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# FINACLECONNECT

Connecting the banking world

## ARTIFICIAL INTELLIGENCE POWERED BANKING

### Cover Story

#### Leading with AI:

The role is cut out for banks' top management

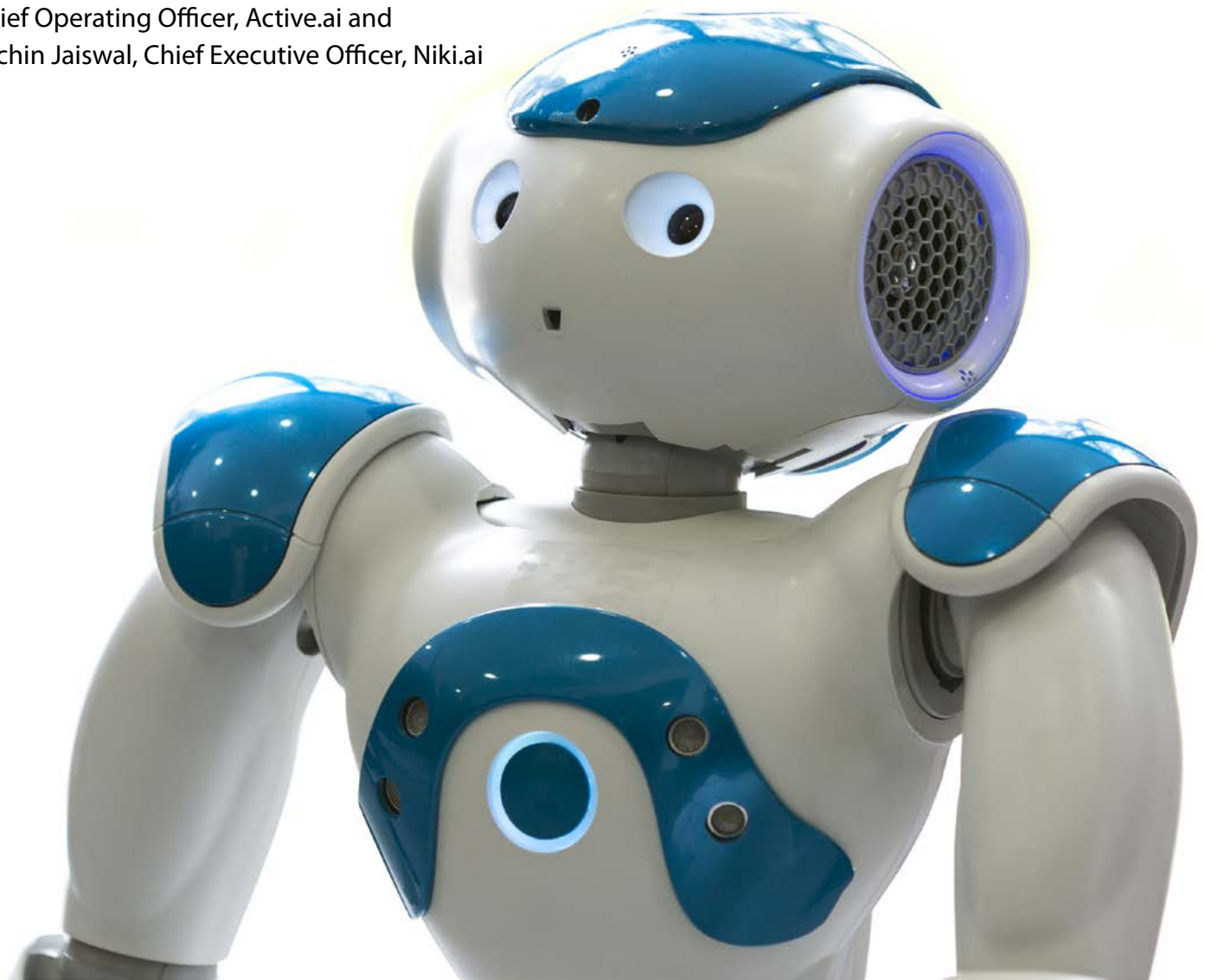
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#### Building the World's Best Digital Bank

Siew Choo Soh, Managing Director, Head of Core Systems Technology, DBS Bank Singapore

#### In Conversation with FinTechs

Shankar Narayanan, Co-Founder and Chief Operating Officer, Active.ai and Sachin Jaiswal, Chief Executive Officer, Niki.ai





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# Voice from the Editor's Desk



Artificial Intelligence, while far from mature, has finally come of age. In recent years, the confluence of a multitude of factors has accelerated the evolution of AI, which had seen alternating periods of advancement and inactivity in the six decades since it came into being. This appreciation and evolution of AI has had a tailwind in that the key building blocks of AI – machine learning, natural language processing, visual processing, and robotics – advanced rapidly at the same time. This combined with the data and computing power built over the years drove a spurt of innovation never seen before.

Today, AI is at a crucial juncture in banking. Although banks didn't take long to recognize this emerging trend, they have been relatively slow in adopting and applying the technology. This is largely due to a limited understanding of the technology

building blocks, lack of expertise to implement and manage AI, and a fear of change among bank employees. However, with innovative companies and consumers being ahead in the curve, banks can hardly take the wait and watch approach.

In this edition of FinacleConnect, we go deeper in the AI landscape and look under the hood to present to you a direction towards 'AI Powered Banking'. The cover story by Sanat Rao, Chief Business Officer, Infosys Finacle, explores the role top management can play in driving the adoption of AI in their organizations for unprecedented gains.

AI has also emerged as an interest area where FinTechs, enterprise application providers and banks look to work together to build innovative solutions. Nitin Babel, Co-Founder, Niki.ai and Shankar Narayanan, Co-Founder and COO, Active.ai weigh in on the rise of AI in banking and how FinTechs are collaborating with banks in what we call "Inside Talk".

We have an interview with Siew Choo Soh, Managing Director, Head of Core Systems Technology, DBS Bank Singapore, talking about the journey of building the world's best digital bank. The edition also showcase the top ten strategic and technology trends that we believe will reshape banking in 2018.

With this edition of FinacleConnect, we endeavor to offer expert perspectives on AI technologies and use cases where they add value for significant differentiation. We hope you find it interesting and insightful. I look forward to your views.

A handwritten signature in black ink, appearing to read 'Puneet'.

**Puneet Chhahira**

Head of Marketing & FinTech Engagements,  
Infosys Finacle, EdgeVerve

# Leading with AI:

## The role is cut out for banks' top management



Artificial Intelligence is expected to be one of the most prevalent technologies of our times that is slowly getting integrated into every aspect of our daily life.

That includes everything from a Coca Cola vending machine, where an embedded virtual assistant<sup>1</sup> will allow you to personalize your drink, to a robot called “Nigel” who will someday recommend whom you should vote for based on an understanding of your political leanings.

That “everything” includes everything from a Coca Cola vending machine, where an embedded virtual assistant<sup>1</sup> will allow you to personalize your drink, to a robot called “Nigel” who will someday recommend whom you should vote for based on an understanding of your political leanings.

Thus today, no CEO can escape the fact that AI will deeply alter the way their business is run. Or that the pace of change will be dramatic given the confluence of forces – explosion of data, increase in accessible computing power, and the rise of open AI – at play.

Let us turn our attention to the banking industry, whose situation hangs in the balance, as economic factors remain soft, new competitors continue to attack, and consumers persist with their demands. Amidst shrinking margins, banks’ leaders are under severe pressure from shareholders to shore up revenue and profit. For them, the AI revolution couldn’t have come at a better time.

In one of its recent reports, the European Financial Management Association said that AI presented a huge opportunity for financial service companies to use their data to improve profit, customer experience, and regulatory compliance, among other things<sup>2</sup>. Other industries, such as ecommerce, have already turned that potential into proof. Amazon, for example, claims that its ability to use AI to propose contextual, personalized recommendations is contributing an astounding 35 percent of its total cross-sales.

Banks can also reap similar benefits by taking their pick from a selection of established AI use cases. They can improve sales by employing a combination of AI technologies, such as machine learning and predictive analytics, to recommend personalized, contextual products and services to individual customers. Besides generating revenue, banks could also leverage AI to price

their products, such as mortgages and personal loans, more effectively and fairly by personalizing interest rates based on a customer’s credit score and risk profile.

