



Digital Quality Assurance: Insights and Trends Shaping Banking and Financial Services

To keep pace with the rampant digital disruption and radical change across the banking industry, financial institutions must increase their focus on digital quality assurance that results in a superior end-user experience.

Executive Summary

Amid the rush to digitize every function of business, CIOs are prioritizing those IT initiatives that create “customer intimacy” through enhanced user experience. As companies push to create “markets of one” that transcend demographic segmentation and customer personas, user tolerance for poor software quality and the application errors and performance issues that ensue, is raising the bar on quality assurance. This in turn is forcing enterprises to pay renewed attention to the quality and reliability of customer-facing software solutions. The reason: Any negative publicity on social platforms can have a significant direct impact on reputation and revenue streams. Thus, banking and financial services (BFS) organizations are looking to services providers to overhaul how they deliver and guarantee software quality to mitigate the potential for reputational and financial damage.

BFS companies have been in the forefront of anticipating and adjusting to the changing technology trends. As digital business proliferates, CIOs of BFS organizations have begun to shift their priorities from maintenance to developing and implementing new systems that drive revenue growth, and are launching new products and services that extend end customer engagement via new channels. Add the increase in merger and

acquisition activities, the advent of new social, mobile, analytics and cloud (or SMAC Stack) technologies, the application development shift from traditional SDLC Waterfall approaches to Agile and to DevOps, bigger budgets for business assurance, and as a result, CIOs in the BFS sector are doubling-down on QA and testing. This, they hope, will accelerate time to market and decrease the cost of quality of new digital offerings.

This white paper offers recommendations, informed by experience, to help IT units across the BFS sector to enhance digital quality assurance across the technology testing landscape, from cloud, mobility and big data analytics through Agile and DevOps.

BFS Industry Trends

Key industry trends are shaping and driving new technology adoption and the associated quality concerns across the BFS sector. Prominent items include:

- **The accelerating globalization of BFS:** Over the next five to seven years, we foresee greater demand for transactional banking services and an increase in consumer demand for credit. To keep pace, BFS organizations must rethink their relationships with customers. Infrastructure funding and partnerships with nonbanks are expected to generate new revenue streams.



- **The irrepressible rise of digital business:** Digital transformation trends in technology are driving investments in the banking sector that make banking services innovative and aligned with the current digital landscape. Mobile, social, Web and IoT together determine how most of the customers today engage with businesses in general. Wider smartphone reach will make mobile wallets the preferred mode of payments, which can be called the Internet of payments (IoP). The share of digital interactions will reach new highs in all the developed and most of the developing countries. As such, the emerging digital ecosystem with an omnichannel approach will define the bank of the future. Meanwhile, banks are enhancing customer experience by ensuring consistency in services across various banking channels.

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- **The reshaping of banking processes:** Digital technology is reshaping processes around improved governance, decision-making, fraud prevention and devising new banking service and partnership models. Greater “gamification”¹ is helping banks improve customer brand loyalty and overall strategy. At the enterprise level, banking organizations need strategies for open application program interfaces (APIs) spanning products or platforms, security, governance and ongoing management of data exposed by the APIs.
- **Revamped operating models:** BFS organizations are focusing more on core operations, accelerating time to market and heightening customer experience. Digital engagements drive data-gathering about customer behavior. This will allow banks to tailor products accordingly, with sales and distributions adopting more omnichannel approaches.
- **Customers redefine rules:** Customer diversity and individualism will pervade buying behavior. Better-informed customers demand greater advocacy and control in their banking relationships. Product and services personalization is on the rise. Banks will anticipate and proactively

suggest banking solutions, and use service and experience to de-commoditize their offerings.

- **Workforce transformation needs:** Digital disruption has encompassed all facets of banking, with the most obvious examples being enhanced customer experience, reduced branch footprints and automated/streamlined processes. As such, the future banking workplace will be transformed by:

- **Automation,** which will power operational activities such as claims processing, accounts payable/receivable, record or account data reconciliations, and data consolidation/validation.

- **Intelligent automation systems,** which will take on activities such as prescriptive pricing, providing services, portfolio management and investment services.

On one hand, the approach suggested above would necessitate an up-skilling of the workforce to keep pace with digital technology advances and new business applications; on the other hand, this will make a sizeable workforce redundant owing to automation.

