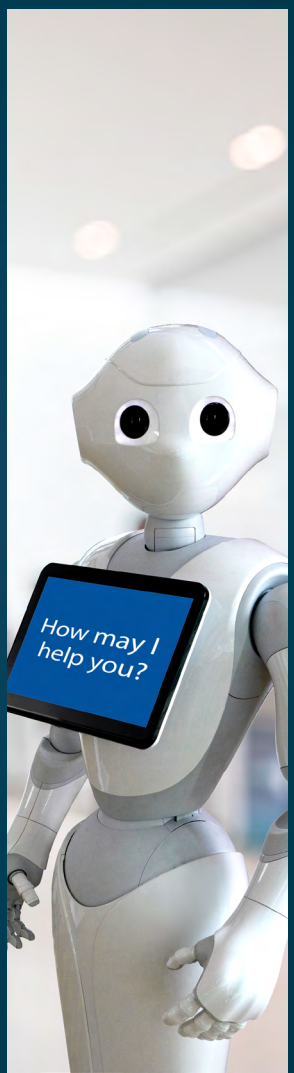
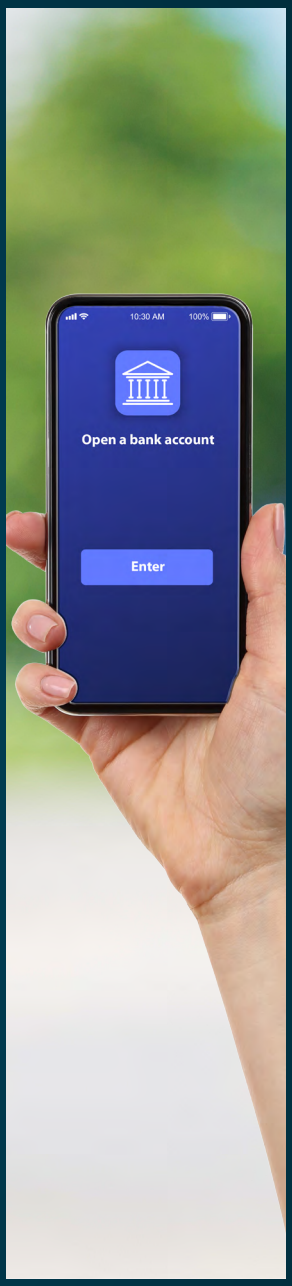
Infosys® | Finacle

SCALE DIGITAL

10 TRENDS RESHAPING BANKING IN 2020





Preface

Ubiquitous digitization of our world is reshaping financial services like never before. Digital is disruptive, pervasive and transformative. It constantly challenges the status quo, has a ubiquitous impact on business and organization, and requires constant re-imagination of the business. With this pervasive digitization, the financial services industry faces the dual disruptive threats of disintermediation and commoditization. Both forces feed into each other. Disruption drives disintermediation and disintermediation drives commoditization, thus accelerating the pace of change. The disruption cycle is further accelerated by the confluence of modern technologies such as Cloud, Artificial Intelligence, Blockchain, Mixed Reality, and Internet of Things. The combination of these technologies is deeply influencing the way individuals and businesses work and bank. They are blending the physical, digital and biological worlds.

In response, many banks have made significant investments towards their digital transformation. However, as the findings of the Infosys Finacle Efma 'Innovation in Retail Banking' 2019 report suggest, only a few have succeeded in deploying them at scale. In our conversations with banks of all sizes across the globe, we sense a growing impatience to get past the challenges of legacy technologies, integration, and culture, some of the biggest barriers to transformation.

In our view, the right formula for deploying digital at scale demands transformation across five key areas. Firstly, in a commoditized market, banks have critical choices to make to evolve their business model and embrace the shift from pipeline to platform. Evaluating the strengths, appetite, and business goals to choose the most suitable business model is the first step in business model transformation. Next, regardless of the combination of business models a bank adopts – universal bank, manufacturer, distributor, marketplace, segment player, or a banking-as-a-service provider – agility and responsiveness to change will greatly determine the success of a bank in a customer-centric digital future. Banking organizations can no longer continue to work in organizational silos, and hence agile business approaches are essential for continuous innovation to stay relevant in this rapidly evolving environment. Thirdly, operational efficiency and speed, two of the most crucial factors of success for digital transformation-at-scale demand adoption of ubiquitous automation across the board. An agile organization is one that makes technology work for it, not the other way round. Consequently, aligning the technology and applications landscape to enable and accelerate business outcomes is paramount for scaling digital successfully. This means adopting cloud-native applications and smart open scalable systems designed for collaboration. Lastly, embedding new ways of thinking, creating, and working, into the regular workday and orienting the workforce and culture to customer-first principles are crucial constituents of a "scale digital" charter.

The ten trends featured in this year's report have been selected and curated to reflect the shifts across all these five areas - business model, agile organization, ubiquitous automation, technology modernization, and culture and workforce transformation. Drawing upon Infosys Finacle's experience and opportunity to learn and shape banking, the report aims to inform your direction and help accelerate your digital journey. Each trend has been compiled not to prescribe or recommend an approach but to help you identify and align your strategic priorities to scale your unique digital journey. We hope the insights captured in this report empower you to discover the most suitable approaches, tools, and strategies to scale digital for your unique context.

Wishing you a year that sets you up for success in 2020 and beyond!

Warm regards,

Sanat Rao
Chief Business Officer and Global Head
Infosys Finacle

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2020: The year the business model changed

2019 will close on a somber note, with banks' growth slowing down across most markets, even going below the GDP growth rate in some countries. Margins are also under pressure; one report estimates that the returns of nearly 60 percent of banks are lower than their cost of equity. While Europe retains the dubious distinction of being the worst performing market, emerging banking markets, including China, Brazil and India, are also posting lukewarm results. There are signs that a slowdown is coming, although industry observers are divided on its exact timing.

Heading into 2020, banks will have to consider receding from a me-too universal bank model to start focusing on and ultimately excelling in a particular area. In a commoditized market, this is the only path to growth. Here, there are two decisions to make – selecting the area of focus, which would be influenced by context (customer base, asset size, capital structure, operational strengths etc.) and choosing between scaling the existing business model and evolving a new one.

For a bank continuing with the existing business model, the focus area could be **scale**, built through organic growth or acquisition from a growing pool of unsustainable banks; **value**, as the most cost efficient player in the market; **customer experience** that differentiates it from all others; or **product/ service** excellence in a niche, such as unsecured lending, mortgage, student financing etc.

