



A New Approach to Enterprise Application Testing in Retail

How off-the-shelf automated testing can unlock more robust systems, enhance productivity, and protect margins

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Introduction

Retail enterprise applications are extraordinary feats of technology and human ingenuity. A typical retailer has a complex integrated landscape consisting of hundreds of intertwined systems processing thousands of batches, interfaces, and data flows to help achieve specific business objectives.

The dream is that the systems work together seamlessly and flawlessly, delivering a maximized return on investment (ROI). The reality is that many factors stand in the way of achieving this goal.

Perhaps the most overlooked or underestimated aspect is the testing of these applications.

Very often, teams face compressed testing time and are unable to carry out adequate coverage at the speed and scale required. As a result, vulnerabilities and defects can creep in, causing a significant impact on operations.

This white paper aims to highlight the causes of inadequate testing, show its impact on retailers, and suggest a new way forward.

This paper does the following:

- Assesses the value of retail enterprise applications and explains why testing them is so important.
- Explores why traditional enterprise application testing methods lack the speed or scale required to deliver quality software.
- Looks at the impact of insufficient enterprise application testing on retailers.
- Considers the gains you can achieve when you set aside legacy thinking around what enterprise application testing needs to look like and embrace what commercial and third-party solutions have to offer.
- Explains why tools such as Keysight Eggplant deliver the required solution, going beyond the testing basics to deliver transformational change.

The Value of Retail Enterprise Applications

Today's enterprise applications enable retailers to deliver on their objectives. These sophisticated systems give retailers the tools they need to help do the following:

- Improve order fulfillment, order lead times, and inventory accuracy.
- Reduce waste.
- Optimize range and assortment.
- Provide enterprise controls.
- Meet financial and regulatory requirements.

Ultimately, the systems have the power to help retailers reduce costs, improve working capital and cash flow, protect margins, and deliver scalable and sustainable growth.

The challenge of system maintenance

Maintaining these systems to ensure that they perform as expected, meet required quality standards, and help retailers deliver their objectives at the pace the business demands is an ongoing challenge.

Enterprise applications continually evolve to meet numerous, often competing, demands. Compliance and regulatory requirements shift. The growth ambitions, breadth, and scale of the business change. The drive to enhance productivity is ever-present. Innovations and R&D initiatives change the required parameters.

Then consider that each system needs to integrate with many other systems. The introduction of application programming interfaces to link the systems together so they can communicate seamlessly every day, every hour, even every minute adds another layer of testing complexity.

Remember too that the systems are not all equal. Some have a monolithic architecture; others use microservices technology. Some are internal and under a retailer's full control. Others are external and under the control of third parties.

Improving the ROI of tech for tech investment

All these factors mean enterprise application testing requirements for retailers are significant.

Retail software testing to ensure every system works as expected requires many testing areas, including compliance, data security, supply chain applications, point of sale, user experience, and integrations.

Given the sheer quantity of systems in use and the breadth and depth of testing required, it's perhaps not surprising that "tech for tech" (see Figure 1) is one of the most significant capital investments retailers make.