- **Intensified regulatory burdens:** If recent activities are any indication, we foresee a demand for transparency and governance by regulators. Strict enforcement of performance and reliability measures as well as disaster recovery policies will also take center stage. We expect banks to leverage technology to aid compliance processes in an efficient and cost-effective way.
- **Broader security concerns:** With more connections, more technology, smart systems, and increasing digital processes and business, there has been a comparable rise in cybercrime. As a highly regulated industry, banks place enormous importance on data security and integrity. While ensuring customer experience across mobile, Internet and cloud channels, banks must also guarantee safe transactions and the safeguarding of sensitive customer information across all touchpoints. System security testing across multiple channels,

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operating systems and networks must be enhanced to ensure comprehensive security measures across the value chain. Banking organizations are prime targets for cybercrimes like hacking, but system vulnerability testing and penetration testing can preempt such fraudulent activities. Comprehensive security protection requires an adaptive protection process that integrates predictive, preventive, detective and response capabilities.

BFS Technology and Quality Trends

In our work with BFS organizations, we see more financial institutions increasingly focusing on process digitization across their back, middle and front offices. Agile- and DevOps-based development methodologies, cloud solutions, mobility, business intelligence (BI) and analytics are enabling banks to remodel for digital technology and process reformation.

Today, investments across industry are vendor and platform agnostic and focus on integrating legacy systems of records with modern digital systems of engagement and intelligence. This is particularly true for banking organizations. Increased IT investments are driving the growth of digital QA and testing budgets across BFS, as well as “Shift Left”² initiatives. Our study reveals that organizations employ a combination of centralized and decentralized testing teams that are focused towards a comanaged testing approach.

To address the aforementioned needs, banks need an IT workforce that is well equipped to manage the rapidly advancing technologies with deep knowledge, experience and skill sets. Cross-skilling human resources around automated tools and evolving business models that are DevOps focused and digitally driven is a major imperative across the

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As the cloud proliferates and powers BFS digital transformation, cloud testing must become a prerogative for winning organizations.

Cloud Testing: Ensuring a Seamless Customer Experience

There are multiple good reasons for BFS organizations to integrate cloud services into their technology landscape. Our informal research suggests that global megatrends such as new operating and digital business models, as well as the push by customers to redefine the rules of business, are fueling the shift to cloud adoption. Potential benefits include:

- Minimized operational costs.
- Availability of more flexible infrastructure and services.
- Streamlined operations.
- Modernized core and noncore systems through the use of cloud service models.

The “customer is king” adage is truer today than ever. Customers demand consistent cross-channel experiences and persistent connectivity for their banking transactions and interactions, services that for the most part are enabled by the use of cloud infrastructure. For example, the cloud allows mobile payment providers to modernize transaction processing, and it makes new models for data management viable. Cloud is now increasingly used for sophisticated service configuration and delivery. Amazon Web Services (AWS) and Microsoft Windows 10 are examples of an enormous amount of automation that has been installed to enable cloud-based solutions. As the cloud proliferates and powers BFS digital transformation, cloud testing must become a prerogative for winning organizations.

The growing embrace of cloud testing among BFS firms will have significant impact on the three fundamental levers: people, process and technology. To keep pace with this development, we recommend that BFS organizations do the following:

- Raise the bar on skill sets within their testing teams; create hybrid team structures with adequate skill-sets around digital and take advantage of the diverse talent capacity available through virtual services such as crowdsourcing and cloud-sourcing.

- Make use of tailored infrastructure- and platforms-as-a-service models (IaaS/PaaS) on secured private cloud environments to support cloud testing.
- Establish cloud-based test environments and procure testing tools that enable better and secured inter- and intraorganizational sharing of resources to improve scalability, affordability, interoperability and security.

Cloud testing comes with its own set of unique challenges that organizations must prepare for and overcome. The lack of scalable testing environments and the lack of dynamic software validation solutions to address the dynamic features of software as a service (SaaS) and other cloud-based services can hamper an organization's journey toward a stable cloud test strategy. The shortfall of test models, test adequacy, test techniques and tools for security testing in third-party cloud infrastructure can be a major obstacle that BFS organizations should prepare for.

Given the global ubiquity of smartphones, it is advantageous for BFS organizations to leverage mobility as a platform to enhance customer reach and provide seamless and hassle-free banking experiences.

Despite the challenges, our experience suggests that cloud testing is and will remain a top priority for most CIOs in the BFS sector. The benefits associated with it - such as reduction in TCO, flexible infrastructure capacity, reduced time for provisioning, flexible payment models, on-demand service, multiple test environments and scalable tools availability - will make investing in cloud-based testing solutions a no-brainer for BFS CIOs.

