TECHNOLOGY AND INNOVATION IN BANKING SERVICES - AN EMPIRICAL STUDY

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Abstract: The banking sector worldwide is becoming more focused strategically besides making huge advancement in technology. Banks and credit unions are innovating faster by targeting, expanding their services, delivering proactive advice, re-configuring delivery channels, integrating payments and using block chain technology. Digitisation has penetrated every sphere of life and the adoption of digital technologies in the delivery of banking services has reached substantial heights. This study employs on two major technology trends like API & Micro Service (amongst many others) which will help in addressing the customer and business demands. The results suggest that while digital innovations may exert significant positive influence on bank performance, there may be cost implications for the banks. It is crucial that banks while adopting digital innovations, should also engage in a reduction of the proportion of overdue and underperforming assets.

Keywords: Digital delivery channels, Digital innovations, Application Programming Interface, Financial performance, Micro services, Technology.

Introduction:

Innovation in banking technology is driven by the constantly evolving customer exceptions and internal business mandates. Customer behaviour earns have shied over the last couple of years and the focus now is on instant fulfilment (be it for account opening, transactions financial/nonfinancial) or problem resolution. Customers today demand a 24 x 7 consistent access to systems and services, with the fastest transaction processing possible and there is no room for system down time even scheduled maintenance or latency.

The competitive marketplace has led to a rise in business demands – to increase growth in terms of accounts and transactions, retain customers by responding effectively to their ever-growing needs, reduce costs to maintain profitability. Towards meeting the rising customer and business demands, a multitude of technological innovations are taking place at a wild pace now than it has in the past. Large organisations are ready to embrace new ideas and leverage the capabilities of Fin tech partners who are extremely responsive and agile.

For all the hype surrounding chat bots and machine learning (ML), few community-based financial institutions have deployed these technologies Going into 2020, just 4% of the institutions surveyed by Cornerstone have already deployed chat bots—twice as many as had deployed them going into 2019. But going into 2019, 13% of the survey respondents said they would be making investments in chat bots—and most ended up *not* investing.

There was a big jump in the percentage of institutions who have deployed machine learning from 2% in 2019 to 8% in 2020. And for 2020, another 17% expect to deploy ML tools. If history is any guide, however, fewer will actually invest.

Cornerstone's **What's Going On in Banking 2021** study, the top five technologies for 2021 are: 1) Digital account opening; 2) Application programming interfaces (APIs); 3) Video collaboration; 4) P2P payments; and 5) Cloud computing.

APPLICATIONS PROGRAMMING INTERFACE (API)

It is well understood that banks cannot do everything in-house and banks that want to be successful in the future will have to consider opening up their transactional data to third-party developers and consume third party capacities via APIs.

Inside-in: Enable more rapid, scalable, and efficient re-use of our services. Drive improved cost and me-to market by decoupling back end systems from applications.

Outside-in: Leverage the explosion of **third**-party APIs to improve our products and experiences and to invent new ones (F integration).

Inside-out (Partners, Trusted Developers & Public):

Extend the distribution of our products and services to new digital platforms by meeting customers where they are become an enduring part, if not enabler, of the broader Fin Tech ecosystem.

API IN FINANCIAL INDUSTRY

Banks are concentrating on internal (private) APIs at present, with some recognition that once their architecture is in place, they will move towards opening partner and public APIs.

OPEN API ECONOMYAND ITS IMPACT ON FINANCIAL SERVICES

Advent of open API economy has potential to unleash new wave of changes in the financial services industries. Bank Regulators and leaders are looking into drive beer deals for the customers by generating more competition, innovation, customer information sharing, transaction initiation, and payment mechanisms. Their efforts, along with changing customer sentiment, are creating both threats and opportunities as the open API economy emerges.

Evolution of Open API Economy

An open API economy will accelerate competition and innovation within banking industry, creating new demands on bank business strategies, pressure on ' future revenue streams, and challenges to profitability. Leading banks of the future will have a clear focus on their end customers and markets and will collaborate with other organisations to s accelerate their market position. An open API economy will enable the delivery of new products and services through collaboration among business units within a bank, among banks across the industry, and between banks and other related sectors of the economy, particularly technology and data businesses.

IMPACT OF THE OPEN API ECONOMY ON BANKS' VALUE CHAINS

Adoption of open API is accelerating customer centricity and bringing transparency, at the same time enabling banks to be more humble to scale on demand. Banks with retail and SME customers will see accelerated fragmentation of their value chain from new competitors entering the market and potentially disintermediation from their customers. The rise of the open API economy will see an unprecedented number of new entrants entering the financial services markets. Challenger banks such as Fidor (Germany), Atom & Starling in UK are adopting "API first" strategy to define their business model, which is enabling their customer to have on demand product and services. Fin Tech have intermediate the banks to large extents where as consumer has started engaging with Fin Tech for variety of financial Transactions whether it is in Lending or deposits space. Technology giants like Apple, Facebook, Google are advancing their game in financial services business and taking full advantage of possibilities by entering payments market and engage ready for further disruption.

Response from Banks to rise an open API

Banks have acknowledged API banking and gearing up towards responding to it. Banks are adopting short to long term strategy (in parallel accelerating value delivery through in FinTech partnerships) FT.

Short-term (0-12 months)

*Define overall strategic direction in light of the rise of the open API economy, resulting in refresh of business and technology strategy and;

*Determine future markets and revenue streams based on existing/new products and services, powered by an open API economy.

*Define the pathway(s) to future operating model(s) based on specific products and services.