In the middle office, AI has shown its prowess in areas such as fraud management, risk assessment and credit scoring. AI-based solutions for KYC/AML adherence, fraud detection and regulatory compliance can analyze transaction data in real-time, (and not after the event has passed) to identify suspicious patterns of activity. Machines can learn continuously from past performance to reduce false positives and negatives. During risk assessment, banks can leverage artificial intelligence to analyze historical transactions and calculate risk exposure

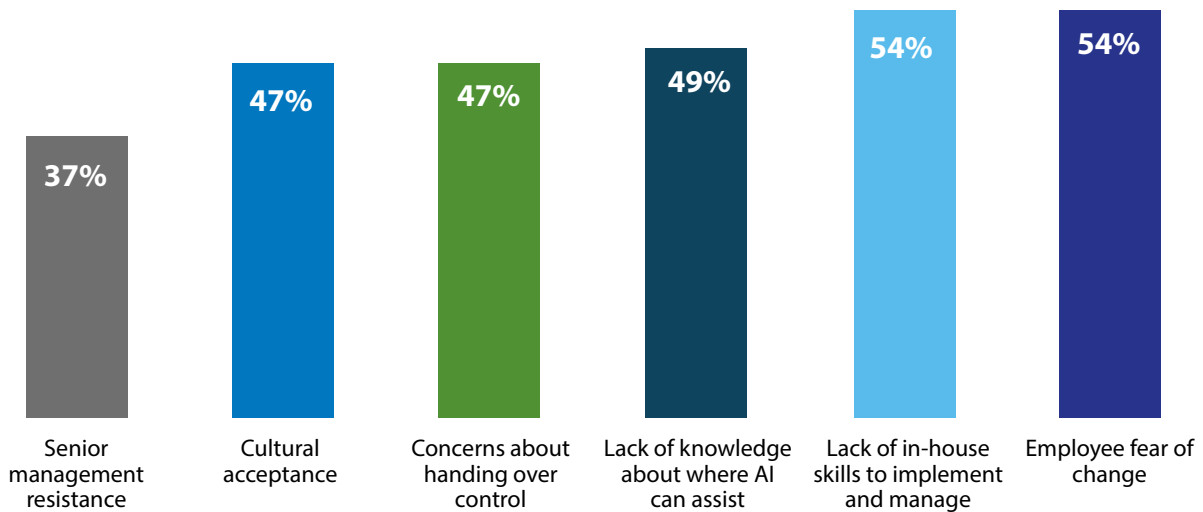
**Amidst shrinking margins, banks’ leaders are under severe pressure from shareholders to shore up revenue and profit. For them, the AI revolution couldn’t have come at a better time**

at a transaction level. Here it is worth mentioning Feedzai, Kenzo and ZestFinance – lenders who use AI to assess risk before extending credit.

Today, Robotic Process Automation is saving financial service organizations significant sums of money by automating value chains across the front, middle and back office. For example, at ICICI Bank, India’s largest private sector bank, software robots operate more than 200 business processes, and a million transactions every day. Response time has come down by 60 percent, and both efficiency and productivity have improved.

But beyond doubt, AI’s impact on banking is most visible in customer experience. Natural Language Processing and Generation capabilities have brought inanimate devices to life as they engage banking customers in contextual interactions, all the while conversing like human beings. By taking over the bulk of routine customer service queries, chatbots, such as Swedbank’s Nina, are allowing banks to serve many more customers with the same number of staff. What’s more, the chatbots are smart enough to know when to hand over an interaction that is not going well to a human agent. The result is a hybrid (machine-human) helpdesk that can render superior service to customers, at a lower cost to the bank.

## Barriers to Adoption



Source: Infosys research 'Amplifying Human Potential: Towards Purposeful Artificial Intelligence'

These are only a handful of hundreds of use cases for AI in financial services, which, if implemented right, can make a noticeable impact on banks' financial performance. Now it is up to each bank to chart its own path to adoption based on business strategy, context, and resources. While spearheading this effort, banks' leaders must also consider technology readiness, both from an organizational and evolutionary point of view, before making a decision. For instance, do they have the solid data and analytics foundation that is necessary for any AI initiative to succeed?

### But beyond doubt, AI's impact on banking is most visible in customer experience

However, the most important issue facing top management is the ethical implications of using AI – the impact on employees and customers, encroachment on data privacy and security, and the risk of ceding control to intelligent, but empathy-lacking machines. An Infosys-commissioned survey of 1,600 business and IT leaders from 10 vertical groups (including financial services) found that fear of change among employees, concerns about handing over control, and cultural issues were among

the top barriers to adopting AI. It is the responsibility of business leaders to bring down these barriers and secure employee buy-in. The survey revealed that most were already on this, with 80 percent of those planning to replace manpower with AI, intending to retrain or redeploy those workers to take up new roles.

And the fact of the matter is that organizations have no choice when it comes to AI. 71 percent of survey respondents agreed it was inevitable, but were also optimistic that it would not only contribute to their organizations' success but to societal and economic well-being as well. Therefore the best option for organizations, banks included, is to make plans and forge ahead towards AI adoption, fully aware that despite the technology not being fully mature, even in its current state it can confer significant benefits and an invaluable head start to the early movers.



**Sanat Rao**  
Chief Business Officer and Global Head,  
Infosys Finacle



# Reimagine Banking

## Top 10 strategic and technology trends for banking in 2018



The breakneck speed of technological change continues to drive new possibilities. If Google's DeepMind AI beating top players at a complex board game "Go" in 2017 was any indication of how far we have come, clearly 2018 is set to mark the beginning of staggering things to come.

In banking, 2017 saw remarkable progress around the adoption of emerging technologies such as Artificial Intelligence (AI), blockchain, the Internet of Things, and the maturity of related underlying technologies of cloud and analytics. Several banks launched bots to help customers transact, and resolve their service enquiries. RPA continued to drive efficiencies with extensive application in repetitive tasks. The use of AI solutions for fraud management and risk management also demonstrated compelling benefits. And blockchain clearly stepped out of the lab and got into production with leading banks such as Emirates NBD and ICICI Bank harnessing blockchain networks for their remittance transactions across the world's largest remittances corridor.

## Reimagining customer journeys will be as important for corporate banking business, as it is for the retail business in 2018

But the unprecedented pace of development is not just a result of new technologies driving efficiency for greater business outcomes. The technological revolution is fundamentally altering the way we live, work, and conduct business. In 2017, new innovative business models emerged, and ecosystems came into sharper focus. Technology giants, and start-ups continued to disrupt the industry with unique solutions, considerably evolving customer expectations in the process. In China, digital start-ups rose to 25% share of the unsecured lending market, up from 1% in 2013. In the UK, several new challenger banks entered the market, including ClearBank, the country's first purpose-built clearing bank in 250 years. Rather than compete, traditional banks saw an opportunity to collaborate with the new entrants and leverage each other's strengths. Progressive banks such as DBS Singapore experimented with the platform business model and forayed into the e-commerce space with online

buyer-to-seller car marketplace, to address the primary requirements of their consumers.

Although fraught with geopolitical and macroeconomic uncertainties, and the influx of new competition, the financial services industry made significant headway towards transforming into a digital business in 2017.

In 2018, we believe the confluence of environmental factors, technology evolution and forces of digitization will further accelerate change. The pace of change will be even more rapid and the scope more disruptive. This creative disruption in the industry presents banks with the unique opportunity to reimagine banking. To capitalize on it, banks need to be in lockstep with the developments and trends in the industry. What you see here is a compilation of ten such trends that we believe will shape the industry in 2018.

We hope you find them valuable in crafting your strategy for 2018, and enjoy reading about them as much as we did putting them together for you.

## Strategic Trends #1: Customer Journey #Reimagined – From customer-centric to customer-specific

A year ago, we predicted that customer experience would determine the winners and laggards among banks in 2017. In 2018, it is the turn of a reimagined customer journey to determine which banks survive and which will fall by the wayside. In 2018, banks will pursue a nuanced goal – understanding the individual journeys of customers at the same life stage, and partnering them through that cycle. To do that, they must gear up for the following:

## In 2018 banks will start to look beyond, and see cloud as an enabler of business rather than a driver for cost reduction

More channels of engagement, including bank-owned, partner-owned and third-party channels, all working to make banking as invisible as possible. Going forward, everything will be virtual, as intelligent assistants start to deal with banks on their owners' behalf. This is yet another change in the customer journey that banks should prepare for.