If a bank decides to evolve its business model, it could choose to be any of the following: a **manufacturing bank** that produces the most efficient product(s) in the market and white labels it for third parties to use; an **aggregator** – India's Paytm and U.K.'s Starling Bank are great examples – that curates products and services to fulfill more than just the banking needs of customers; a **distributor** that focuses on acquiring and servicing customers without taking on mid and back office burdens (many Fintechs and neo banks do this); a **segment player** that focuses on say, manufacturing companies or ecommerce retailers; or a **banking as a service** provider that is a manufacturing bank, which also directly acquires and services its customers.

Regardless of the choice, every bank will spend 2020 transiting between its current and target state, and hence, juggling a combination of models. This is quite expected since banks are slow to adopt new business models: in the 2019 Innovation in Retail Banking study, presented by EFMA and Infosys, as many as 50 percent of respondents stated their intention to continue as full stack banks working in retail, business and corporate banking. However, we can expect some acceleration in the pursuit of scale or value leadership or alternative business model, as banks realize that in order to survive their commoditized markets they must seize ownership of a property such as size, cost efficiency, experience, distribution or customer segment. Here, they will get help from the environment in the form of opportunities to acquire or merge with weak banks – [1]a recent report says 35 percent of banks globally are staring at merger or sell-out to survive – and to establish new models, such as specialized marketplaces or digital-only banks. It is worth mentioning DBS, which, in addition to digibank, has set up four marketplaces for property, car, electricity and travel.

The momentum will be greater in markets that have embraced Open Banking, where banks are under more pressure (but also have more opportunity) to differentiate their propositions.

As partners to several banks that have started, or are about to, change their business models, we believe the time has come to place clear bets. In a digital world, where the winner usually takes all, sharp vision, flawless execution and early action make all the difference. 2020 is upon us; there's no time to waste.

Heading into 2020, banks will have to consider receding from a me-too bank model

Returns of nearly 60 percent of banks are lower than their cost of equity

Very few organizations – just 14 percent – think they are innovation pioneers

75% banks believe leading consumer technology companies and FinTechs will lead banking innovation over the next 5 years

Banks need to choose between

Continuing with existing business models, a bank can choose to be a

Scale leader by organic / inorganic means

Value leader by focusing on automation and efficiencies

Customer experience leader by crafting differentiated and contextual customer journeys

Product / service leader by offering the best-in-class product / service in a chosen area

Evolving its business model, a bank could choose to be a

Manufacturing Bank, Build the best-in-class product and make it available to ecosystem in the most efficient manner

Value aggregator, Curate the best-in-class ecosystem and provide for customer needs going beyond banking

Distribution focused, Be the best in customer service without being weighed by mid & back-office processes

Segment player, Focuses one customer segment like manufacturing companies or ecommerce retailers

Banking as a service provider, A manufacturing bank that also directly acquires and services its customers

Citius, altius, fortius with Agile in 2020

Rapidly evolving customer expectations have put banks in a competitive race unlike ever before. Leading banks are taking customer-centricity a notch higher. Riding the data and digital wave, these organizations are redefining the age-old technique of market segmentation and personalizing experiences to a "segment-of-one". By calibrating not just the demographic attributes of a customer segment into their experiences and solutions, but also the lifestyle, aspirations, mindsets, hobbies, and underserved needs of their individual customers, these banks are micro-personalizing customer value. In 2020, the race will intensify as fast-followers and mainstream players join this pack of leaders and first-movers. However, as the success stories and challenges of some of these leading banks demonstrate, desired customer outcomes are seldom a result of prudent application of technology alone. That the adoption of agile business practices throughout the enterprise radically increases the rate of success is now more than a substantiating clause that adorns the pages of the book of Agile.

So what is this agile way of doing business?

We are talking about an all-encompassing definition of agile that pervades technology, operations, talent practices, business strategies, leadership and management, and ecosystems.

In 2020, banking, an industry known to be exceedingly slow and resistant to change, will be marked by an uncharacteristic impatience for modernizing the IT and technology landscape. Banks have wrestled with the challenge of staying relevant and competing with the likes of GAFA whose technology prowess allows them to introduce new features and upgrades within minutes and in the most non-intrusive way to their customers. In 2020, greater adoption of cloud, continuous integration and continuous development (CICD), and Dev-ops will accelerate the agility to assimilate changing market expectations and quickly translate them into action.

Next, Agile in banking will be characterized by a bolder and more expansive adoption trend that goes beyond the traditional design-build-test-deploy practice which is limited to product development at large. Leading banks are cultivating flexible and flat organization structures that encourage collaboration, enterprise-wide adoption, and empower employees at all levels to make decisions. Although embryonic currently, this is a sign of Agile maturity, a move towards "transforming with Agile" or "being Agile" as opposed to "doing Agile" in pockets. A good example here is Bank of America's top-down approach. In an industry-first, Bank of America began its Agile transformation journey with a few members of the executive management team leading by example. These leaders got themselves certified as scrum masters and evangelized Agile right at the helm. They went all-in after this first step, deployed Agile coaches from outside the organization, relentlessly measured progress of transition with time-boxed iterations, and redefined the organization structure to break down silos and enhance collaboration.

What's more, in 2020 banks will not be content with adopting agile business practices within their organizations. Leading banks will also lead the change in their respective ecosystems. Banking has experienced a sweeping rise of ecosystems over the past couple of years.

In the new year, hedging themselves and their ecosystem partners against the risk of potential roadblocks in the ease and speed of doing ecosystem-driven business, leading banks will take it upon themselves to accelerate ecosystem innovation through greater integration and exposure of sandbox environments to third-party developers, FinTechs, partners and regulators.

To conclude, a truly agile organization in 2020 and beyond will be a sum of various self-learning, self-healing, and self-evolving parts, each of which works in tandem with the other through suitable gateways for collaboration. Much like a living organism that evolves, adapts and self-learns, more and more organizations will live and breathe Agile in 2020, making it a year of Darwinian evolution in business.

