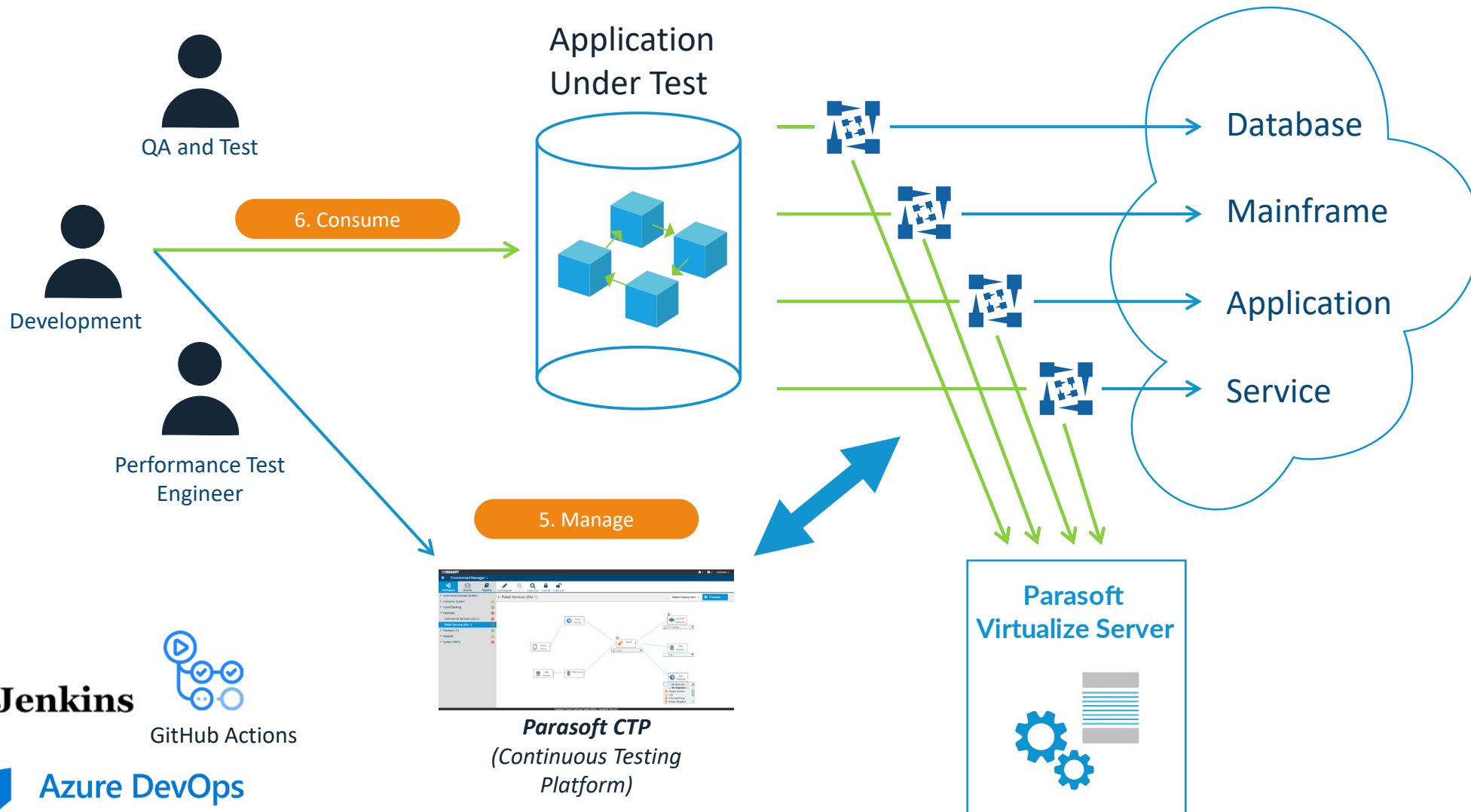# End-to-End Automated Testing

Total Control of the Test Environment

Load Testing

Security Testing

Test Automation

Application Under Test

Mobile

Web

API

SQL / NoSQL

Safe Test Data

Service Virtualization

500 Internal Server Error

Malformed Response

Expose a security Exception
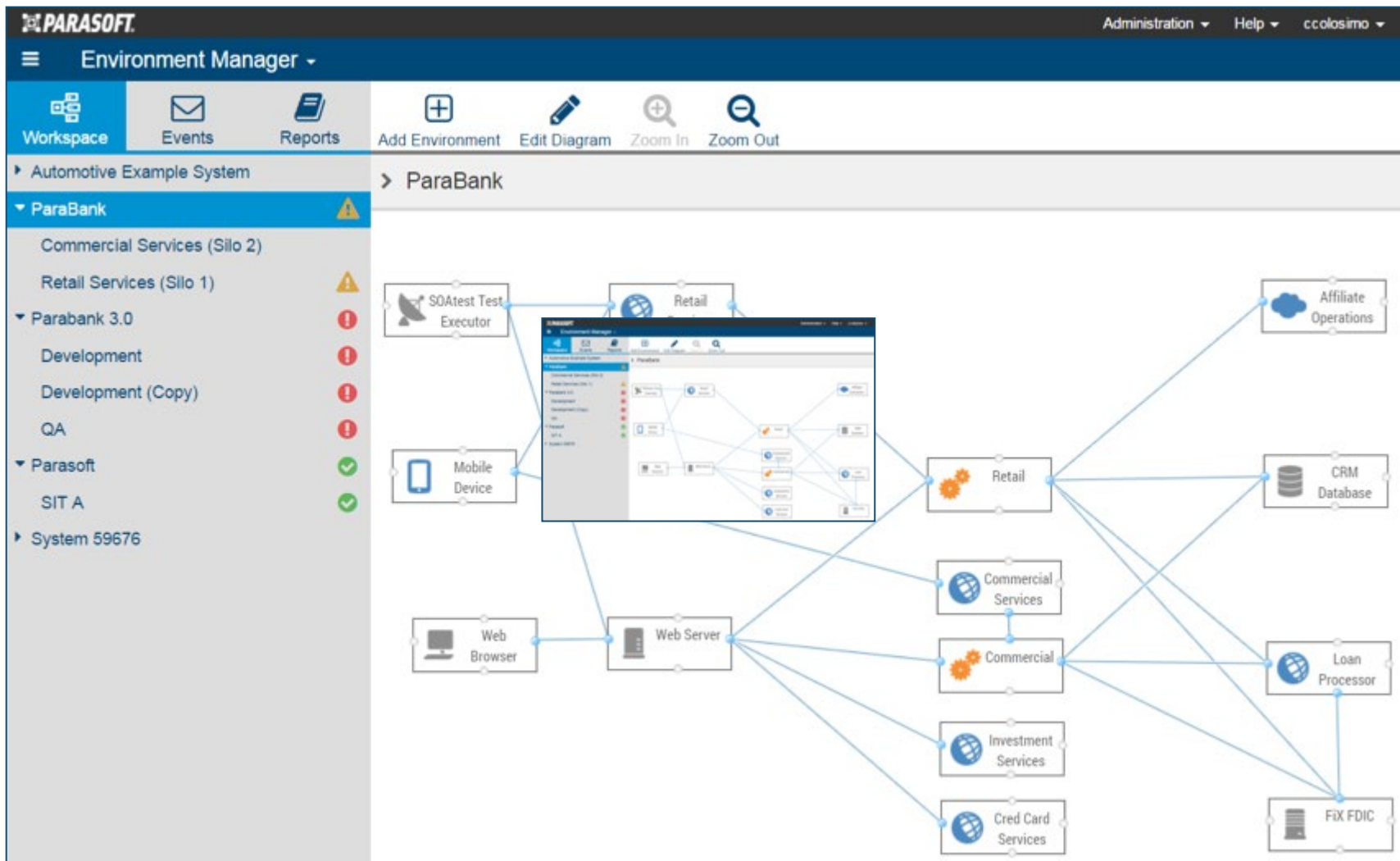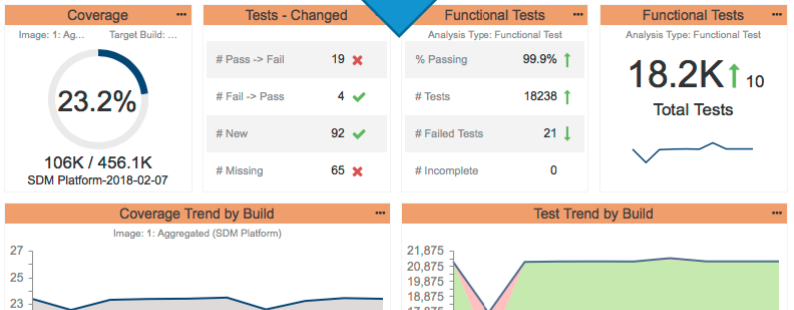