Reimagining customer journeys will be as important for corporate banking business, as it is for the retail business in 2018.

Progressive banks will abandon incremental change to pull out all the stops, using all the modern technologies at their disposal, right from analytics to AI to augmented reality to IoT, to be ready for these scenarios. The offering of banking services through Alexa, Amazon's smart virtual assistant, is just a preview of things to come. In 2018, expect to see more of this and much more as banks reimagine the customer journey riding the digital wave of confluence of technologies.

**The pace of change will be even more rapid and the scope more disruptive. This creative disruption in the industry presents banks with the unique opportunity to reimagine banking**

### Strategic Trend #2: Business #Reimagined – From platforms for business to the business of platforms

The world's top 15 public platform businesses account for \$2.6 trillion in market capitalization. Playing catch-up are about 140 unicorn companies, currently valued at more than \$500 billion. In 2018, we see banks riding this trend to shift faster from a pipeline business to a platform model.

Under the platform model, banks will no longer stick to manufacturing and distributing their own products and services through their own channels. Rather, they will expand their portfolio with complementary products sourced from partners, such as insurance companies; products co-created with FinTech firms; non-financial products ranging from movie tickets to cars; and even competing (and superior) products from third parties. Secondly, banks will go from being monolithic institutions selling products designed in-house and distributed through owned channels, to acting as aggregators selling a host of financial and non-financial offerings in a single marketplace. Thirdly, banks will bring third party channels on par with their own. So, in addition to distributing via their network of branches, mobile channels, agents, kiosks,

wearables, smart virtual assistants, etc., they will use APIs to sell through third party apps, FinTech companies, other partners, and even other banks.

### Strategic Trend #3: Security #Reimagined – It is everybody's business

2017 witnessed one of the worst cyber security breaches of all time when U.S. credit agency Equifax lost sensitive data, including Social Security Numbers, that could impact as many as 143 million people. So, there is absolutely no doubt that security will take center stage in most enterprises in the New Year.

Amidst growing digitization, concerns about protecting customer information and interest are intensifying. An important part of that will be to make banking systems compliant with the new rules, and in the case of new investments, make security an integral part of the architecture design itself.

With more technologies coming up and then coming together, both the quantum and sophistication of cyber-attacks will increase. A single-pointed, analytics-based security application is inadequate protection against such multifaceted threats, which can only be combated by a solution combining the power of AI, machine learning, analytics and big data with biometric devices and other anti-fraud technologies. 2018, the year of AI versus AI.

2018 is also the year when banking ecosystems will multiply and unprecedented amounts of data will be shared within and between ecosystems. Hence in the years to come, security will be everybody's responsibility in the bank.

### Strategic Trend #4: Workforce #Reimagined – From the right talent for strategy to the right strategy for talent

With automation increasingly taking over routine and repetitive manual jobs in banks across functions, where



does that leave the banking professional? A view that is gaining ground is that emerging digital technologies will create a demand for new professional skills, and increase reliance on innately human capabilities such as critical thinking, empathy and problem solving.

Banks' multigenerational human resources will tilt towards youth, with the millennials set to account for 72 percent of the global workforce by 2025. With the boundaries between business and technology breaking down in banking operations, the same will happen at the individual employee level to create multidisciplinary talent with an appreciation of both domains.

Progressive banks will move towards empowering their employees to work in multidisciplinary teams by using Agile principles at scale across IT and product management. Unfortunately, on current form, banks will find it challenging to attract the right talent for this new kind of workforce. Therefore, in 2018, banks will need to effectively articulate their purpose, to tap into the progressive millennial talent that is inclined towards impacting a change and associating with a purpose.

**With connectivity and connected devices on an overdrive, banks are increasingly introducing solutions to blend banking in their customers' everyday lives**

#### Strategic Trend #5: Organization #Reimagined – Cultural readiness fills the gap between business and technology readiness

In 2018, organization transformation for a culture that embraces change, innovation, customer-centricity, and lifelong learning will be a top priority for banks. Progressive banks are instituting programs to train their employees to view customer journeys, to enable them to see realities differently, and to help them connect the dots for creative solutions to deliver value to their customers as well as the end consumer.

In a culture where continuous learning is a way of life, to upskill and cross-skill their employees, banks are discarding the traditional class-room training programs in favor of unconventional ways. For example, DBS Singapore hires people with the required skills and capabilities and pairs top performers with the new hires to quickly multiply these capabilities across the organization.

Banking organization of the future will be very different from what it has traditionally been. Progressive banks want to operate like the leading platform companies and digital organizations of the world that thrive on diverse ecosystems. To that end, banks will increasingly diversify their human capital, adopt cross-industry processes and transform into cross-cultural organizations. 2018 marks the beginning of this transformative trend.

#### Technology Trend #1: Ecosystems #Reimagined – The rise of the API economy

Regulations the world over are fostering and encouraging API-led innovation. Even in regions where it is not a regulatory requirement yet, banks and financial services providers are proactively taking the plunge into the API economy.

Banks that have already launched their API stores, have somewhere between 5 to 50 APIs. As banks look to cultivate rich ecosystems and platforms, we predict this trend to grow stronger and more diverse in nature. This year, APIs will increase in breadth as well as depth i.e. not only will we see more APIs allowing digital firms, FinTechs and other developers to build real world applications but also more APIs with production data.

The rise of APIs has heralded creative disruption in the financial services industry, of which the payments space has seen the maximum action. In the New Year we will see API innovation going beyond payments, wallets, and P2P transfers to areas such as corporate lending, corporate deposits, mortgages and loans. In 2018, banks will also further increase their collaboration with non-banking partners, in that they will not just be a provider of APIs, a consumer of APIs from other ecosystem players.

The year 2018 will officially usher banking in the API economy. And clearly with shrinking margins and unprecedented competition, 'participate or peril' is the writing on the wall for banks and financial institutions.

## Technology Trend #2: Value #Reimagined - Cloud for cost efficiency to cloud for business enablement

After a decade of disruption, today cloud computing is a critical component of every enterprise's IT strategy. Although the cost benefits remain undisputed, in 2018 banks will start to look beyond, and see cloud as an enabler of business rather than a driver for cost reduction.

In 2018, more banks will be comfortable with the public cloud. With proof of security of data on their application infrastructure, banks are looking to experiment with new public and private cloud arrangements.

By moving towards public cloud, banks can ensure seamless integration with FinTechs and third-party APIs in the digital ecosystem. In addition to integration, banks also want to replicate the success that some of the new digital companies have seen with cloud, in terms of flexibility to scale and growing the fee based revenues. All the more reason for banks to look at cloud as a revenue lever than a cost lever in 2018 and beyond.

## Technology Trend #3: Networks #Reimagined – Blockchain for banking and beyond

In December 2016, we predicted that enterprises would take Blockchain out of the lab and into production in 2017; twelve months later, we can safely say that that prediction has come true.

A big development in 2018 will be the maturing of existing ecosystems and emergence of a number of new ones, buoyed by the results of pilot projects. The ecosystems that will emerge in 2018 will be richly diverse; there will be global, regional, local and even intra-group ecosystems which will range from purely "bank and bank" partnerships to large networks comprising financial and non-financial entities.

Our second big prediction for 2018 is a shift in regulatory attitude towards greater openness and a willingness to support blockchain ecosystems.

Blockchain action in 2017 was driven mainly by large, progressive banks. In the coming year, it will enjoy wider participation – from the leaders and early adopters for sure, but also from fast followers. And with regulators getting into the act, 2018 will see blockchain becoming serious business.

## Technology Trend #4: Intelligence #Reimagined – AI comes of age

This is the year that we will refine our understanding of AI technology and begin to appreciate its diverse components and capabilities, central to which are a data and analytics foundation, machine learning, deep learning, natural language processing and generation, and visual recognition. Having gained early experience in using AI, in 2018, enterprises will talk specifics when discussing their future plans.