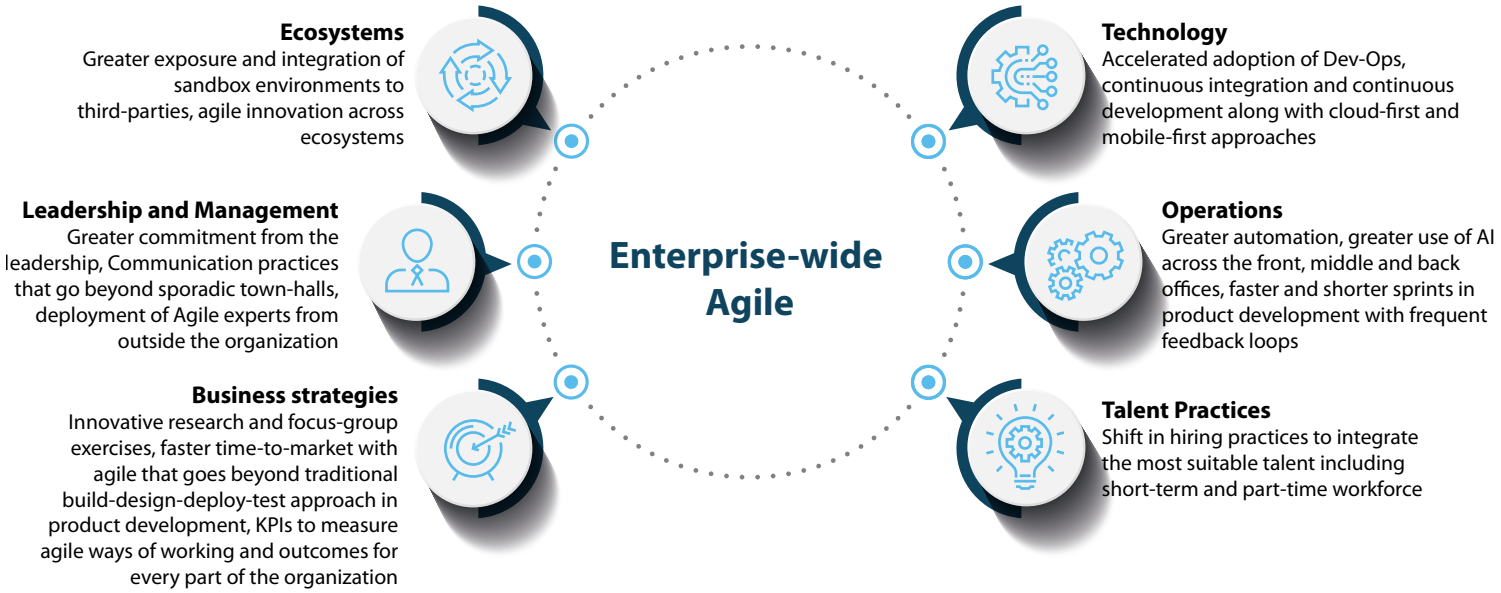
Technologies such as analytics are bringing in a shift unlocking new customer value

Segmentation

Personalization

Micro-personalization

In 2020 banks will adopt enterprise-wide Agile for greater flexibility, speed, and customer-centric outcomes



Automation in 2020: Alive and well and everywhere

As one of its key strategic levers, automation is an evergreen theme in banking. With the fourth industrial revolution, automation has evolved beyond eliminating inefficiency in parts to pervading every process, journey and function in banking, lowering costs, improving experience, curtailing risk and improving operations in myriad other ways. Banks are employing automation across customer and employee journeys, for example in customer onboarding, where a machine learning/ machine vision program scans documents, extracts their information and validates it by connecting to various external systems, while a biometric application does a liveliness test to verify that the "customer" is indeed human and alive. Machine learning is also helping banks reduce risk by identifying and preventing fraud more effectively than a traditional rule-based system. Automation and artificial intelligence technologies are underpinning a digital workforce that is dramatically changing the cost structure and organizational dynamics of banks. In 2020 and beyond, banks would need to continue on the path to ubiquitous automation to match their digital challengers in cost efficiency – many of whom operate at sub 30 percent cost income ratios – agility and quality of engagement. It is going to be a race between incumbent scale and challenger cost structure.

Banking automation is already fairly mature, with a landscape dotted with technologies from different generations, from rule-based and BPM-led automation, to API-driven straight through processing, to robotic process automation. The latest to emerge is cognitive automation with machine learning, which is still in a nascent stage of adoption.

All the use case examples mentioned so far – customer onboarding, fraud detection etc. – are internal to the banking organization processes. Automation is also finding its way into inter-organization processes, between bank and bank or bank and regulator, for example. In the past, this was achieved through host to host integration and then, API-based integration, both of which involved the placing of a request, which was acknowledged and put into action. Now, with Blockchain, the request and action processes can also be fully automated. Today, automation can be applied not only to internal and external operational processes but also to the various technology applications running in the bank, turning them into auto scaling and auto healing solutions.

The outlook for automation in 2020 and beyond remains strong, amid continuing pressure on margins. Even the application of traditional automation levers – rule-based, BPM or API-led – shall increase, as the laggards expand usage to catch up with the progressive banks. In the past, bank applications used rule-based processing or APIs to connect to other systems – for instance, an account opening application would connect to a discrete OCR application via an API; going forward, banking business applications shall be embedded with cognitive capabilities, such as machine learning or natural language processing, enabling further out of the box automation. Increasingly, vendors will develop cloud-native applications that scale, heal and correct themselves without external intervention. In 2020, we expect Blockchain, which has undergone years of experimentation to establish proof of concept and then proof of value, will go into production in the form of

structured initiatives that bring about systemic change. Besides automating payments and trade finance (which has seen several announcements), Blockchain networks will expand inter-organization automation in areas such as syndicated lending.

There will be a noticeable move towards the creation and adoption of banking industry utilities, especially in non-differentiating functions or those with high complexity but low volume – think KYC, mortgage processing, or trade finance processing. In 2020, we expect that many banks will come together to build these utilities on a Software-as-a-Service or Business Platform-as-a-Service model to bring down operating costs for all.

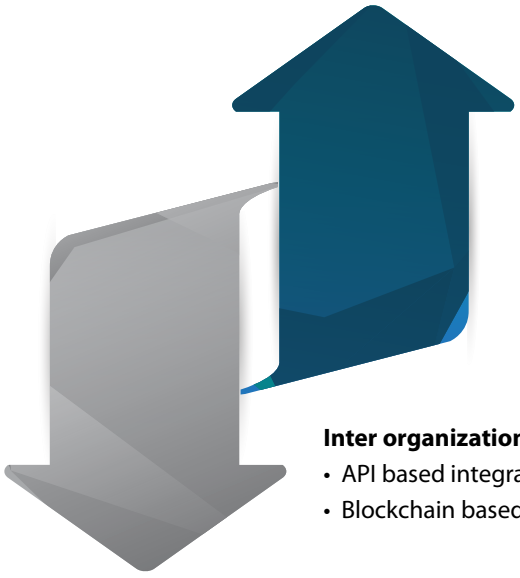
Banking automation is already fairly mature

In 2020 and beyond, banks would need to continue on the path to ubiquitous automation

Example: Automating customer onboarding

Examples: Automating contracts processing

Example: Accessing millions of transactions and non-traditional data sources to identify suspicious activity and fraud



Intra organizational processes:

- Rule-based and BPM-led automation
- API-driven straight through processing
- Robotic Process Automation
- Cognitive automation

Inter organizational processes:

- API based integrations
- Blockchain based networks

2020: The bank of the millennial workforce

With millennials infiltrating their ranks, banks will be preoccupied with shaping their workforce and culture for organizational success in 2020 and beyond. The most successful organizations will create – or sustain – a culture that unites their people in a shared purpose. That shared purpose could be maximizing the opportunities of the digital age to fulfill business and customer objectives, or equally, meeting its challenges head on.

