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Multidimensional & Federated QA: The Future of Financial Services Testing

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Trends in the financial services industry

The financial services industry is undergoing rapid changes due to advancements in technology, digital convergence, increasingly cheaper and newer channels of communication. Financial firms are investing in innovative product offerings to increase their market share. A few decades back, a typical financial institution just aspired to be the best deposit, savings & loan organization in a particular geography. However, in the current market scenarios, the financial institutions largely rely on technology for their growth and increase their reach out beyond their geographical boundaries through new communication channels. Many financial firms are engaging in strategic mergers & acquisitions to diversify their product & service portfolios and to increase their global foot print. This has in turn led to the transformation of some of these institutions into financial behemoths through diligent planning and aggressive product marketing over the years. The current business environment mandates that they keep pace with the technological advancements (mobile platforms, browser standards and tablets) so that they can meet the growing business demands in the industry. The internet and mobile usage in the financial industry has also been increasing.

The global IT spending in the financial services industry is likely to grow to $700 billion USD by 2015 [1]. Reports predict that by 2014, 50% of mobile subscribers will use their mobiles for digital purchase [2]. At the same time, events in 2008 have affected the monetary and fiscal health of financial institutions, which led to new regulations including the Basel III and the Dodd-Frank Act. This leads to the ominous question and theory of – *Have the financial services organizations become "too big to fail"?* A brief description of the regulations and the theory is given below.

BASEL III: This regulatory policy has been made to strengthen capital requirements and introduce new regulatory requirements on bank liquidity and bank leverage.

Dodd-Frank Act: The Dodd-Frank Act was brought about to protect a borrower from abusive lending and mortgage practices. This reform bill ensures that the government agencies monitor banking practices.

Too Big to Fail: According to this theory, certain financial institutions and sectors are exceedingly influential and too large to fail. If these large financial institutions crashed, it would have a huge impact on the economy.

Some of the major business and technological trends in financial services industry are:

a) **Mergers & acquisitions** – Mergers and acquisitions are common place today and involve transformation of business processes, data and information from multiple sources to the target organization.

b) **One enterprise focus** – Focus on creating an integrated solution for external and internal management with minimal downtime and maintenance.

c) **Improving ROI** - The aim is to cut the cost of IT spending annually and ensure optimal utilization of IT resources. For instance, a typical question asked by clients today is: "The IT infrastructure used for test environment may not be used more than 30%-40% of the year. How do we utilize it during the lean time"?

d) **Globalization** – Organizations which want to expand globally have to create applications and systems that can interact within the local geography and also be in sync with the centralized global application.

e) **Security & privacy concerns** – Organizations have the responsibility to provide a secure environment for its end users.

f) **Regulation & compliance** – Due to the recent economic slowdown and recessions in the global market, there is an increased focus on business transparency and uniform reporting practices through regulatory compliance accords.

g) **New technologies** – There is a constant demand for moving to newer technologies and for faster time to market. Mobile banking had started with SMS alerts/voice recognition apps and was followed by browser service applications/native applications, and currently the NFC (near-field communication) and RDC (remote deposit checks) are being considered for banking services.

h) **Digital convergence** – This has bought in a paradigm shift to the business functions in the banking sector. With the digiti-

zation of content, the advent of IP networking and new powerful consumer electronics (smart phones, tablets and PDAs), there is no distinction left between the data transmissions of voice, video, image and text.

i) **Social media emergence** – Twitter, Facebook and blogs are social media channels which are being considered as additional ways to connect with employees, vendors, suppliers or end-users for information, careers, user inputs and voice of customers. Bank of America was one of the first banks to provide customer service via Twitter [3].

j) **M2M** – Short-range communication technologies and near field communications will influence the payments and cards domain of the financial services industry.

k) **Business intelligence** – Business intelligence is the transformation of data into significant useful information for strategic, tactical and operational insights. It also covers data integration, data quality, data warehousing, master data management and content analytics [4]. This is relevant in the event of M&A and in social media scenarios.

l) **Innovations in cloud** – The idea of moving non-critical business applications to the cloud is gaining momentum within the financial services industry. This has triggered the shrinkage of private data centers. The virtualization of large servers into several logical servers is another trend that is attracting the infrastructure groups.