Digital Assurance: Going Mobile

Given multiple banking channels such as IVR, mobile, Internet and branch, banks need to provide a seamless and consistent customer experience across all touchpoints. The role of QA here is to deliver a top-notch experience through best-in-class device integration testing, channel interface validation, security and compliancy testing, and service/network virtualization testing - whether the customer is accessing the bank via a mobile, tablet or visiting a branch in person. We anticipate the more expensive modes of banking

(such as branch and call centers) will be leveraged for only complex transactions.

Given the global ubiquity of smartphones, it is advantageous for BFS organizations to leverage mobility as a platform to enhance customer reach and provide seamless and hassle-free banking experiences. Omnichannel journeys are the norm for consumers; for banks, this means they must recognize and serve up data to individual internal users or customers as well as manage processes and data in new and unique ways.

Our experience shows that security, performance and compatibility of applications on digital platforms must be at the center of a digital assurance strategy, followed by functional and user interface testing for mobile solutions. Based on our work with clients, we believe many BFS organizations are turning to either third-party service providers or are establishing internal testing centers of excellence (TCoEs) to provide niche mobile testing solutions. To set up a specialized mobility TCoE, we recommend that BFS organizations do the following:

- Provision end-to-end testing infrastructure: devices, methods, tools and people to ensure quality of mobile applications. TCoEs would work explicitly in the area of digital assurance testing and should provide access to multiple possible combinations of devices, operating systems and application versions. They should enable organizations to scale up existing testing processes and offer new business products and services with higher quality, in a shorter delivery time and at a reduced cost.
- Address the rising demand for a dynamic workforce by leveraging testing as a service for a quick turnaround of tests. This can advance virtual work anytime, anywhere initiatives.
- Meet the needs of a tighter mobile app development cycle with Agile testing methodologies. Effective coverage of the testing procedures in a secured environment should be prioritized for mobile solutions.
- Embrace regression testing for mobile applications via automation tools. Organizations should look toward simulation of multiple possible devices, platforms, application versions and operating systems in a single automation testing tool for effective validation of mobile applications.

Foreseeable challenges are bound to emerge to digital assurance testing for mobile applications. One

is the lack of specialized mobile testing procedures. Companies cite a dearth of specialized resources to augment their existing internal resources for mobile testing. Most companies do not have the devices, platforms and operating systems needed to perform end-to-end mobile testing.

Apart from this, security testing for mobile banking applications is of the utmost importance. Also, crowdsourcing of mobile applications offers an effective way to perform testing using varied user demographics and combinations of devices and platforms; however, this approach may be deemed a security threat by most companies given the sensitivity and confidential nature of banking information. Other challenges for testing mobile banking apps include the complex industry value chains when providing location-based services (LBS), resource-intensive applications constrained by current mobile maturity, insufficient mobile banking infrastructure and network bandwidth.

Still, adoption of mobile testing has some obvious benefits. These include attracting and retaining tech-savvy smartphone users, offering instantaneous access to data and services for end customers, facilitating an on-the-go workforce, strongly enabling B2B transactions and communications, as well as delivering an omnichannel experience through emerging mobile technologies including wearables and beacons.

Banks sit at the center of the payments web and as such have unique insights into how, when and where customers are spending their money. This gold mine of information must be leveraged by BFS organizations to help design products and services tailored to customers' needs.

Big Data Analytics Testing: Aiding Decision-Making

Big data analytics has become a cornerstone in the digital transformation journey of many BFS organizations. The driver is customer service improvements, delivered through mass personalization and modernization of account management by leveraging customer feedback and drawing meaningful insights. In our work with the fifth largest U.S. bank, campaign analytics, segmentation and personalized recommendations

have driven a significant increase in the net promoter value. Big data analytics is leading the way in helping banks design customer-driven products. Today, banks sit at the center of the payments web and as such have unique insights into how, when and where customers are spending their money. This gold mine of information must be leveraged by BFS organizations to help design products and services tailored to customers' needs. Banks need to apply real-time insights into customers' spending patterns to boost decision-making relevancy.

In terms of the Code Halo™³ perspective, enterprise halos are beginning to reshape the banking business. These halos are transforming customer experience (e.g., consistent omnichannel and personalized services across touchpoints), operational processes (e.g., employee enablement and process agility) and business models (e.g., regulatory compliance and shared services).