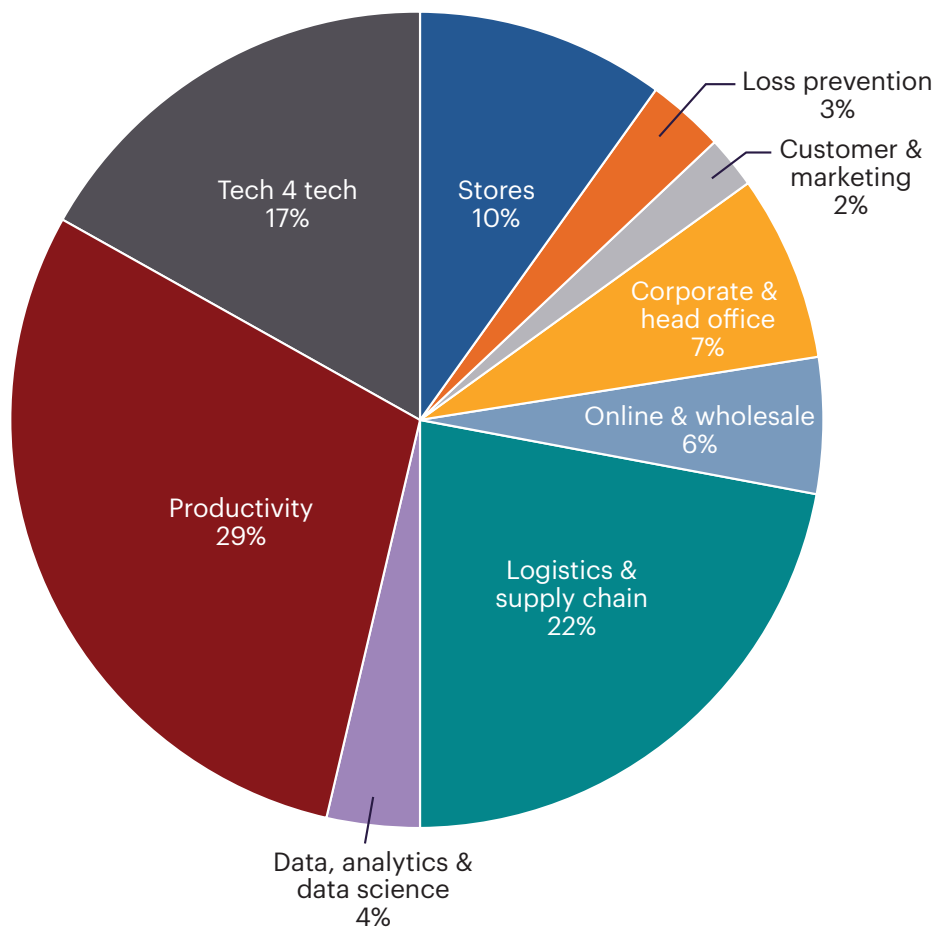


Figure 1. UK grocery retail sector: Typical capital investment split by business area. Source: McLean J. (2023)

Business area	What it involves
Stores	Includes any stores or retail specific technology requirements to improve customer or colleague experience, includes changes to the property portfolio, including new stores or refurbishments.
Loss Prevention	Investments aimed at reducing known or unknown loss to improve company cash and margin position.
Customer & Marketing	Any requirements that specifically target customers with the aim of improving customer spend/ basket size and market share
Online & Wholesale	Any improvements to the online proposition from front end improvements through to order management and fulfilment and to improve the wholesale proposition.
Logistics & Supply Chain	Investments to improve the flow of product from the point of forecasting demand through to on shelf availability.
Data, Analytics and Data Science	Delivering enhanced data management, analytics and action orientated models to improve or automate decision making and end to end processes.
Productivity	Driving efficiency into end-to-end business operations to remove wasted effort, reduce unnecessary spend and improve margin.
Tech for Tech	Investment in improved technology to maintain security, service, stability and currency of platforms.
Corporate & Head Office	Investments that are required to enable the business to continue to operate legally, improve head office functions and support regulatory requirements, e.g. Brexit, HFSS, Deposit Return Schemes.

However, even at nearly a fifth of capital expenditure, testing often isn't delivering as it needs to.

The effort required to maintain retail systems is significant because of the high volume of patches and upgrades required, coupled with the need to ensure that rollouts do not interrupt business operations. This inability to maintain systems is holding retailers back. Larger chains use relatively simple tools in comparison to their smaller competitors, often bespoke tools created by their software development partners. The main reason larger competitors don't use systems more is the major effort required to link them with the existing enterprise IT architecture.¹

1. Riesenegger, Lena, and Alexander Hübner. "Reducing Food Waste at Retail Stores — An Explorative Study." Sustainability 14, no. 5 (2022), 2494. doi:10.3390/su14052494.

This is a problem retailers must overcome — the power of enterprise applications to deliver commercial advantage is not in any doubt. Retailers, therefore, need to understand how to improve the ROI of their tech for tech investment. Specifically, it means finding a way to test their systems more effectively.

To begin to test more effectively, we must first understand how retailers test their enterprise applications.

 This inability to maintain systems is holding retailers back

The Reality of Retail Enterprise Application Testing

A key contributor to the inadequacy of enterprise application testing is that most companies still largely conduct testing manually. This situation is clearly a pinch point when you consider the scale of the task.

Companies often see testing as a bottleneck, so they may overlook or reduce it to maintain release deadlines. Improvements, such as new features or functionalities, may fall behind simply because manual testing cannot keep up.

Then consider that manual testing always runs the risk of human error, leading to an increased risk of vulnerabilities, not to mention a failure to spot a critical issue.

Automated testing offers a solution. However, for many quality-assurance (QA) testing teams, the challenge of keeping up with day-to-day testing requirements means implementing it is often a second-order priority.

Even when they do implement automated testing, it often fails to live up to expectations. This failure is likely because automation scripts may be brittle from changes in the Document Object Model. One defect can have a dramatic impact on numerous system integrations. Finding and fixing the issue requires manual intervention, which hampers testing speed and coverage.

Further issues that affect testing

Whatever the testing scenario in a retail business, several issues impact its success.

The retailer's technology services partners or system integrators normally define the scope of testing. The developers who built the solution will typically conduct the testing, and they will instinctively conduct testing of the most straightforward scenarios rather than exploratory testing. They may not test the user experience or interface either, missing opportunities to capture end-user experience issues.

There is also a focus on testing functionality in isolation, not verifying the impact on other software components or applications.

In the real world, therefore, the system will not work as expected or intended.