m) **Enhanced user experience** – The average age of the consumers in the financial firms is dropping. These end-users are tech-savvy and their expectations are increasing. The ease of usability and personalization are standard expectations now.
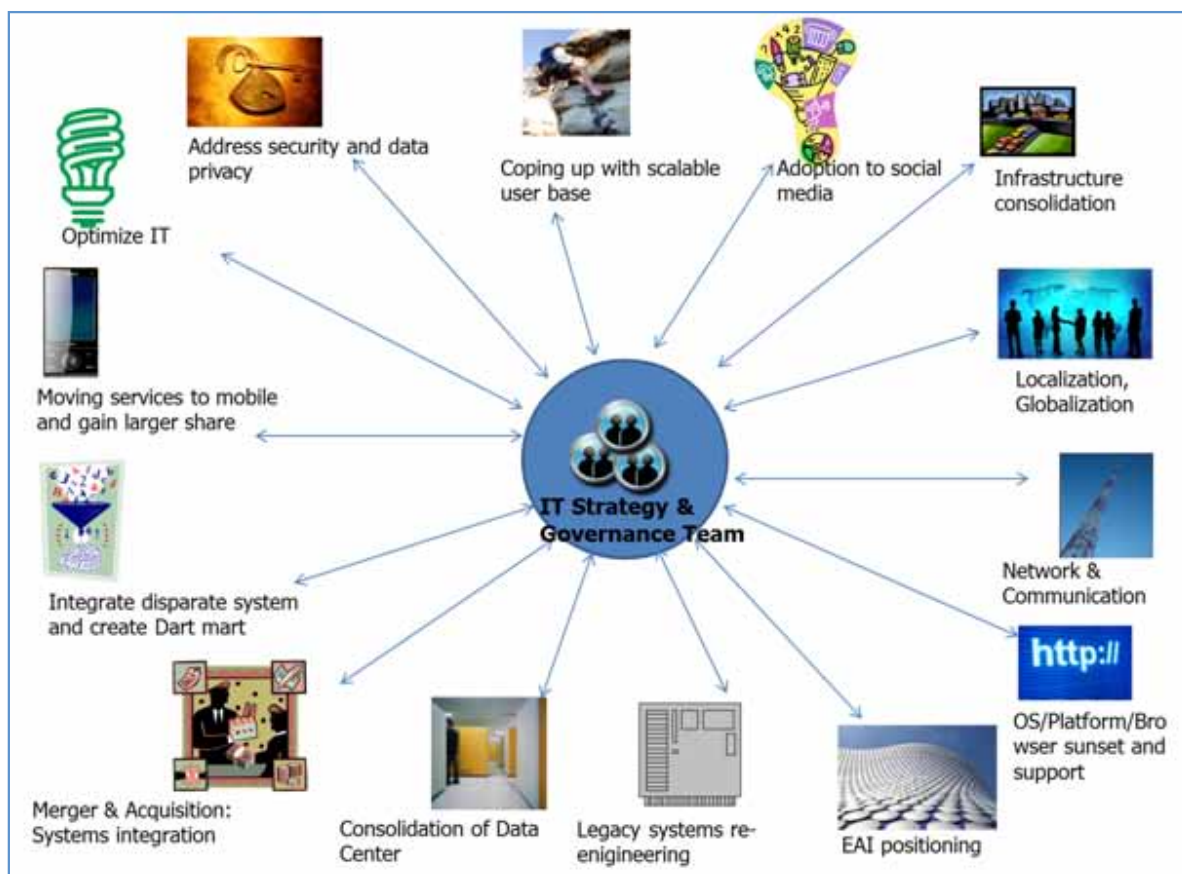

Figure 1: The IT Trends in Financial Services Industries

Futuristic QA of the Financial Services Industry

Software testing has made quantum leaps in the last decade to match pace with the increasing complexities of IT environments and meet the growing dynamic business needs. These business and technological trends in the financial services industry pose newer challenges for IT and governance, from an implementation and validation perspective. The QA teams in the early years (the 1990s) followed the **Test factory model**, which primarily focuses on functional and non-functional testing. The functional testing is a basic verification check that ensures the quality of a system. The non-functional testing caters to the scalability, stress or load testing for a given business situation. In the 2000s, when software testing gained more focus and attention, the Center of Excellence **(CoE) QA model** within QA organizations was created. The model focuses on automation, performance, data warehouse testing and web-services testing. The trends in the current financial services are highly complex and the skillsets of QA teams will have to be multi-talented to cater to the niche areas of QA. Each type of testing is focused in its own way and can be referred to as specialized testing.