According to our experience, big data analytics testing is among the top priorities in BFS-sector test strategies. The customer intelligence acquired from multiple banking channels can be more effectively leveraged if banks have suitable big data analytics testing infrastructure in place. To get there, we recommend the following:

- **Live data integration testing/performance testing:** Validating the collated live big data acquired from multiple feeds for quality and performance.
- **Instant deployment testing:** Deployment testing of live data to ensure reliable predictive analytics.
- **Scalability testing:** Validating the application's architecture for scalability with huge volumes of big data.
- **Security testing:** Data security testing at different levels of the application is hypercritical.

To move beyond "doing digital" to "being digital," we recommend that organizations embrace a big data testing strategy that does the following:

- **Demands greater skill sets from testers** as testing teams must also be responsible for identifying data irregularities, validating data quality and confirming the accuracy of the ETL process.
- **Defines new strategies and processes** for checking the quality of big data; this requires setting up validation processes for establishing accuracy and meaningfulness of big data.

The ability of big data analytics to help BFS firms make faster and more accurate decisions that drive value is why big data analytics and testing is soaring in popularity.

- **Emphasizes automation tools** that can handle complexities associated with large volumes of data and tools for instant deployment and that will focus on live data integration testing.

BFS organizations must overcome big data analysis challenges such as acquiring and analyzing data from multiple sources, the lack of right test automation tools/methods and inadequate QA skill sets. However, the ability of big data analytics to help BFS firms make faster and more accurate decisions that drive value is why big data analytics and testing is soaring in popularity.

Agile and DevOps Testing: Delivering Incremental Value Fast

Faster time to market, demands for greater transparency and the pressing business need for risk mitigation are nudging many BFS organizations to switch to Agile development methodologies.

Agile promises improved efficiency and speed, and also facilitates the creation of tools and software to satisfy dynamic customer behavior. One of our largest clients digitalized their transactions by using Agile and DevOps⁴ delivery approaches. With three releases per day, they reported productivity improvements and higher customer and employee satisfaction tracked through their continuous monitoring and survey scores. In our experience, BFS organizations should embrace more Agile and DevOps techniques for increased on-budget and

on-time delivery. For this, we suggest the following:

- **Focus on Agile testing principles** such as time boxing, DSDM⁵ test approach and exploratory testing.
- **Create versatile Agile testing teams** composed of a mix of business analysts, developers, and QA and testing professionals. Agile testing warrants an increase in the proportion of onshore and near-shore testing teams. Hybrid team structures and testing teams with diverse skill sets are helpful in accomplishing this.
- **Adapt traditional Waterfall testing methods** to include Agile-type Scrums and risk-based analysis for focused testing efforts. This can help BFS organizations facilitate their transition to full-fledged Agile testing.
- **Embrace Agile test automation tools** to significantly reduce regression and integration testing times. Testing tools that ensure maximum reusability of test scripts must be leveraged by organizations to obtain full benefits of their Agile journey.

BFS organizations must embrace an integrated DevOps quality approach with the DevOps delivery cycle, wherein the role of the DevOps QA engineer is central to the DevOps teams. Also, test-driven development models are required to bring more agility to the quality assurance process. A DevOps quality approach is based on continuous testing and continuous quality monitoring. A quality automation framework can be implemented for this, which can fulfill all QA-related needs around continuous build, deployment and monitoring, and it can provide a virtualized environment for quality validation, as depicted in Figure 1.