Medium-term (12-36 months)

*Actively seek to "test and learn" using key strategies by leveraging internal expertise and appropriate partnerships in the open API economy and confirm initial operating model, including bank customer data approach '

 *Continue to earn and refine.

Long-term (post 36 months)

 *Launching new business innovations and staying ahead of competition.

MICRO SERVICES IN BANKING

The micro services architecture splits monolithic applications into a set of services that talk to each other via open APIs. Each service performs one function extremely well; the service and its API are products that are discoverable, well-defined and carefully maintained. Self-contained services are then assembled as required. Services cooperate to deliver complex functionality, even if they are deployed independently of each other. Services can scale independently too, making the software adaptable at rename. And if one service fails, it typically won't bring down the entire system' because of the re silence built into micro service based digital banking solutions. Separation means that each service can be developed independently using whichever methodology, programming language, application framework or data storage options are appropriate to the specific task it fulfils. And this also means that the micro services assembled into a solution can be developed by entirely separate organi sation.

How can banks benefit ?

Micro services architecture has its own benefits which include improved agility, reliability, elasticity and finally global scalability. In the current climate when challenger banks are

being built ground up and are able to accelerate their digital value propositions at lightning speed, large banks are actively rethinking the fastest way to accelerate transformation, micro services has been one of the well adopted approach. - Adoption of micro services brings its own challenges which banks need to deal effectively, challenges such as IT delivery organisation adopting Agile and Develops, new skill matrix across design, development and testing.

ARCHITECTURAL MODELS CONSIDERED

Service Based Architecture

*A service-based architecture provides more delivery speed than a monolith or service oriented architecture (SOA) by breaking the code apart in the domain-centric way advocated by micro service and DDD (Domain Driven Design) proponents. SOA advocates breaking the architecture apart into layers rather than by domain. This ends up meaning that a simple change from a business perspective is more likely to be spread across multiple layers, requiring lots of testing to release. A domain centric architecture will increase delivery speed compared to monolith or SOA by decreasing the testing surface to a single component to be released. The smaller the component, the smaller the testing surface, which is what micro services optimise for. But a service-based architecture should still speed up delivery of working software

*Service-based architectures consist of deployable services, (lesser than the numbers advocated by micro service proponents). These micro services may have separate data stores, or may still share a single monolithic data store.

Tactical Micro services

Instead of proactively decomposing the application into micro services to allow separate lifecycle and deployment, isolate them or separately scale each out, to take advantage of the common infrastructure and environment uniformity where possible, while explicitly identifying and extracting components that warrant separation. The tactical micro services is either reactively separating out micro services that require complete isolation or have separate scaling needs, or anticipating such scenarios and proactively deploying them as individual micro services For example, if one of the business services [e.g. Reporting Services] in the application is best maintained and upgraded as a small and separate unit that is managed by a dedicated team, it may be deployed separately.Similarly, a component within another business service may be extracted and separated.

Business driven Micro services

* A distributed, business-driven, micro service architecture can achieve many of the benefits. An important and distinguishing characteristic of this architecture is that micro services do not communicate with one another. Instead, an aggregation layer is provided in the form of a web application that provides the required coordination. In its simplest form, micro services in this architecture remain self-contained within the system by avoiding any dependencies on

other micro services. This does not include external dependencies, but is an attempt to simplify the environment by avoiding a large and deep dependency graph within the system.

*When a certain component requires special consideration, either in its scaling requirements or in terms of fault isolation, it can be broken out and deployed independently. This can lead to a hybrid solution incorporating some of the tactical considerations of the previously described architecture depicted in Tactical Micro services.

Strategic Micro services

 The Micro service Architecture paradigm can be fully embraced by decomposing entire applications into Micro services and implementing entire systems as separately deployed Micro services regardless of actual or anticipated isolation needs of individual services. In this architecture, each micro service includes its own persistence, which is at least logically encapsulated within the service. Each such service can be independently deployed, scaled, upgraded and replaced. The environment is fundamentally heterogeneous, so while frameworks and infrastructure services may be available to provide features and functions, each micro service is free to use its preferred micro technology.

 The recommended approach are:

*A tailored "Hybrid Micro services/Service Based" architecture model which decomposes the system into Domain-Specific Macro Services

*This model would resolve orchestration, transaction issues, allow complex business processing, use shared database for service clusters , reduce contract dependencies, improve performance due to fewer remote calls, allows transformations of contract differences, non transactional orchestration of services, protocol agnostic heterogeneous inter operability and less complex service governance

 *For example at high level, we recommend, domain service clusters for current & savings accounts(CASA), Client Demographics, Investments and Insurance, Assets and micro service clusters like Fund Transfer .

*A domain service cluster like CASA can be further decomposed into services like Account Opening, Cheque Processing and Debit Card Processing

*Similarly core service cluster like Fund Transfer will consist of services like Payee, Transfers (Internal, External - NEFT, RTGS, IMPS).

*Inter-service communication will be realized through Event Stores, APIs or Service to Service Calls.

*This architecture will support customer centric framework and API based development scalable for future requirements. Shared database across service clusters will require minimal changes to core data model and peripheral applications testing effort.

CONCLUSION

While many innovative technology trends are emerging to address ever growing customer and business - demands, the two topics that I have addressed in this article will prove to be as this will completely modernize the core banking system. Front end interfaces will be achieved through the APIs which will be channel and partner amongst. Back end systems will be truly component based and will contribute substantially towards improving scalability and high availability. This architecture will also enable banks to utilise cloud infrastructure which will help in considerably bringing down the infrastructure costs.

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