Specialized testing is an 'array' of testing services created with the aim of partnering with clients to cater to their specific business needs which go beyond the realm of normal functional testing QA. "Glocal" i.e. thinking globally and acting locally is the apt word that describes the future of testing in financial services. This is a concept of QA organization reaching out to global resources to serve each client situation uniquely for a solution [5]. The term "globally" describes the global problem of the client for a specific issue or business situation. The term "locally" refers to the organized testing practices specific to a situation. Consider an end-to-end trade selling verification scenario in mobile banking as global scenario, this would involve functional testing, device performance testing, network variability testing, server performance testing, browser standards testing and usability testing to name a few as examples of local scenarios. Mobile testing for

financial services in payment application testing or cloud testing are examples of multi-dimensional specialized testing which includes usability, network performance, security testing, device testing, server configuration, environment, infrastructure apart from functional testing. The QA professionals in these scenarios would need to be multi-skilled for a **multi-dimensional federated QA model**.

The figure below illustrates the evolution of QA services over the years and our depiction of a futuristic QA team:

The table below maps the global events and trends taking place in the financial services industry to the corresponding validation points and types of testing:
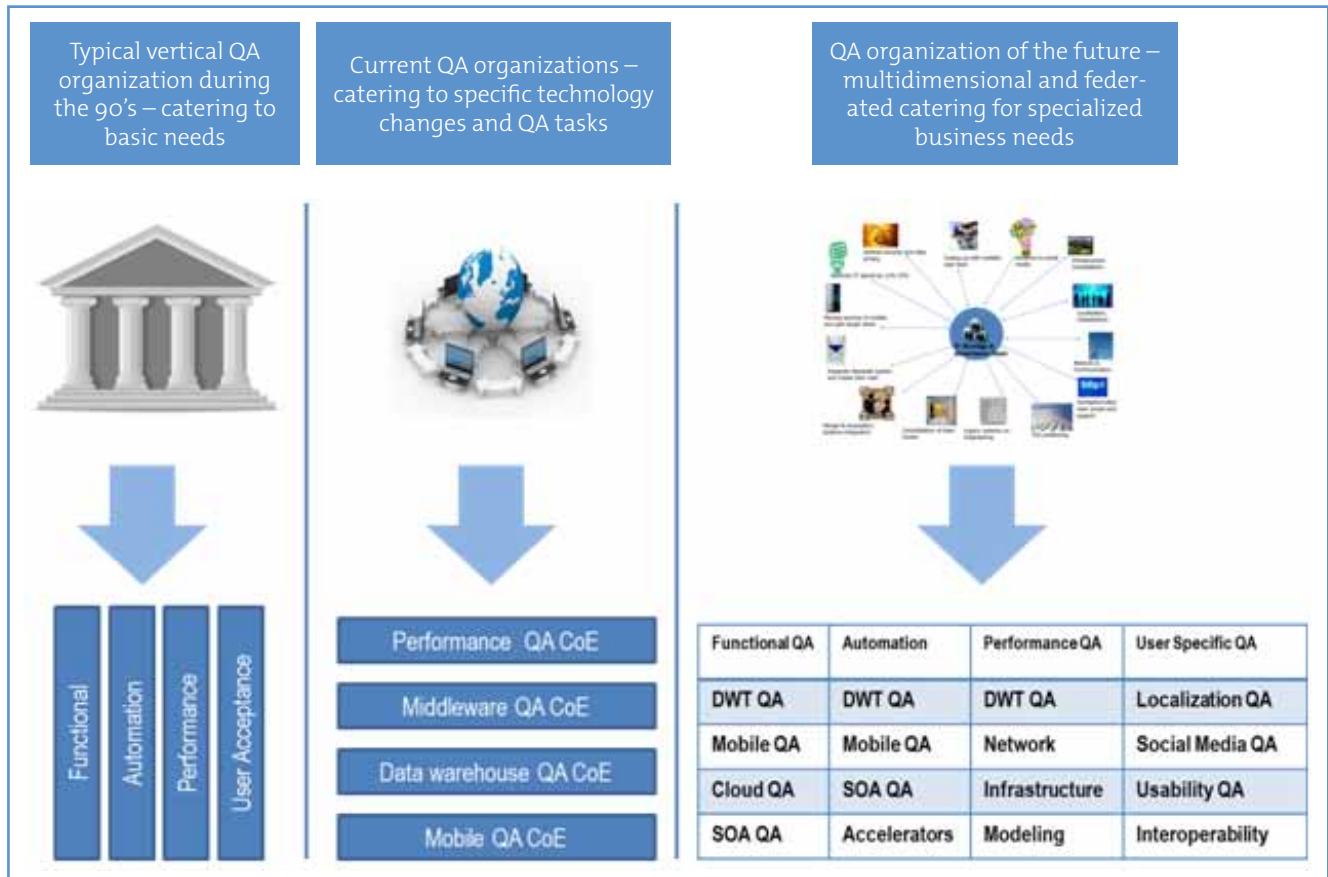