These gaps in testing have real-life consequences.

The developers who built the solution will typically conduct the testing.



The Consequences of Inadequate Retail Enterprise Application Testing

Profit margins in retail are tight. Just as marginal gains add up to an outsized positive impact, so the smallest of glitches can add up to an outsized negative impact.

At the most basic level, adding unplanned testing cycles to the project timeline after you find defects can delay the business benefits of a software development project. This can mean the resource isn't released from the project on time, causing ripple effects elsewhere, including the potential cost of having to find more resource to get the project back on track.

A lack of testing coverage for new system, update, or feature releases causes issues. Additionally, business benefits may not meet expectations because of gaps in or problems with the user experience or because of inefficiencies in the end-to-end user journey.

Impacts on product flow and on-shelf availability can result when testing does not identify bad data. A systems integration failure can cascade the negative consequences even further.

Every bug could have security implications, which can damage a business's reputation and incur financial penalties.

The business may also experience unintended consequences. For example, new bugs inadvertently introduced to self-checkout software might result in a greater requirement for staff intervention. If replenishment systems over-order because of faulty data entering the system, waste increases; on the other hand, if they under-order, gaps start to appear on shelves.

Then consider the user experience.

When systems don't work as expected (or at all), users must make manual validations, initiate corrections, or develop workarounds. All of this impacts productivity and reduces users' confidence in the systems. Users are less likely to trust what the systems tell them, leading to system overrides. They may even be less likely to embrace the benefits of technology more widely, which makes introducing other systems harder than ever.

Instead of reducing costs, issues with software enhancements can lead to increased costs, impacting productivity and profitability.

The solution to this challenge is simple: more testing, scoped early in the project life cycle alongside the business requirements, better coverage, more accurate test scenarios, and a focus on end-to-end user journeys.

When time is always at a premium, conducting additional testing isn't an option.

The solution is to look at the value that off-the-shelf automated testing solutions powered by artificial intelligence (AI) and machine learning (ML) bring.

The Benefits of Off-the-Shelf Automated Enterprise Resource Testing Solutions

Off-the-shelf automated enterprise resource testing solutions that use AI and ML turbocharge testing straight out of the box.

They speed up the delivery of testing and provide greater test coverage, helping protect delivery timescales and give greater confidence in the results.

Quality of testing improves because retailers can automate exploratory testing to go beyond directed cases and uncover the unknown unknowns.

Automated resource testing solutions ensure the quality of the environments by testing both inputs and outputs. And because they validate the user experience and the technical functionality of the solution, they help minimize manual intervention or overrides, improving the experience of testers and customers.

What's more, retailers gain all this without having to factor in additional test script maintenance requirements. The tools update scripts intuitively and automatically.

One such tool is Keysight Eggplant. It puts an end to custom coding and complex open-source deployments. It gives retailers the ability to find defects faster, accelerate time to market, and dramatically improve release quality. It gives retailers the means to reap the benefits of enhanced testing year after year.

Eggplant at a glance

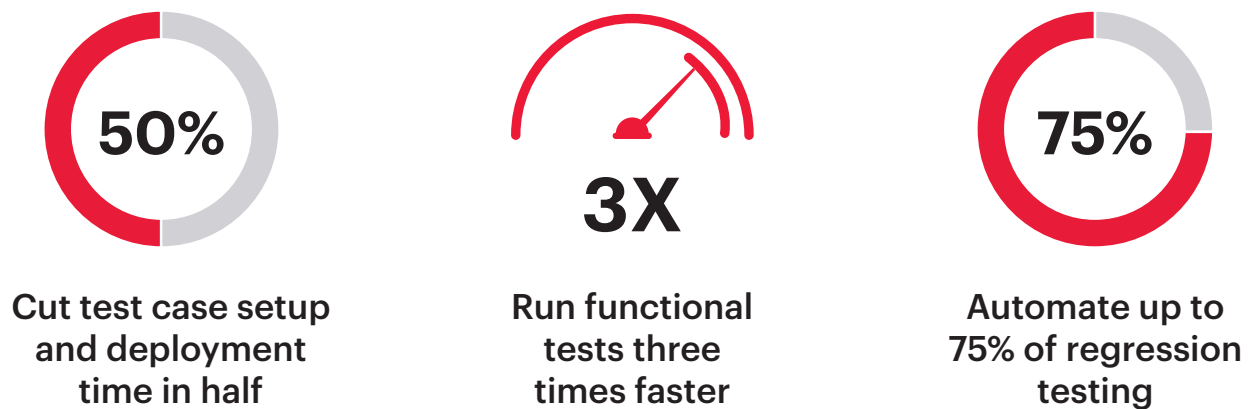


Figure 2. Key benefits offered by Eggplant software test automation

Software test automation for any device or system

Eggplant's AI-powered software test automation offers model-based testing to optimize user experience across any device or platform, providing a holistic look at application performance.