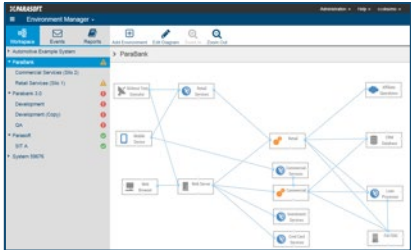Test the boundaries of performance SLAs
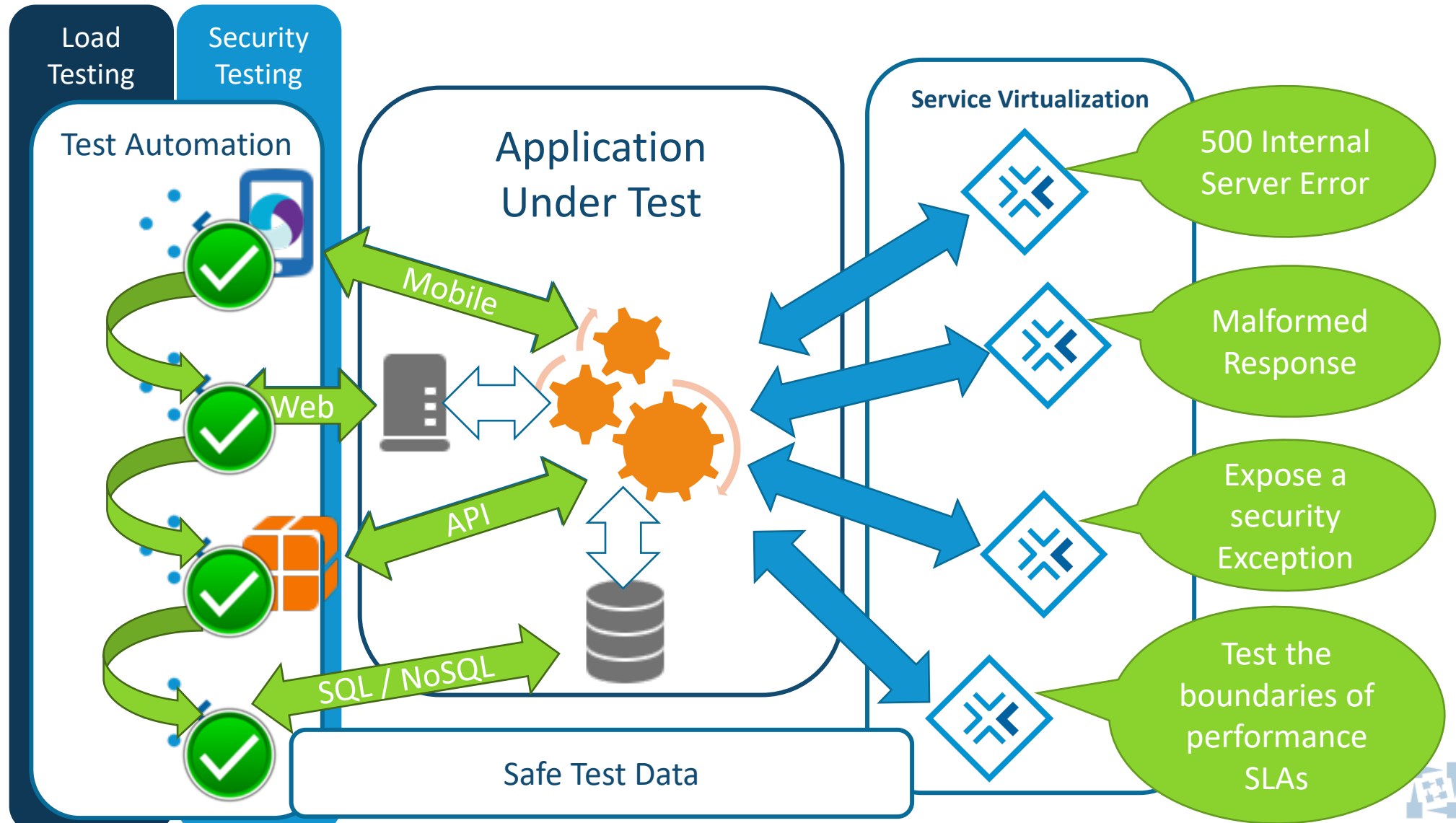
Parasoft Virtualize: Capturing Current Behavior

Environment-Based Approach to Testing

On-demand Dynamic Test Environments
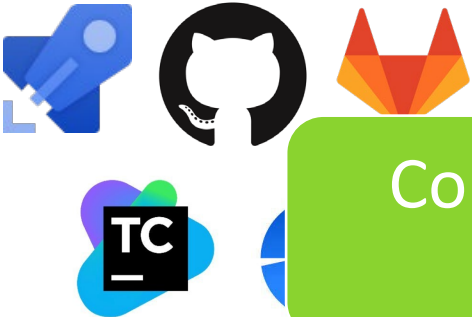
Combining tests, virtualize assets, and data into disposable test environments to enable complete test coverage

Demonstration

Use Simulation to Accelerate Testing

» Leverage existing assets to bootstrap your service virtualization roll-out

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https://www.surveymonkey.com/r/Parasoft928

3 winners to be chosen!

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virtualize/community-edition/

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