**In 2018, we see banks riding this trend to shift faster from a pipeline business to a platform model**

When it comes to applied solutions of artificial intelligence, some will fare better than others. Robotic Process Automation, which is entering its fifth year and is therefore quite mature – one survey claims 34 percent adoption in financial services<sup>3</sup> – will continue to attract interest. So will machine learning and its subset, deep learning, which received 60 percent of AI investment in 2016<sup>4</sup>.

Natural language-based applications – chat bots, smart assistants etc. – will also find their way into banks that don't have them yet.

This is the year that use cases will multiply beyond the established applications in risk management, fraud prevention and customer service. These are non-



traditional credit scoring, documents classification, product recommendation and enhanced automatic trading among others. Indeed, AI will prove to be a huge differentiator for banks that understand the technology better and invest early.

### Technology Trend #5: Possibilities #Reimagined – More things to bank on

From branches and ATMs, to web properties and mobile assets, banking is consumed through a variety of touchpoints today. And these touchpoints are set to multiply with more and more connected devices in the future.

**A big development in 2018 will be the maturing of existing ecosystems and emergence of a number of new ones, buoyed by the results of pilot projects**

With connectivity and connected devices on an overdrive, banks are increasingly introducing solutions to blend banking in their customers' everyday lives. An example is Ally bank's mobile application 'Splurge' that sends the customer a warning to avoid making a purchase if monthly sundries exceed the budgeted.

But the hyper connected world of tomorrow will also have machines transacting on behalf of humans, and not just humans consuming services directly. In 2018, progressive banks will prepare for this future with services designed to talk to smart machines at the consumption end, i.e. at households, customer premises or customer assets.

In 2018 banks will harness data sources in a variety of consumer and industrial scenarios. For example, in trade finance an exporter of perishable goods need not worry about the inventory getting damaged due to weather or temperature, and hence the commercial value of the shipment going down.

As data inputs multiply rapidly, progressive banks will find opportunities to make use of this data, to introduce new products, modify existing products or reimagine existing products for better efficiencies. Progressive banks are working to improve the integration between their systems and data sets to make these possibilities happen.

Download the full report



# Inside Talk I: Building the World's Best Digital Bank

In conversation with  
Siew Choo Soh,

Managing Director, Head of  
Core Systems Technology,  
DBS Bank Singapore



The goal of DBS Bank, a leading regional bank based in Singapore, is to reimagine banking and make banking invisible to customers. In so doing, it seeks to enable customers to “Live More and Bank Less”. A frictionless experience is the key to achieving this, and the bank is enabling it by not only offering seamless user interfaces to clients but also providing the customer service to match. In an interview for the FinacleConnect, Siew Choo Soh, Managing Director, Head of Core Systems Technology, DBS Bank Singapore, talks about the bank’s digital innovation journey and top banking technology trends for the coming year.

## Our philosophy is to digitally enable the entire bank from the bottom up and to be digital to the core

### **DBS has always been at the forefront for digital innovations in banking; what is in store on the digital front for 2018?**

Banking on the go, and on mobile in particular, is a key priority for us. We have already launched our digital-only bank in India and Indonesia, and will soon launch equivalent services in other markets as well. DBS is also focusing on using Artificial Intelligence (AI) to make banking interactions and experiences more enjoyable for customers.

An important initiative that we are part of is Singapore’s “Smart Nation” agenda, which aims to create a cashless society.

### **Big data and analytics will play an important role in the digital transformation of a bank – be it to provide personalized experience to customers or to enable employees to make smarter decisions. Tell us how DBS is leveraging big data in your bank’s digital transformation journey.**

The Bank has a lot of data, which is currently residing in different places and being used by different units in a piecemeal fashion. Our data analytics team leverages these assets to make better recommendations to customers. Also, various departments are putting data to use for internal purposes. The HR department, for instance,

uses data analytics to look at retention of our employees and top performers. We are in the process of creating a fully integrated Big Data and Analytics platform that provides a complete end-to-end big data and machine learning capabilities that is self service to the entire Bank. This platform will ensure frictionless access to data, and will enable us not just to provide a great client experience, but also help us manage Risk and Compliance as well as better employee experience.

### **Artificial Intelligence is considered to be a key technology trend that will reshape banking. How much of the discussion around AI is ahead of its time (or hype) and how much is real? Which business use cases should banks prioritize for 2018?**

We have been using predictive analytics for 4 - 5 years now, and are also leveraging machine learning and chatbots in many areas in the Bank. So, AI is clearly not hype. AI is an integral part of our agenda to make banking joyful. As one of the next steps, we are taking AI and machine learning to the platforms that are supporting them i.e. deploying AI to make those platforms intelligent.

### **An important element of digital transformation is to make sure internal teams embrace digital banking as a way of life and build a culture of innovation. Can you take us through initiatives that DBS has undertaken to make this cultural change successful – like, Agile, devops, open source technologies, etc.**

Our philosophy is to digitally enable the entire bank from the bottom up and to be digital to the core. People and cultural transformation is a big part of that. Driving cultural transformation so that all employees understand the need for change and the desired culture in the organization is the first part. The second is helping our people acquire new knowledge and skills. At DBS, we take this very seriously. There are various mechanisms and methods that we use to transform the skills of our incumbents. Dedicated classroom training programs is one way, but it is the least preferred option. Mostly, we believe in pairing employees who need to be trained with others who are native to those capabilities; we have found this to be one of the most effective methods of transforming people. We hire people with the required capabilities and pair them up with the incumbents, and

the result is that those capabilities are multiplied across the organization. This is rooted in the simple belief that in order to learn something, you must experience and practice it rather than hear about it in a classroom setting.

In my team, we have a very active learning program in a bootcamp setting. The format involves a short Sprints of learning, followed by Labs. The bootcamp attendees learn new skills or new technology, take those learnings, apply them to a use-case and demonstrate the implementation in 2-week sprints.

**In your opinion, which are the top three technologies that will have a major impact on the banking business models in 2018?**

The first is cloud, the second is data and the third is AI. Ultimately, the combination of the three together with agile culture is imperative for scaling any business. It gives any company the ability to experiment quickly and cheaply, and the intelligence to provide superior client experience through data and machine learning.

**Tell us about the top initiatives that were immensely successful for DBS in 2017**

We transformed our entire Hong Kong business landscape from front to back at one go as part of the Finacle implementation program. The bank needed a standardized, flexible, scalable and resilient core banking platform as part of its digital agenda. We partnered with Finacle for the transformation, which also extended to replacing our mobile banking, internet banking, ATM and IVR platforms. It was a huge project, completed in over 18 months.

We started work on a new technology stack on cloud native architecture two years ago. Six months into the journey, we started to feel that the value of the truly Agile approach was not just in Agile rituals, but also in having a truly Agile architecture and development practice. One year into the journey, we started to realise the benefits of extremely high quality releases, minimal production

**We have already launched our digital-only bank in India and Indonesia, and will soon launch equivalent services in other markets as well**

support resources required for these platforms and more importantly, solutions that delivered superior user experience. Using platform-as-a-service (PaaS) such as Pivotal Cloud Foundry, we started to realise the benefits of developer productivity. The platform empowers developers with superior non-functional capabilities such as auto-scaling, self-healing and easy deployment, so that their time can be focused on creating business capabilities.