Focusing on four capabilities

In 2020, the most progressive banks will focus on building four vital capabilities in their millennial workforce. The first of these is critical thinking. As automation and Artificial Intelligence take over an increasing number of manual tasks, the most important responsibility of the human worker is to add value through critical thinking. Since most education and training systems do not inculcate this capability, banks will have to fill that gap either singly or in collaboration with academia, training providers, industry experts, and other partners.

The second capability is collaboration. As families shrink, humans are losing their ability to collaborate. This is particularly true for the younger generations. But organizations survive and thrive on collaboration; hence one of the biggest priorities today is to teach the workers to function interdependently – and not just independently – through sharing, participation and collaboration.

Linked to the above is the third capability that banks will focus on developing in 2020 – communication. Paradoxically, communication has all but broken down even as people connect incessantly with each other online. Face to face conversation has been replaced by information exchange on Facebook and other channels. This is a worrying sign for organizations, which, while leveraging the potential of digital technology, cannot afford to distance their employees from their customers, or from each other. Therefore, teaching the art of communication must be a part of every training program.

So should the art of creative thinking. Every person is unique, more so the millennial, who has a strong sense of identity, and a stronger need for individual recognition. To tap that creative potential, the organization must change its internal focus that is structure and organization-centric to one that is employee-centric and even employee-specific. In the past, banks' external outlook changed from product-centricity to customer-centricity and then, customer-specificity. This year, it is the turn of the internal outlook.

Spreading triple literacy

In the years to come, the goal of training will be to keep the banking workforce relevant. Programs will change to suit the digital native learners and their environment, targeting three kinds of literacy: information literacy, media literacy and technology literacy.

As data grows to unmanageable levels, banks must develop judgment in their employees about what information to gather, what to store, what to assimilate and what to ignore. The workforce should also understand how to turn the insights of analytics into wisdom and competitive advantage.

The young bank worker is a heavy user of social media. This can yield many advantages for the bank, such as better customer service and advocacy, but an employee's careless post can also cause instant, irreparable damage to both brand and reputation. A media literacy program can inculcate best practices and etiquette in the workforce, so that employees know how to behave in social media.

In the past, technology training was directed at the IT organization. But digital technologies are so consumerized that it is essential to make every bank employee literate in them. Future training programs will focus on developing technology appreciation in the banking workforce to enable them to leverage new digital technologies, such as Cloud, IoT, Blockchain and AI for the organization's benefit.

Riding the gig

Previous generations produced career bankers; the millennial generation, on the other hand, has given us the gig worker. The gig worker is hard to pin down – this could be the worker who enters the organization to do a specific job and leaves once it's done, or works flexible hours from flexible locations on flexible terms. The most valuable companies of today use as many, if not more, gig workers as regular employees. The benefits are huge – low overheads, wide talent pools and vibrant communities, to name a few. Starting 2020, banks should tap the gig economy, not only to reap similar benefits, but also because "permanent" employees will be increasingly hard to find.

Overcoming the challenges of the times

Millennials want to work in organizations that embrace values such as social and environmental consciousness, inclusivity and diversity. For traditional banks from an earlier time and different value system, the challenge will be to deploy, demonstrate and sustain actions in line with millennial values. Another challenge is increasing protectionism with most governments stressing the need to hire local talent. In 2020 and beyond, many banks will have to reconstitute their workforce with mostly local talent, supplementing it with international hires for skills not available locally.

In 2020, the most progressive banks will focus on building four vital capabilities in their millennial workforce

Critical thinking

as automation and AI will take over manual tasks

Collaboration

Employees should function interdependently – and not just independently

Art of communication

in the age of digital

Creating thinking

to make the shit to customer-centricity and then, customer-specificity

Spreading triple literacy

Information literacy

To make right judgements on information usage and leverage insights optimally

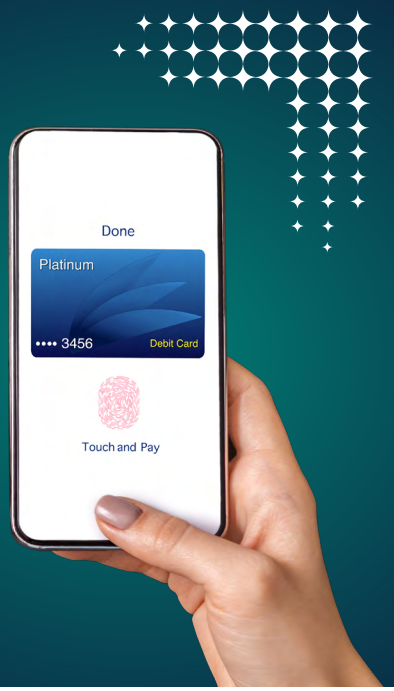
Social media literacy

Young workers are heavy social media users – best practices and etiquette are important

Technology literacy

Enabling employees to embrace new digital technologies, such as Cloud, IoT, Blockchain and AI

2020: The year of security dichotomy



Our 2019 security forecast identified data privacy regulation and Artificial Intelligence-led attack as the key themes. In 2020, the trends in cybersecurity will derive substantially from those in cloud computing, digital identity, 5G and the Internet of Things, and automation/ AI/ Machine Learning. Regulation will remain an important, and possibly, the trickiest trend to negotiate in the New Year. Some trends will work in opposition to others, forcing banks into a delicate balancing act.

The rapid adoption of cloud computing, particularly the use of the public cloud, will have enormous implications for banking security. Public cloud providers have evolved security beyond what any individual bank can achieve, but their defenses are only at the level of infrastructure. Beyond that, it is the banks' responsibility to configure their applications safely on the cloud, in conformance with prescribed rules and specifications. We therefore expect that in 2020, banks will focus on building resilience through employee education, by maturing their cloud competence, and by acquiring new tools for managing cloud security.

With customers transacting increasingly on a variety of digital banking channels, strengthening online identification and authentication will remain a top priority for the industry. The password is passé; current and future digital identity management will employ a combination of biometrics led multi-factor security. An emerging trend is leveraging behavioral analytics – tracking how each user works a keyboard or mouse, for instance – to verify that he or she is genuine.

2020 will see more devices connecting to 5G and the Internet of Things in different parts of the world. As billions of devices, from simple phones to intelligent voice assistants, exchange information with a universe of other devices, networks and people, they will impose new security challenges. In 2020, banks will have to figure out how to plug the vulnerabilities when say, a 5G-enabled car transmits a customer's private or confidential information to another connected device, such as a tollbooth or drive-through restaurant.