Continuous Quality, Integration and Delivery

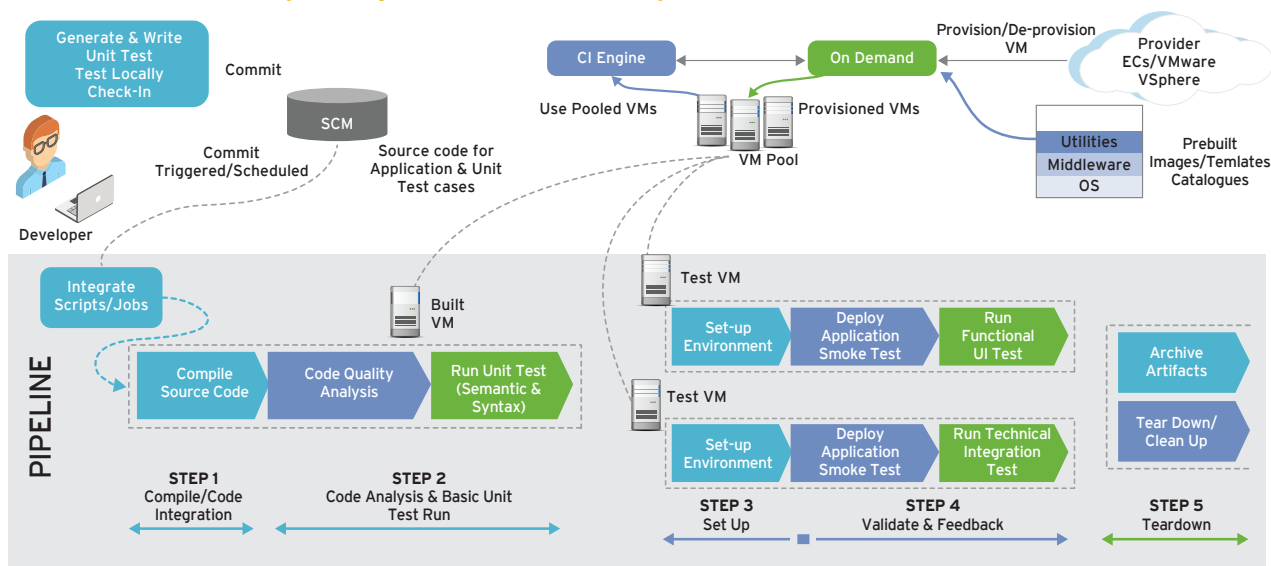


Figure 1

Challenges when transitioning to an Agile or DevOps methodology include the lack of an effective testing approach, an inability to apply test automation, difficulty in applying the right focus areas and lack of Agile test expertise. However, BFS organizations must cross the initial hurdles and establish a personalized Agile or DevOps testing strategy if they hope to keep up with modern consumers' ever-changing demands for personalized products and services.

Looking Ahead: Key Takeaways

- **Adapt your organization's QA and testing models to new technologies required by digital transformation.** Testers not only need specialized testing skills, but also better knowledge of business and industry.
- **Focus on omnichannel experience testing for validating E2E customer experience.** When creating test strategies for omnichannel applications including mobile solutions, the main focus should be on end-user experience.
- **Increase the use of cloud and virtualization solutions for test environments.** Define a cloud testing strategy after reviewing the existing test environment.
- **Focus on IT workforce transformation.** Cross-train and up-skill quality assurance groups to best cater to end banking consumers in the face of digitalization and technology advancements.
- **Develop faster and more structured testing solutions for Agile- and DevOps-driven projects.** Combine risk-based testing strategies with test-driven development. Also, Agile testers need to be more knowledgeable about business processes and development techniques.
- **Get a head start on automation with a test-driven approach.** Automate early, before the UI is ready, and consider deploying service virtualization to test before services become available.
- **Improve test efficiency beyond operational levels while controlling costs.** Improve test governance, effective use of specialists, standardization of processes and increased automation levels.
- **Increase focus on nonfunctional testing, specifically security and performance testing.** Provide state-of-the-art solutions for nonfunctional testing in a fixed-usage or output-based pricing model. A confidentiality, integrity, availability and security (CIAS) model should be used as a new benchmark for evaluating information systems security.
- **For a successful TCoE, combine multiple business domain-oriented teams with shared service centers.** Use early quality assurance, and deploy effective comanagement engagements between in-house QA teams and specialist third-party providers.

Footnotes

- ¹ Deploying games across digital channels to improve customer experience and educate customers about offered products and services. As such, it is a concerted attempt to use gaming psychology to influence (and alter) consumer behavior. It is not a promotional strategy (to acquire more accounts, for example); it is a product engagement strategy, to deepen relationships.
- ² A methodology or approach in which testing is performed early in the product lifecycle. The idea is to "test early and often" to improve quality, reduce cost and quicken time to market. Such initiatives can take different forms: traditional, incremental, Agile/DevOps or model-based Shift-Left testing.
- ³ For more on this topic, please read *Code Halos: How the Digital Lives of People, Things, and Organizations are Changing the Rules of Business*, by Malcolm Frank, Paul Roehrig and Ben Pring, published by John Wiley & Sons, April 2014, <http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118862074.html>.
- ⁴ A cultural shift in product delivery that aims at greater collaboration across departments and focuses on continuous integration between development, QA and operation activities. The DevOps approach leads to significantly shorter time to market, improved customer satisfaction, better product quality, more reliable releases, improved productivity and efficiency, and the increased ability to build the right product by rapid experimentation. The approach is gaining increasing adoption across industries.
- ⁵ Dynamic systems development method is an Agile project delivery framework primarily used as a software development method. It is an iterative and incremental approach that embraces principles of Agile development, including continuous user/customer involvement.

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About Cognizant

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