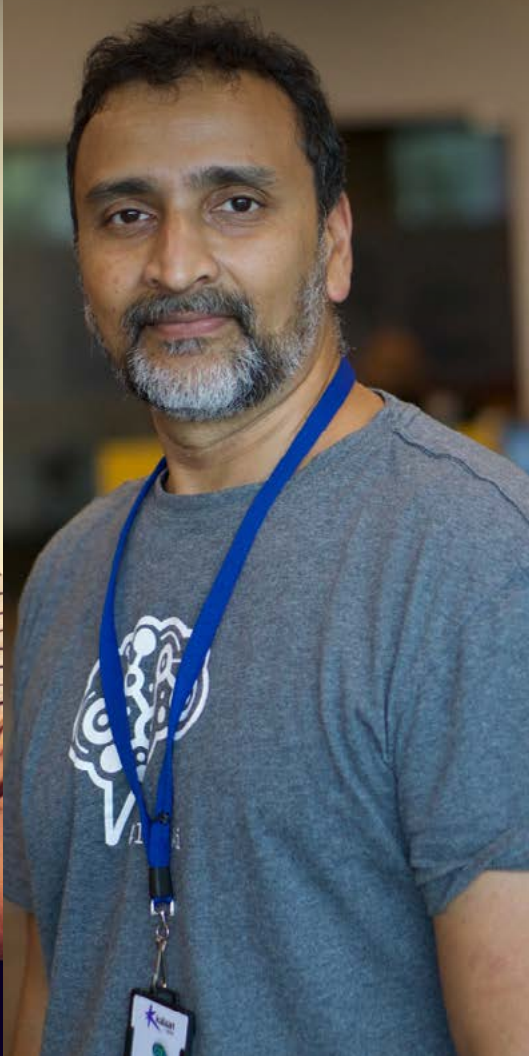


# Inside Talk II:

## In conversation with FinTechs



**Sachin Jaiswal,**  
Chief Executive Officer,  
Niki.ai



**Shankar Narayanan,**  
Co-Founder and  
Chief Operating Officer,  
Active.ai



**Sudha Annie Saigal,**  
Program Director,  
Finacle FinTech  
Connect Program



A report jointly presented by Startupbootcamp and PWC shows a marked interest in AI among UK FinTech startups. A few years ago, AI practitioners were focused on understanding the science, even though they were not sure how it would apply to day to day life. But now, an increasing number of startups are working closely with financial service providers to find solutions to practical problems faced by bank customers. **Sudha Annie Saigal**, Program Director, Finacle FinTech Connect Program, catches up with Sachin Jaiswal, Chief Executive Officer, Niki.ai and Shankar Narayanan, Co-Founder and Chief Operating Officer, Active.ai on their experience with artificial intelligence powered banking.

## Customer service, engagement and acquisition are some of the areas starting where banks are beginning to explore the power of AI

Active.ai is a Singapore based FinTech that offers an Enterprise AI platform for banks. With their Omni Connector AI platform, Active.ai is helping banks and other financial institutions to intuitively and intelligently engage with the customer on mobile, chat, or voice enabled IoT devices using AI.

Niki.ai is an emerging FinTech, headquartered in Bangalore, that offers chat- based commerce solutions. It was founded in May 2015 by 4 IIT Kharagpur graduates - Sachin Jaiswal, Keshav Prawasi, Shishir Modi and Nitin Babel. Niki offers a one stop solution - AI powered chatbot for commerce with 40+ merchant integrations.

**Sudha:** In your opinion, which are the top three technologies that will have a major impact on the banking business models in 2018?

**Sachin Jaiswal:** If we talk about personal banking, we have already come to apps and e-statements from queues and passbooks. We believe that 'Mobile Banking' has been an enabler for banks and consumers alike, to be more adapted to technology and count on it to create

the next best experience. Therefore, in India particularly, after demonetisation when we're rapidly moving towards a cashless society, making every consumer go mobile-first and tech-first is the way to go about transforming banking. This has become more doable recently due to the exponential increase in smartphone and internet penetration in the country.

Bots based on Artificial Intelligence and Machine Learning are another technology trend that are already seeing adoption, and we believe, these have the potential to bring about true digital transformation everyone is aiming for. Be it customer engagement, sales, risk assessment or claim management, AI-based technologies are helping banks do it all better than ever while saving time and money.

## AI will also make banks more efficient in processing and deducting patterns from big data, including text, imagery and speech from various sources

**Shankar Narayanan:** I think blockchain will definitely be one of the key technologies that have a significant impact on banking this year. In addition to areas like trade finance and remittances where there is a lot of traction already, I think blockchain will also make a difference in the know-your-customer process bringing in a lot of efficiency and transparency. Secondly, regulations or not, banks will focus on setting up open banking framework to play a larger role in the banking ecosystem. This will be important for banks to develop a new revenue stream and increase their reach through third parties. Thirdly, Artificial Intelligence cannot be ignored any more in banking. 2018 will see more of conversational banking services through chat and voice based interfaces across their digital channels.

**Sudha:** Artificial Intelligence is considered to be one of the key technology trends that will reshape banking in the coming years. Are banks taking this technology seriously or is there a wait and watch approach?

**Sachin Jaiswal:** Banking being one of the most competitive and tech-intensive sectors, has always been a frontrunner in leveraging technology to automate backend processes and create smoother customer-facing experience. With the advent of AI-based technologies, many banks have already started utilizing these for customer service, digital transactions and more.

The success of these AI-based solutions being implemented by banks, although gradually, is leading to an increased belief and adoption among others in the industry as well. More use cases, more solutions and more adoption will definitely create a trend soon where none of the banks will be willing to lose out on the immense benefits AI brings with itself.

**Shankar Narayanan:** The fact that we are living in a world where AI technologies are increasingly making things simple, and that people are increasingly interacting through conversations with smart virtual assistants, they have similar expectations from their banks. Banks cannot afford to have a wait and a watch approach.

The good news is that the initial group of progressive banks are putting lots of resources and funding behind AI. These banks realize that the future of scalable sustainable open banking will be driven by AI. With more banks looking to harness artificial intelligence to automate and enhance customer experience, the solution providers

**Nitin Babel, Niki.AI:** AI is still taking its baby steps and the data which banks have amassed as on today, only solve half the problem. AI needs time, extensive training & investment before it will reap results. Especially the Natural Language Process capabilities bring in engagement in a personalized way through customizations & local language support thereby opening up banking & financial services for the digitally unbanked. This can increase the overall efficiency of the banks by reducing physical footprint in branches, thereby bringing in operational & financial synergies.

**Shankar Narayanan:** AI is in a nascent stage when it comes to banking, but in coming years I think we will see substantial adoption. Challenges like systems integration and legacy technology have prevented banks from taking advantage of their data sources. But banks cannot delay their investments in AI any further as front runners will have a huge advantage. Hence banks will need to balance their investments in modernizing their technology landscape and new applications of AI. In 2018, FinTechs in the AI space will also look to collaborate with banks more effectively for customer data, an asset they chiefly lack.

**Sudha:** Clearly, the technologies under artificial intelligence are yet to mature. Which application areas or business use cases are banks prioritizing? Which are some of the areas where banks can see quick returns?

## Be it customer engagement, sales, risk assessment or claim management, AI-based technologies are helping banks do it all better than ever while saving time and money

and the solutions are gaining substantial domain-specific knowledge base. With the combination of these bringing out more success stories, hopefully we will see far more mainstream adoption.

**Sudha:** Although the banking and financial services sector is showing interest in AI, our research found that it is clearly not very mature in its journey to adoption, coming in at the 8th position. This is surprising considering that financial services is a data intensive business. How do you think banks should build business case for investments in emerging technologies like AI?

**Sachin Jaiswal:** Time and again, we have seen new use cases emerging for AI in banking. An insurance company can reduce costs and increase efficiency by deploying a chatbot instead of human agents. Same can be done in claim management and vehicle damage analysis using AI-based technologies. Similarly, a lender can automate credit risk analysis using machine learning algorithms to save time and reduce defaults.

Customer service, engagement and acquisition are some of the areas starting where banks are beginning to explore the power of AI. One success story is that of HDFC Bank's Facebook Messenger bot 'OnChat', created by Niki.ai. The bot has seen 160% m-o-m growth in number of transactions, proving the adoption and utility of the AI-powered tool. Over 26% of OnChat users are non-HDFC bank customers. That is, OnChat has helped the bank acquire more customers as well.

## 2018 will see more of conversational banking services through chat and voice based interfaces across their digital channels

**Shankar Narayanan:** Like any new technology, majority of the banks are looking to invest in areas where AI will give tangible benefits and fast. We see that banks are currently prioritizing customer engagement and call center enquiry based services in near term. Hence you see many banks offering chatbots for helping their customers access account information, pay bills, make transfers and access several other banking services. Creating smarter experiences and lowering operational cost for engagement is the objective here.

**Sudha:** Artificial intelligence holds the potential to redefine customer engagement on digital channels to drive new business and cross sell. What do you think should be the approach for banks here?

**Sachin Jaiswal:** Customer engagement using AI-based conversation bots can definitely prove to be a game-changer for banks. An engaged customer is a retained one, and customer retention is paramount for any business. Banks should look to automate most of the customer-facing conversations with the help of bots. Bots provide a personalised and consistent experience to the customers, and can play an important role in reaching out to customers right when they're most likely to interact with the business through data analysis, thus efficiently covering gaps there are when it comes to user education and communication.