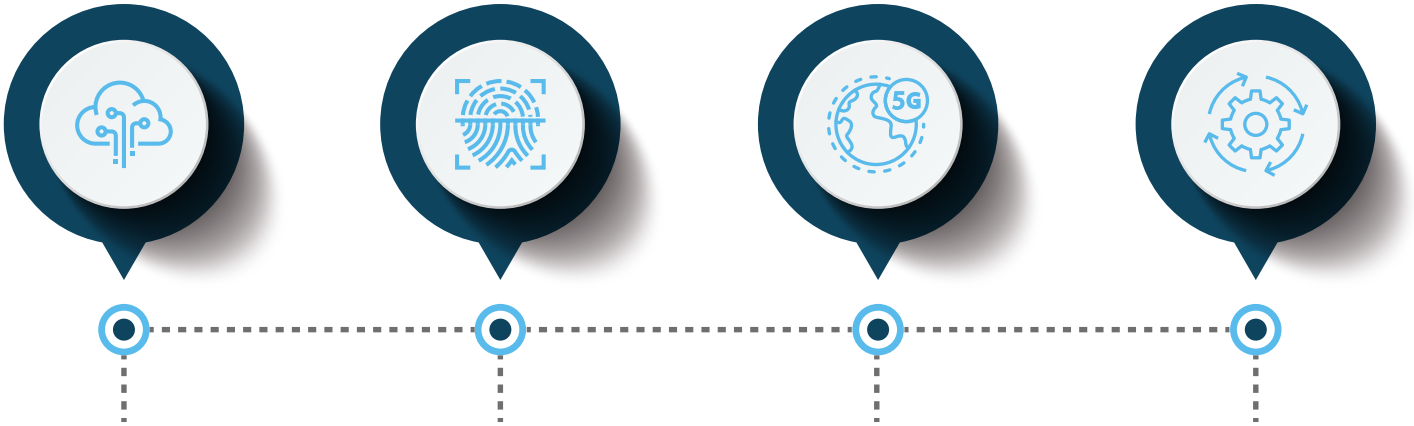
The year will also see cybersecurity needs driving increasing automation in processes, such as scanning, environment checking, patching to the data security level, closing ports, preventing attack etc. Banks will also use AI/ ML to improve the speed of response to attacks that are coming faster and faster. The use of these technologies will yield an additional benefit in the form of data that can be analyzed to understand, identify and prevent cyber attacks.

2019 was about coming to terms with new regulations in data privacy. Now that understanding is maturing in areas such as data ownership – belongs to the customer, not the organization – and the responsibility of banks when data is shared, lost or breached. From Australia to India to California, regulators are enacting laws to protect the privacy of data by enforcing customer consent, data residency and data collection and storage standards. But many regulators are also introducing open banking regulation, which, acting counter to privacy laws, orders banks to share customer and transaction data with

authorized third-party providers. Balancing protection with openness will be one of the biggest challenges facing banks in 2020.

We predict that 2020 will also mark the beginnings of a new approach to security. Instead of reactively layering or bolting on one security solution after another, banks will take a privacy-by-design approach where privacy is part of the foundation on which all systems are built. This implies a fundamental change in security thinking that may challenge traditional banks, but is already at work in some progressive financial institutions.

Threats in cybersecurity, 2020 and beyond



Cloud computing

Public cloud providers have improved infra security, but banks have to configure their applications safely on the cloud

- Build resilience through employee education
- Maturing cloud competence
- Acquire new tools for managing cloud security

Digital Identity

The password is passé; current and future digital identity management will employ a combination of biometrics led multi-factor security

- Adaptive or risk-based authentication
- Leverage behavioral analytics

5G and Internet of Things

2020 will see more devices connecting to 5G

Proactively address security threats from information exchange on billions of devices, from simple phones to intelligent voice assistants

Automation / AI / Machine Learning

Use of AI and automation to understand, identify and prevent cyber attacks

Cybersecurity devices will increase automation in processes, such as scanning, environment checking, patching to the data security level, closing ports, preventing attack etc.

Technology in 2020: Information, application, and the whole nine yards

Industry research has consistently shown that customer experience leaders outperform the larger market in stock returns and revenue gains. A recent research by Infosys and Efma reinforces the success of CX leaders as it delineates a positive correlation between digital transformation and customer experience outcomes. The survey reports digital transformation leaders to be more successful in meeting their transformation goals including customer experience.

Leaders, fast followers, and mainstream players all recognize that data, advanced analytics, and artificial intelligence will be at the center of consumer engagement and consequently market success over the next few years. While few banks today claim to be sufficiently ready to take full advantage of these technologies, there is a clear distinction between how leaders and laggards are approaching transformation. The survey found that leaders are adopting a process of digital evolution to make their technology architecture a powerful enabler of their products, processes and organization to meet the demands of a rapidly changing marketplace while laggards are hesitant to make bold technology moves relegating their transformation efforts to elimination of paper-based processes.

In 2020, we expect fast followers and mainstream players to accelerate and scale their modernization efforts. This means plumbing the depths of their IT architecture, application architecture, system architecture, and information architecture to suit the requirements of the customer-first digital age.

Year after year, industry surveys indicate that legacy technology is one of the greatest impediments to transformation. A stop-gap workaround by banks every time a new digital channel comes along only adds to the technical debt. While most leading banks have begun their core modernization, in 2020, all banks, large and small, will evaluate and modernize their technology and application architecture. A good way to begin is to classify the applications as customized, proprietary, or COTS (Commercial off the Shelf), and then identify the features in the base product, the customization built around the base product, and the components of localization. A clear analysis of the application architecture in this way provides greater ease-of-execution-and-replacement in an agile fashion and flexibility to retain customization as desired.

Likewise, modernizing the system architecture will require banks to adopt the cloud docker container service at scale so the conventional architectural layers – OS, database, application, presentation – and their notional functionalities do not stymie an agile and digital way of working in the future.

All the talk about the readiness to take advantage of digital technologies has brought cybersecurity into sharper focus. Banks recognize security as one of the top risks facing financial services. However, they also understand that risk and security are evolving constructs and processes. In 2020, they will strive to design and implement an adaptive security architecture that anticipates and mitigates the evolving cyber threats without compromising the convenience of the end-user or the customer.

Furthermore, modern omni-channel experiences demand an adaptive information architecture that lends itself to the most intuitive experiences and seamless upgrades on existing, emerging and yet-to-emerge digital channels. In 2020, banks will future-proof their workflows to ensure accurate coupling with their application, system, and security architectures.