[Learn more.](#)

Continuous testing for application releases

Eggplant's drag-and-drop interface and scalable test integration framework help retailers shift left and maintain a library of automated test scripts in continuous integration and continuous delivery pipelines. Retailers can identify defects faster, execute continuous testing, and accelerate releases.

[Learn more.](#)

End-to-end robotic process automation

Eggplant uses end-to-end robotic process automation to streamline business processes, minimize human error, and save staff precious time. [Learn more.](#)

Predictive application performance monitoring

Eggplant uses synthetic or active monitoring so retailers can continuously monitor application performance, making it easy to pinpoint performance problems, improve customer experiences, and maximize conversions. [Learn more.](#)

Simplified and streamlined mobile application testing

With low-code / no-code mobile application testing, Eggplant lets retailers validate the mobile user interface, accelerate deployment, and ensure top-quality experiences across every operating system, network, and device. [Learn more.](#)

To see how it works in practice, let's look at how American supermarket chain Albertsons embraced Eggplant.

How Keysight Eggplant Has Helped Albertsons

Albertsons Companies, Inc., is one of the largest American supermarket chains with 2,252 stores, 1,725 pharmacies, 398 fuel centers, 22 dedicated distribution centers, and 20 manufacturing facilities across 35 states.

Albertsons was looking at ways to realize the vision of frictionless retail. As it reviewed its technology infrastructure, it wanted to move from relying on manual testing of its point-of-sale (POS) and peripheral systems to an automated solution that would improve software quality and the customer experience. This move was critical to the business as POS issues, such as not taking a card payment, directly impact revenue and frustrate customers.

Albertsons turned to Eggplant for its AI-driven test automation and its partner IntelliQA, which specializes in industrialized test automation.

The first step: Accelerating POS automation

The initial scope was to automate Albertsons's main bank testing, as manual testing of the complex system was a slow and onerous task. Albertsons needed a test automation solution that did not require installation on physical devices, as that would present an array of security concerns. Eggplant's innovative solution is the only software that can test any technology on any device, operating system, or browser at any layer, from the user interface to application programming interfaces to the database, without installation.

The intelligent automation tests thousands of scenarios quickly and continuously hunts for defects. Automated testing rapidly accelerated the delivery and quality of Albertsons's POS software. It also freed up the team to focus on evaluation and exploratory testing rather than repetitive manual test execution. Intelligent automation slashed the time to execute tests from almost two weeks to just a couple of days.

The next project was to automate gas station testing. Fuel pumps are a leading source of credit card fraud, so Europay, Mastercard, and Visa compliance avoids liability for fraudulent transactions. Once the hardware is modified, the process needs to be certified, which Eggplant and IntelliQA teamed up to solve. As a result, Albertsons has greater insight into how its customers are interacting with its digital platforms well as actionable intelligence on areas that are causing issues.

As a result of the benefits delivered to date and the demand for a contactless retail experience, Albertsons is looking to automate the self-checkout process.

Results

Albertsons realized benefits in productivity, efficiency, and cost reduction.

Productivity

The retail POS test automation was particularly valuable during the global pandemic. It enabled manual testers to focus their efforts on solutions introduced to help ensure the safety of customers and retail associates.

Efficiency

Albertsons has been able to quickly trigger automated testing whenever it receives a new version of vendor POS code. This has enabled it to validate the quality of the software and identify defects more quickly, speeding up deployment to the stores.

Cost reductions

The automation of almost 500 retail POS regression test cases has enabled Albertsons to reduce the need for manual testers for new initiatives.

Looking forward

After seeing such success with test automation at the front end, Albertsons now also harnesses Eggplant's capabilities for back-end systems testing.

For validation testing, the team pulls reports from the back-end system and exports them into Eggplant suites.

Eggplant's ability to integrate with other types of scripts and languages means Albertsons can execute full logs and certain reports on the controller using Python scripts. The team created batch scripts that run a set of Eggplant tests and save the results to a file. These scripts run automatically at a specific time to perform regression testing. The team can stop and start the tests as necessary to make sure operations are performing as expected.

"Our customers benefit from an improved experience, while our colleagues, without technology frustrations, can focus on the customer. Additionally, our implementation of test automation provided significant relief during the recent challenges with COVID-19. Eggplant is core to the capability, and we are excited by the use of AI within the product to optimize execution paths and hunt down defects."

Mike Friedel Sr., director of retail customer solutions at Albertsons

Conclusion

If you want to protect program and delivery plans, de-risk development, improve confidence in quality through improved insights, and gain certainty over testing coverage and timescales, look at what a solution such as Keysight Eggplant can bring. Ultimately, it could hold the key to unlocking the benefits that enterprise applications often promise but can't always deliver.

Explore **Keysight Eggplant** today.