**Shankar Narayanan:** Banks will need to be on the same channels on which customers are spending more today. Mostly, these are the digital channels today and AI can play a significant role to redefine customer experiences on these channels. Chatbots, for example, have the potential to provide non-intrusive but in-context banking experiences to customers, and meaningful insights based on their interactions to banks. AI will also make banks more efficient in processing and deducing patterns from big data, including text, imagery and speech from various sources. For me, banks that invest in AI stand to gain a huge competitive advantage in the near future.



# Banking and AI

## Laying the foundation



A good way to begin any discussion on what banks should do with Artificial Intelligence is to look at what the four tech-biggies are up to. On the infrastructure side, there's Amazon Web Services and data center, Google Cloud, Apple SIM, and now, a solar-powered Internet spreading drone called Aquila from Facebook. In the world of mobile communications and instant messaging, there's Plus, Duo and Allo from Google, FaceTime from Apple and Facebook Messenger. Connected technologies are also inviting interest from Google (Google Auto), Amazon (Alexa driven-integration), and Apple (AirPlay/ Car). Besides this, the GAFA set have their own smart assistants namely, Google Assistant, Amazon Alexa, Facebook Jarvis and Apple Siri.

## Now it is up to each bank to decide which use cases to lead with, based on core competence, objectives, resources and readiness

A recent report estimated that globally, the tech giants (GAFA, Baidu and others) spent between US\$ 20 billion and US\$ 30 billion on AI in 2016<sup>5</sup>. All these companies are betting on an AI opportunity that is expected to contribute US\$ 15.7 trillion to world GDP by 2030, of which US\$ 6.6 trillion will result from productivity gains and the remaining from consumption effects<sup>6</sup>. 2017 marked the beginning of the 4th digital wave sweeping through 25 countries around the world, and driven by robotics and AI. As AI overlaps with the Internet of Things, there's no telling how many devices and people it will connect together in the next few years, but one thing is certain that the future will witness massive collaboration between human and machine intelligence.

### Where do banks figure in all of this?

Traditionally a laggard in technology adoption, in AI the banking industry has a chance to right that record. This is because industries that have already gone digital in a big way – and financial services is one of them – are also best

placed to adopt AI. But when we commissioned a survey of 1,600 business and IT leaders from 10 vertical groups to understand what their organizations were doing in this space, half the respondents said that not knowing where AI could help was one of the biggest barriers to adoption.

## Industries that have already gone digital in a big way – and financial services is one of them – are also best placed to adopt AI

One way of finding out is to use a framework proposed by the McKinsey Global Institute to assess where AI fits into the value chain of any business. Does it help projection processes by improving R&D and forecasting?<sup>5</sup> Does it optimize production and maintenance? In what ways does AI benefit sales and marketing? And above all, can the enterprise provide better user experiences using the technology?

Applied to banking, this framework says that AI could project things like new consumer demands, changes to the regulatory landscape, competitor activity and the extent of customer churn. More importantly, the data and analytics layer of AI would be able to analyze the root cause of various events and recommend the best response to each. Currently, most banks are sitting on 10 to 15 years of mostly idle data. AI would enable them to extract its insights to project future events and optimize their impact on the organization.

Moving further down the value chain, AI technologies, such as robotic process automation and machine learning, would eliminate the manual effort going into routine, repetitive banking processes to deliver enormous efficiency and productivity gains. For example, at JP Morgan Chase, a program called COIN interprets loan documents in seconds, with a high degree of accuracy. Previously, the bank employed a very large number of loan officers and lawyers who spent 360,000 hours every year on this task<sup>7</sup>.



## 2017 marked the beginning of the 4th digital wave sweeping through 25 countries around the world, and driven by robotics and AI

Similarly, the framework can locate a number of use cases where AI can add value by identifying the right targets for product promotions, or by improving the delivery of services to provide superior customer experience.

Now it is up to each bank to decide which use cases to lead with, based on core competence, objectives, resources and readiness. It is important to be aware that there is no single formula that will work for all banks. After identifying

their top use cases and enabling AI technologies, banks should lay the groundwork by provisioning the required IT infrastructure, ensuring connectivity and mobility, and making the necessary investments without delay. AI is still evolving, which means that there is significant advantage to be had by early adopters. On the flip side, fence sitters and slow movers risk falling behind to a point of no comeback.



**Rajashekara V. Maiya**  
Head of Product Strategy, Infosys  
Finacle (Moderator)

# AI Adoption

You can debate the how,  
but the time is now



So, recently, Musk and Zuck were at it again, trading arguments on whether AI will kill, or redeem, us all. Unfortunately, this enjoyable debate, instead of clearing the fog around artificial intelligence, is only polarizing public opinion further.

The truth about AI lies somewhere in between these two extreme viewpoints. Another truth about AI is that adoption is no longer optional for any business that hopes to survive into the future.

For banks, which are struggling to reduce costs, maintain margins, and meet customer expectations of personalized experience, the need to implement AI is particularly urgent. All parameters, whether pertaining to economics, risk, or customer satisfaction, reinforce this need. Take for instance online fraud, which is on the rise as businesses digitize on scale. There is no way that enterprises can manage this risk manually or using legacy information systems; the only solution is to deploy machine/ deep learning and predictive analytics to examine every transaction in real-time.

Banks who are slow to adopt AI will end up conceding an unassailable lead to the early movers, and also forego the opportunity to give their AI systems a head start at learning. The industry can no longer afford the luxury of

watching and waiting for the technology to mature. The time to begin the AI journey is now.

With that resolve, banks must proceed to firm up their understanding of AI technologies before taking the plunge. It is important to recognize that a major reason behind the recent spectacular rise of AI is the coming together of several component technologies, such as machine learning, predictive analytics, natural language processing, robotic process automation and smart virtual assistants. Banks should also be aware of the layers in the AI stack to take full advantage of its potential.

**AI may not have matured to its fullest potential, but it is evolving so fast that anyone who isn't on board yet is already left behind**

The AI stack consists of building blocks and applied solutions, which are commonly used across a variety of use cases. The foundational layer is Data and Analytics. Next come the building blocks of machine learning, deep learning, natural language processing, natural language generation and visual perception. These building block technologies combine into applied solutions such as