Finally, an extremely crucial part of technology modernization for the customer-first digital age will be about going mobile-first in all a bank does, thinking cloud-first for operational efficiencies and time-to-market gains, and being API-first for effective ecosystem collaboration with partner banks and cross-industry participants.

Technology modernization for customer-first digital banking in 2020

IT and Application Architecture

Evaluation and transformation of application architecture

Agile evolution towards target architecture

System Architecture

Adoption of cloud container services at scale for agile and digital way of working

Security Architecture

Adoption of adaptive security architecture that anticipates and mitigates the evolving cyber threats without compromising the convenience of the end-user or the customer

Information Architecture

Information architecture designed for customer-first multi-channel insight-driven banking

Mobile-first for new age digital experiences

Cloud-first for radical operational efficiency and time-to-market gains

API-first for effective ecosystem collaboration

AI in banking in 2020: Settling in

In the 2019 Innovation in Retail Banking study presented by Efma and Infosys Finacle, 76 percent of respondents named AI as the technology with the greatest potential to impact banking in 2020 and beyond. [2]Banks' investment in Artificial Intelligence, which was about US$ 41 billion in 2018, is expected to rise sharply to US$ 300 billion by 2030. Heading into 2020, the overarching trend is to embed Artificial Intelligence across business processes to drive greater operational efficiencies, better risk management and superior customer engagement. For instance, intelligent automation of functions such as payments reconciliation, and documents understanding. AI is, first and foremost, going to be an efficiency lever that reduces cost and improves productivity directly or otherwise.

Chatbots figure right at the top of the peak of inflated expectations in the Gartner Hype Cycle for Artificial Intelligence, 2019. Many banks have deployed chatbots in the customer service function in the past 3 to 5 years with mixed results. In 2020, banks are expected to focus on driving tangible gains from chatbots.

In addition to efficiency, banks will continue to explore using AI in improving customer experience in the coming year. In self-serve channels for instance, banks will improve upon the "next best offer" with hyper personalized product and service recommendations at scale, based on contextual, real-time data from multiple sources. In assisted channels, AI will improve the customer experience in areas like servicing – one simple example is in the routing of service requests by identifying the most appropriate agent based on AI, instead of routing requests based on rules, as seen in routing processes today.

Another interesting usage of AI is in the ability to improve customer experience by mapping entire customer journeys and uniquely personalizing communications, recommendations of products and services, and all other interactions based on that segment of one. While this use case has been tested in pilots and applied in a few areas for a period of time, this will start going mainstream in 2020.

Another trend is the mainstreaming of technology for regulatory functions, also referred to as RegTech. Given the stringent norms surrounding Know Your Customer checks (KYC) by regulators the world over, strengthening KYC checks using AI is a natural white space that RegTechs are tapping into. Regulations around Open Banking will drive the need for strong customer authentication globally. The use of AI to prevent identity fraud will increase with this rise in real-time, faster or instant payments around the world. AML compliance is another area impacted by real time cross border payments – AI based platforms bring additional maturity into this regulated space.

Additionally, banks will continue to make significant investments in using AI in fraud and risk management in the coming year. Banks will invest substantially in Machine Learning and/or Deep Learning-based models to identify, predict and prevent fraud. AI-based identity verification and user authentication applications which have already achieved reasonable maturity, will gather significant momentum in the coming year.

Banks, big tech companies and FinTech firms alike will increase investment in platforms to predict and prevent

cyber-attacks, typically Machine Learning and / or Deep Learning based. An emerging development is the use of AI and quantum computing for improving cybersecurity – to determine the type of encryption needed to prevent hacking, for instance.

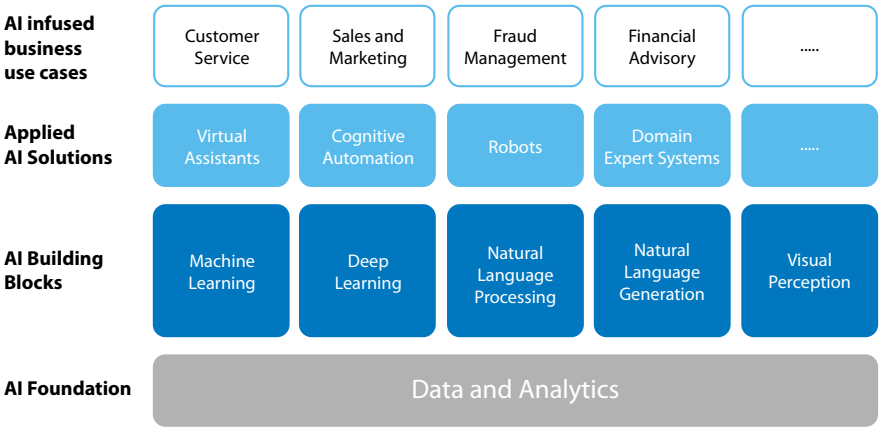
A very significant development to watch out for in 2020 is the emergence of synthetic data sets. One of the biggest challenges in training a Machine Learning or Deep Learning model is that it requires enormous, high quality datasets, which are often not available. A solution is emerging in the form of synthetic datasets, which are generated programmatically, and typically used to establish proofs of concept, as well as train and test models.

With so much AI-driven change in the offing, banks should gear up for building their AI skills in 2020 and expand their capabilities organically as well as through partnerships. There is no time to lose.

AI in banking in 2020

AI in Banking

The AI Stack



AI use cases in 2020

Operational efficiency

- Intelligent automation of functions such as payments reconciliation, and trade documents scrutiny

Customer service

- Use of chatbots will begin to show tangible gains in productivity and cost savings
- Hyper-personalized recommendations at scale on self-service channels based on data from bank, third-party channels, mobile usage pattern, and other sources

Fraud detection and risk management

- AI-based identity verification/ user authentication applications such as "Smile to unlock" and "liveliness" checking will gather momentum
- Investment in AI, esp. machine learning and deep learning platforms for regulatory technology and cybersecurity will increase

Public cloud in 2020: New frontiers of flexibility

Declining apprehension against the public cloud, a rapidly growing market for SaaS solutions, and the widespread adoption of cloud as the preferred environment for workload execution are clear signs of cloud strengthening its position as the required foundation for emerging disruptions in financial services. Furthermore, the rise of FinTechs and interoperability requirements in the disruptive wake of Open Banking will make cloud a crucial catalyst of co-innovation and integration in 2020.

Here's how we expect the trend to play out:

The sharp rise in the use of public cloud PaaS services especially relational databases, data warehouse, and container-as-a-service combined with convenient private cloud options from public cloud providers that offer near on-premise experience are driving migration of workloads that banks are typically reluctant to move to the public cloud. Till 2018, banks were largely seen moving non-critical workloads to the cloud. In 2019 we saw banks turning to the cloud for their international operations and new lines of business driven by the need for quick roll-outs with limited operations and customer base. As multiple cloud providers expand their operations across regions, banks are now exploring options to move higher workloads to the public cloud in their home countries with sizeable customer base.