Figure 2: Transformation from a traditional QA organization to a futuristic QA organization

Global events, scenarios @ financial institutions	Validation points	Type of testing
Mergers and acquisitions	To verify the successful migration of system user base from bank XYZ to Bank A	Data migration testing Performance testing
One enterprise focus	To verify that the management information system works well as a product in an integrated environment	SAP/ERP testing Product/package testing
Improving ROI	To automate regression testing which would reduce the execution effort. Automation accelerators, performance test accelerators, mobile automation, SOA/Cloud automation are means to reduce testing effort	Automation effort
Globalization	To verify multi-country support for applications	Localization, globalization
Security & privacy	To verify accessibility, authorization and permissions	Security testing
Regulation & compliance	To test THE financial institution's data for regulatory and compliance accordance	Regulatory & compliance Testing
Newer technologies (e.g. mobile)	To test the financial institution's applications for mobile hand-held devices	Mobile testing
Digital convergence	To test the compatibility of PDAs, tablets, smart phones with financial applications, usability, form factor etc.,	Device testing, usability testing, network testing, security testing
Social media emergence	Testing the financial services company's social media websites and related applications.	Social media testing, Browser testing
M2M	To verify the mobile application's functionality for business transactions for mobile based applications	Mobile network variability testing, performance testing

Global events, scenarios @ financial institutions	Validation points	Type of testing
Business intelligence	To verify data flow from multiple sources to the unified target via reports, business intelligence and data analytics	Data warehouse testing, data validation, report validation, data mining
	To validate the back-end processes, system parameters & batch jobs	Back-end testing, batch testing
	To prepare data for testing and managing data effectively	Test data & master data management, data integration
Enhanced user experience	To verify a positive experience of using the application (from an end user's perspective)	Usability testing for client-server, mobile applications and performance testing

Future direction

The major business and technological trends in the financial services industry has led to complexities in QA processes, methodologies and the types of testing to be used. This also brings in the need for viewing the different types of specialized testing in a federated mode. The demand for QA team to be multi-skilled in functional and specialized in a few areas of testing is expected to increase in the coming years. The future of QA in the financial services industry will be specialized and a niche with federated capabilities.

QA as a discipline is at a critical junction now, where each specialized testing area has developed its own niche discipline (for example: mobile testing, cloud testing, SOA etc.). The QA industry has grasped the technology advancements and has developed its own processes and procedures to test applications and products effectively. However, the next big step should be "QA at the speed of technology". In other words, any advancement in technology should be accompanied with a parallel advancement in the corresponding QA discipline. In order to move towards this thought process, today's QA organizations should "ARM" themselves with the following aspects:

- Analysis of the current and emerging trends in the market: Smarter QA organizations would not wait for the product/technology to mature, rather they would invest proactively in them and ride on the wave of change effectively. Analysis of current and emerging trends in the market is very essential in order to formulate the future strategy for operations.

- Research & Development: Research oriented collaboration of QA teams with products/technology groups under incubation might lead to an accurately developed technology. Imagine mobile or cloud computing technology developed in tandem with the corresponding QA methodology.

- Mentoring & people enablement: Reliable mentoring programs are essential to inculcate this thought process in future QA leaders. However, constant training, competency development and assessment for specialized QA would be required for their sustenance.

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