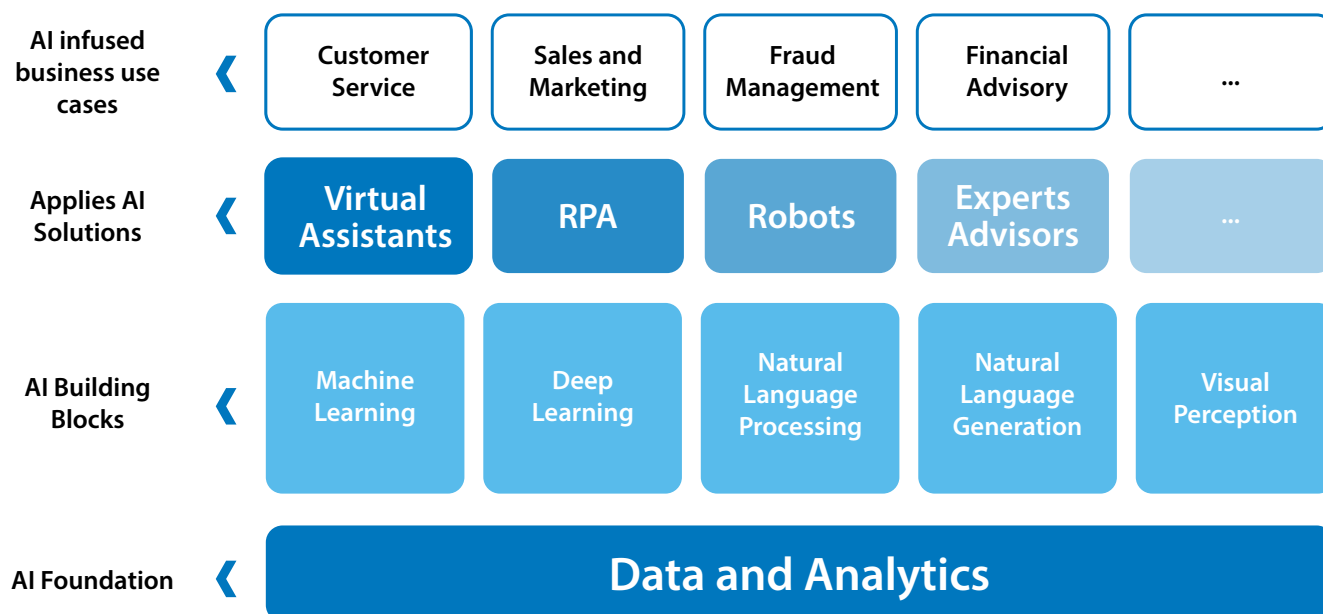
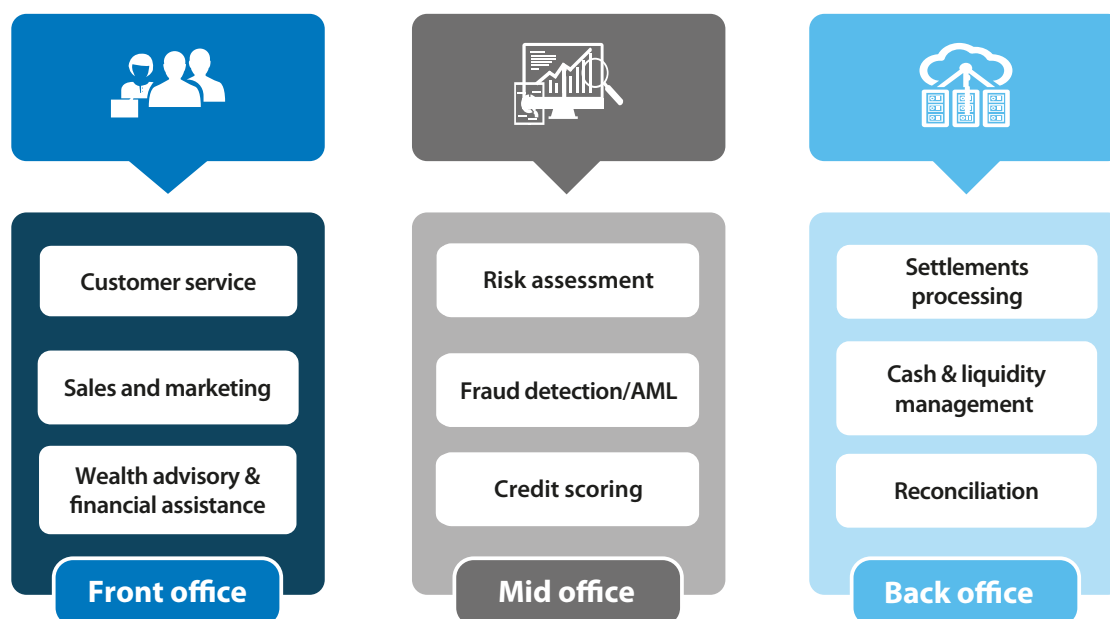


Figure 1: AI Stack



virtual assistants, robots and expert advisors, which may then be deployed into hundreds, even thousands, of use cases in banking functions ranging from customer service to risk management.

Another way to understand AI is by type of action or role: is the intelligence merely observing and sensing, or does it interpret and evaluate, or better still, interact and take action? In the first instance, the solution, typically based on natural language processing, speech recognition and/or visual perception, acts as an observer, sensing things around it just like human beings do. In the second case, the organization leverages AI to emulate the human thinking process, including creating and evaluating various hypotheses. In the third case, AI takes action, based on its interaction with both man and machine.

However, most banks are likely to appreciate AI by where it fits into the banking function. Today, AI has the potential to reimagine a number of banking processes in the front, middle and back office. Here, a few illustrations may be useful.

In the front office, AI can improve the effectiveness of a marketing campaign by identifying the most likely adopters. Virtual advisors, such as Luvo from RBS, can empower relationship managers with all the information they need for client meetings. And bots can handle a

majority of routine queries addressed to the service desk. For instance, Swedbank's Nina takes more than 40,000 calls from customers every month.

**Banks should also be aware of the layers in the AI stack to take full advantage of its potential**

In the bank's middle office, machine learning can play a huge role in mitigating fraud by scanning transactions for suspicious patterns in real-time, assessing clients for worthiness, and helping risk analysts with timely recommendations for curtailing risk.

Opportunities for deploying AI in the banking back office abound. In securities settlement, robotic process automation may be applied to validate trades and reconcile the information in back office systems with trades made in the front office. AI can also facilitate trade enrichment, confirmation and settlement. Banks may leverage AI for reconciliations in the case of Nostro accounts, OTC derivatives and Forex transactions, and for target balancing and notional pooling in the area of cash and liquidity management.

In a recent Infosys-commissioned study that spoke to 1,600 business and IT leaders across 10 verticals, half the respondents from financial services felt that AI solutions would only be effective if their cost came down. While the benefits of implementation will pay for its cost over the long term, it is also possible to minimize the upfront cost of AI by consuming it off the cloud as a service. Other deployment options are platforms and applications, which confer their own advantages. The commonly held view is that a combination of all three is best.

**For banks, which are struggling to reduce costs, maintain margins, and meet customer expectations of personalized experience, the need to implement AI is particularly urgent**

That being said, there is no set formula or strategy for embracing AI. Each bank must determine its own path, pace and destination based on its business circumstances, readiness and resources. For a bank seeking to build everything in-house, the precondition is that it must

have the necessary business vision, skill sets, technology readiness and time. Most banks would probably consider taking some help from the outside, especially from young FinTech companies and startups who have the technical savvy and innovativeness to create AI solutions that they can offer on top of their services to provide real value to customers. When choosing an external partner, certain things to consider are breadth and depth of the AI stack, alignment with the bank's thinking, domain expertise and track record.

While the approach may differ from bank to bank, the one thing common to all is the need to get going. AI may not have matured to its fullest potential, but it is evolving so fast that anyone who isn't on board yet is already left behind.



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# Automating the Bank

## The first step towards AI



An increasing number of banks are beginning to consider using software tools to automate repetitive, rule-based processes consuming massive manual effort. One estimate says that the robotic automation market for Banking, Financial Services and Insurance companies will grow 75 percent every year to touch US\$ 835 million by 2020<sup>8</sup>. Many industry watchers believe this could be the year that Robotic Process Automation (RPA), also known as the digital workforce, comes into its own.

A 2016 study of RPA in the financial services industry revealed that three-fourths of organizations had tried their hand at it with either a proof-of-concept or a more intensive implementation<sup>9</sup>, seeking benefits ranging from cost efficiency and accuracy to scalability and freeing up

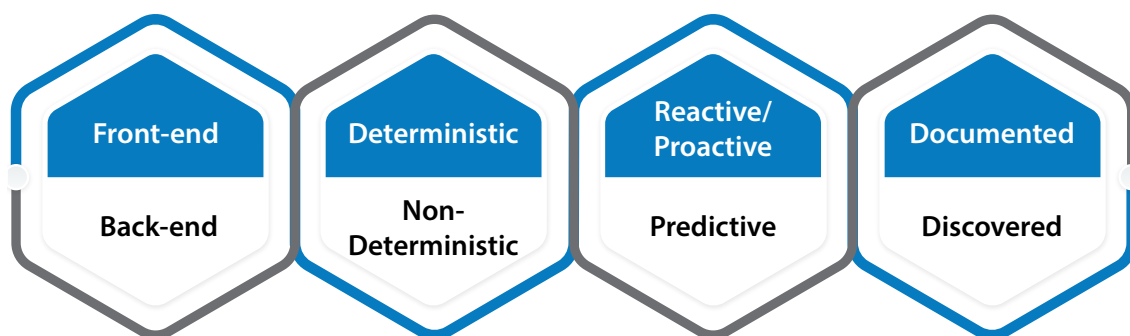
of human resources that could be deployed into more value-enhancing roles.

But while RPA has elicited great interest, it still has miles to go to hit meaningful usage: in the above study, only 4 percent of respondent organizations reported widespread implementation, whereas another 13 percent said that they had started, but not finished, the process of adopting RPA throughout the enterprise.