[3]Industry estimates suggest that public cloud revenue will grow by about 17% in 2020 globally. The growth trend in financial services will mirror this cross-industry estimate. In 2020, a majority of financial service providers will have multi-cloud IT environments, designed to enable workload portability and seamless delivery of functions across platforms. Banks are beginning to see multi-cloud environment as a solution to performance, compliance, and cost-optimization challenges.

[4]Public cloud IaaS and PaaS are expected to be the primary environment for 28% of the hosting and managed services workloads over the next two years, compared to just 9% today. Containers, Docker adoption, and container orchestration tools such as Kubernetes, have also recorded a steep growth over the last couple of years. In 2020, containerization of legacy applications will be a necessary step in the large-scale migration of workloads to public cloud in banking, as more and more banks adopt multi-cloud architectures. This will in part be fueled by the growing comfort with container-as-a-service solutions by public cloud providers such as AWS, Azure and Google who have proven themselves as the go-to partners for cloud roll-outs in new geographies that require navigating unfamiliar regulatory complexities. Their rapid geographical expansion in 2018 and 2019, has helped public cloud providers establish a level of comfort with the watchdogs. The flexibility of multi-cloud environments will allow banks to tap into on-demand container-driven application portability to execute workloads more optimally and swiftly than ever before.

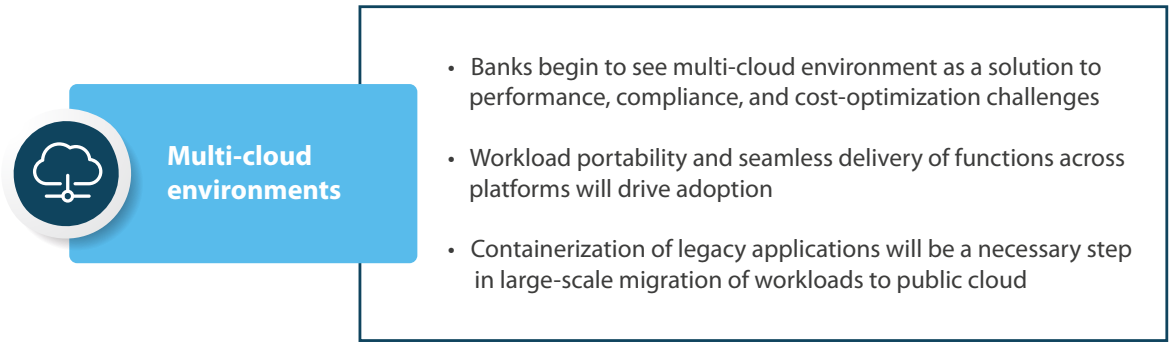
Having said that, single-tenant infrastructure will continue to be the safe place for banks to isolate workload components that involve confidential records such as customer account information, company intellectual property and other sensitive data subject to compliance requirements and organizational security guidance. And even as banks move their core banking applications to

the public cloud, they must take into account data loss prevention and compliance considerations in the light of frameworks and regulations such as GDPR, PCI, SSAE 18, SOX, SOC1 and SOC2.

In our conversations with leading banks across the world we have seen banks in the US and Europe being particularly keen on migrating current workloads and setting up new operations in the public cloud. With a long-term view of their investments and business strategy, these banks want to ensure that their technology landscape and solutions are completely cloud-native and ready for new ecosystem realities. In 2020, more and more banks in other regions of the world will migrate existing workloads to the public cloud and adopt completely cloud-native SaaS-based solutions for new lines of business and digital-only propositions. Cloud platforms will be pivotal in the transformation of existing IT infrastructure and as a vehicle for new technology-driven innovations over the next two years.

Higher adoption of public cloud

Multi-cloud environments rise to prominence



Blockchain gets real in 2020

After reaching peak hype a few years ago before slipping down the slope of disillusionment, Blockchain is now at a stage where business recognizes its potential to produce real solutions to real problems.

Along the way, Blockchain went through two phases of experimentation, the first to establish Proof of Concept and the second to demonstrate Proof of Value. Between these two, the technology gained maturity and attracted several companies to launch their own distributed ledger technology platforms, such as R3 Corda, Hyperledger Fabric etc., on top of which various applications could be built.

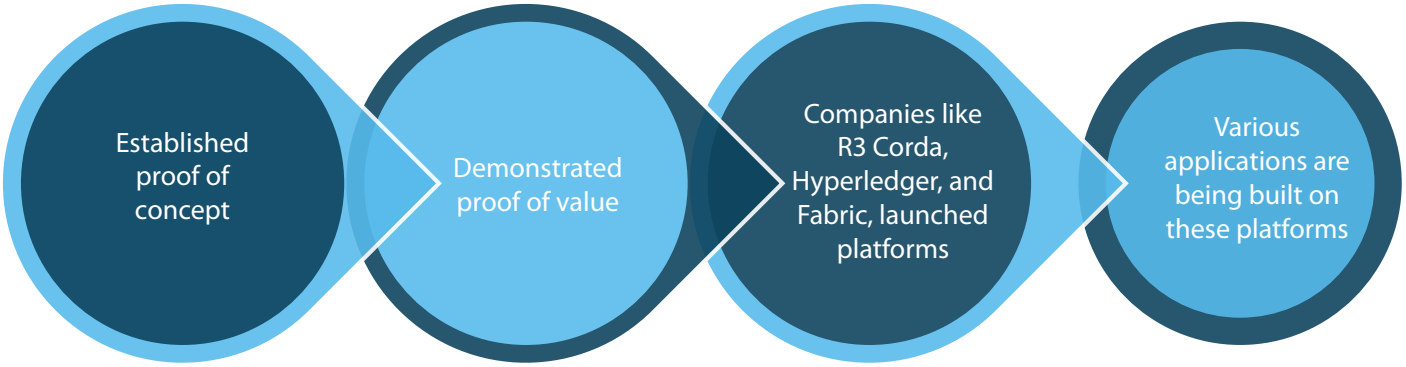
The current phase, which will extend a few years beyond 2020, is about structuring Blockchain initiatives to bring about systemic change and thereby deliver its benefits in a sustainable manner. A good example here is the Blockchain-based trade finance network from Infosys Finacle, which is now evolving a governance mechanism to prescribe how to handle disputes or failure from a legal, operational and technical perspective.

Even as industry consortia work on structure, regulators are driving adoption by encouraging the use of Blockchain in areas such as eKYC. Having overcome their initial reservations – about cryptocurrency, in particular – several regulators, such as those in the Middle East and South East Asia, are actually floating RFPs for Blockchain-based eKYC and self-sovereign identity solutions. 2020 will see more investments in Blockchain-based national platforms for trade finance, payments and identity.

There is also an organic push for adoption coming from new use cases, which justify the large-scale transformation and replacement of systems of record with Blockchain-based platforms. While Blockchain's initial promise was cost reduction, banks are discovering its potential to reduce risk, build stickiness within their ecosystems and even generate revenue. In 2020, Blockchain-based eKYC, trade/supply chain finance and payments solutions will be adopted at scale in a production environment. Some of these will open up new sources of revenue for banks. An example is working capital finance for small and medium enterprises, which either do not get funding from banks, or get it on unfavorable terms. Typically, an SME customer receives the money after intensive scrutiny and paperwork, after 20 days of the application. But thanks to Blockchain, which offers a secure environment to digitize, automate and approve documentation, some banks are disbursing funds against invoices of a certain value and tenor, within a day or less. Another example is India's ICICI Bank, which has expanded its India-centric international remittance business to "anywhere to anywhere" banking. The Bank is using its Blockchain-based remittance network to transfer money between 6 countries other than India, with plans to bring more countries on board soon. It is also offering this facility to third-party banks, creating a new line of revenue for itself in the process.

The New Year will also bring some edgy Blockchain initiatives, most notably, the digital network backing up China's Belt and Road initiative. Then there's Facebook, which has also announced that its audacious plan to introduce a permissioned Blockchain-based digital currency named Libra will start in 2020.

Blockchain went through phases of experimentation



2020 will see more investments in Blockchain-based national platforms

Benefits from blockchain based platforms expected

Infosys Fincale experience

Cost reduction

Commercial Bank Qatar leverages blockchain for intra banking group remittances

Risk reduction

RBS made KYC/identity management a shared service among three banks in its group thus reducing duplication

Stickiness within their ecosystems

India Trade Network of 11 banks has reduced Letter of Credit cycle time by 75%

Revenue generation

ICICI Bank is offering its blockchain based remittance network to third-party banks, creating a new line of revenue for itself in the process

IoT in 2020: Banking on every device

An estimated 5.2 billion devices are connected to the Internet at present, a number that is set to cross 6 billion in 2020. After impacting industries such as manufacturing, aerospace, agriculture, healthcare and electronics – among the first to leverage the Internet of Things (IoT) – the technology is expected to impact Banking and Financial Services as one of the key drivers of change over the next two years. Largely, the impact will come from real-time customer and transaction data emanating from digital devices such as smartphones, smart watches, connected cars, and smart TVs, that will serve as banking channels to different degrees. In 2020 and beyond, we can expect IoT to change the way banking is done in the following ways:

Enable banks to offer guidance or even advisory services at the point of transaction: Digital natives trust user recommendation more than company communication to arrive at a buying decision. The need for advice varies with the scale of the purchase and also the immediate context. For instance, a dilemma about which movie to watch is easily resolved by checking viewer ratings, whereas a decision to hold or sell a volatile security requires inputs from a more qualified source. The "texture" of the advice may also depend on the customer's immediate location, time of day, type of transaction etc. In the age of the Internet of Things, the customer will expect the bank to know the background of the need (through the information travelling through the device in use) and respond accordingly. For example, if the bank spots a query on a particular stock received from a smartphone that's in an airport somewhere, it may choose to send a quick buy/hold/sell recommendation, but if the same query comes from the customer's office desktop, it may share a detailed company and stock analysis. The scope of activity is unlimited, but possibilities such as offering advice on currency movements, stock portfolio changes, or major financial investments, come to mind immediately.

Significantly improve fraud detection: IoT-enabled devices provide important information that can be used to detect suspicious activity. A device's journey can divulge information such as its owner's activity pattern, current location etc. Say a bank detects an online credit card charge from a location that does not correspond to that of the customer's smart watch or phone, it can immediately trigger an alert about the unauthorized activity.

Build a dynamic product portfolio: IoT devices are a rich source of real-time market data. By curating, mining and analyzing this data, banks and other financial service providers can get immediate insights into marketplace events that can be used to design new products or rationalize the existing portfolio. Unlike market studies, which take weeks to present their findings, IoT offers real-time insight. This means banks can continually evolve and personalize their products instead of maintaining a static portfolio. As financial ecosystems connect among themselves and with other ecosystems on the IoT, banks can facilitate customer journeys around products from end to end and thus intensify engagement. An example comes from a challenger bank in the United Kingdom. The bank's mortgage smart app also offers property insights to customers on their connected device. In addition, when a customer applies for a loan, the details are automatically forwarded to other agencies in the ecosystem, such as the

local council and legal advisors, activating a logical chain of events. In 2020, expect a growing number of banks to use insights about device usage patterns to not only develop contextual portfolios but also build loyalty with effective loyalty programs for their products and services.

As the Internet of Things expands further in 2020, it is necessary to evolve a sound governance framework for it. Some of the key issues include allocating responsibility for data – as custodians of customer data (in addition to wealth), banks must share responsibility for data governance, integrity and security. A technology such as Blockchain can be integrated with IoT to protect device data from being stolen, duplicated, changed or compromised in any other way. Some of these things will start to fall into place in the coming year.

Advisory at the point of transaction

Sample use case:
Using information such as device type and device location for communication that is easy to ingest for the customer. For instance, one-line recommendation to buy / hold / sell a stock if a customer is at an airport vis.a.vis. complete stock analysis if the customer is at home

Dynamic and more personalized product portfolios

Sample use case:
Property insights and other services such as legal advisory, local council, utility services and more if a customer applies for a loan.

Significant improvement in fraud detection

Sample use case:
Detecting potentially fraudulent activity if an online credit card charge from a location does not correspond to that of the customer's smart watch or phone

Key challenge for banks:

- Security and privacy of data as custodians of customer data
- Alternative thinking for strong governance

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About Infosys Finacle

Finacle is the industry-leading digital banking solution suite from EdgeVerve Systems, a wholly owned product subsidiary of Infosys. Finacle helps traditional and emerging financial institutions drive truly digital transformation to achieve frictionless customer experiences, larger ecosystem play, insights–driven interactions and ubiquitous automation. Today, banks in over 100 countries rely on Finacle to service more than a billion consumers and 1.3 billion accounts.

Finacle solutions address the core banking, omnichannel banking, payments, treasury, origination, liquidity management, Islamic banking, wealth management, analytics, artificial intelligence, and blockchain requirements of financial institutions to drive business excellence. An assessment of the top 1250 banks in the world reveals that institutions powered by the Finacle Core Banking solution, on average, enjoy 7.2% points lower costs-to-income ratio than others.

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