What is the focus of these efforts? Are banks looking to automate any and all processes that are amenable to RPA, or are they operating within a narrow band? And is there a “right” way to adopt the technology?

## Automation Capabilities

## RPA



## Cognitive

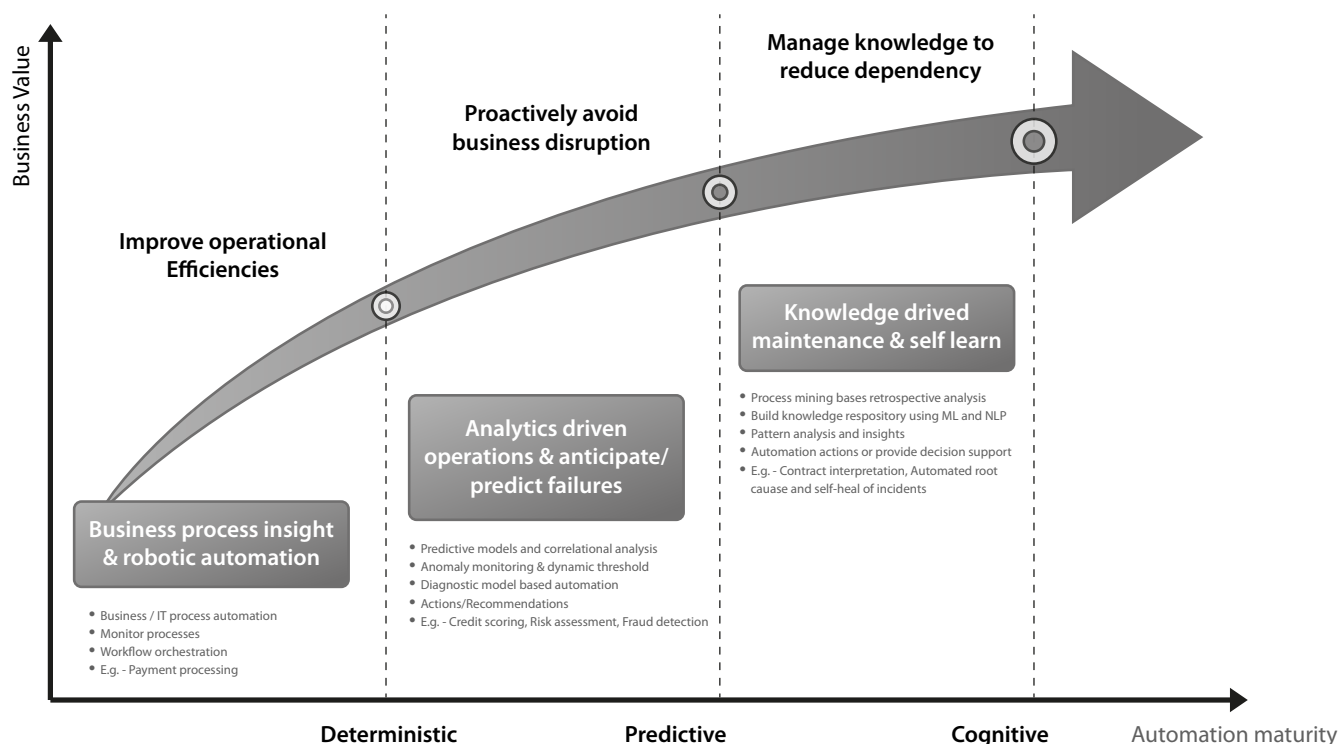
Our experience of working with banks around the world says that the bulk of robotic software automation is targeted at front-end banking processes that are deterministic, either reactive or proactive, and well documented. Let us look at each descriptor briefly.

**Front - Back End:** Front-end processes are those where interaction between customer and bank happens over a User Interface such as a website/ web form, spreadsheet, or application where data is extracted through the UI

**In the early stages of automating deterministic processes, the bank gains operational efficiencies**

itself. The back office processes, however, are yet to take advantages of modern technologies. The processes consisting of functions like clearing, settlement, payments, custody operations, reporting, and compliance can also benefit tremendously from AI technologies.

**Deterministic - Non Deterministic:** In a deterministic process, all the steps are known and hence easily automated. A request for resetting a password is an example of such a process. A non-deterministic process, on the other hand, is not as clear-cut because it may arise from one of several causes and accordingly, set in motion any one of multiple processes. As illustration, consider a website that is down. The problem might be with the application itself, or the network, or the user's browser. Clearly, recovery can be automated only after identifying the reason for the outage using a probabilistic decision tree that analyzes the organization's past history to arrive at the most probable cause. That is actually deeper Artificial Intelligence (AI), or more specifically, Machine Learning territory. This tells us that when banks seek to automate complex or uncertain processes, they might need to use RPA as a first step in deploying a solution involving some form of AI.



**Fully - Partially- Not Documented:** A process may or may not be fully documented. It is obviously easier to document a deterministic process. But sometimes, even that is not possible for a variety of reasons – people with expertise leave the organization taking their knowledge with them; the organization lacks a holistic view of a certain process; the necessary systems and resources are unavailable, and so forth. Exceptions often go undocumented because while people have a good idea of what a functioning process looks like, they don't have

**Which Processes to Automate: Reactive - Proactive - Predictive - Cognitive:** Every banking process is triggered by something. Robotic Process Automation lends itself easily to processes that are triggered proactively or reactively. An example of a reactively triggered process is a relationship manager being notified as soon as his customer enters the branch. A proactive process is anticipatory; the automatic dispatching of a fresh checkbook when a customer issues the last check in his booklet, is an example of such a process.

**Our experience of working with banks around the world says that the bulk of robotic software automation is targeted at front-end banking processes that are deterministic, either reactive or proactive, and well documented**

the same clarity about a broken one. Here, the bank would have to discover the process before it can document and then automate it. Once again, this might call for a more complete AI-based solution to examine all the exception logs from an application, or study the keystrokes at an agent's desk to understand what is going on.

A predictively triggered process is set in motion based on a reading of data patterns. For example, if a customer's transaction activity drops for three months in a row, it might signal that she has moved some business to another bank, and therefore trigger a particularly attractive promotional offer to win her back. This process can be fully automated since it is rule-based.

When the trigger is cognitive in nature – requiring a human skill such as natural language understanding, for instance – it will take a combination of RPA and other elements of AI to automate the related process. Think of a simple service request sent via email. Robotic Process Automation can do nothing until an AI tool with Natural Language capability, such as a chatbot, reads the email and instructs the software.

### **The way forward**

From the above discussion it is clear that banks can begin their journey of automation with RPA, but will someday need to step up to solutions that take advantage of other AI capabilities to automate their trickier processes (non-deterministic, not documented, cognitively triggered etc.). A bank's progress from deterministic to predictive to cognitive processes marks the increasing maturity of its automation capabilities, as well as the increasing business value it generates from automation.

In the early stages of automating deterministic processes, the bank gains operational efficiencies. In the middle stages, when it uses analytics to drive operations and

make predictions, the bank becomes more proactive and resistant to business disruption. When it manages to automate cognitive processes, the bank will get to a state where its systems learn on their own. At that point, knowledge management will play a vital role by reducing the bank's dependence on individuals.

That being said, it is not necessary for a bank to transition sequentially from one stage to the other; it could choose to run multiple initiatives of varying automation maturity levels in parallel. However, before getting into anything the bank would do well to lay out its vision for the future and get the right partner on board. A vendor with full spectrum capability, and a strong track record in financial services automation would be an invaluable ally in this important journey.



**Sudhir Jha**

Senior Vice President, Head of Product  
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# Machine Learning in Banking

## Fantastic beasts and where to find them



I am an amateur Go player for more than twenty years. The best part of Go is its deep strategic component. The immense board size (19x19) makes the “standard” reasoning and scoring techniques infeasible even on supercomputers – in the year 2008, the best computer Go programs were still mired at just beyond an advanced beginner’s level.

In March 2016, I was astonished at the news of AlphaGo winning Go game over 18-time world champion Lee Sedol. Artificial intelligence (AI) relevant headlines kept going these days. Google’s image captioning AI claimed to describe photos with 94%+ accuracy. Facebook just tried teaching bots art of negotiation – so the AI learned to lie. Analysts recently forecasted that in 2025, 15% of new passenger car sales worldwide would be autonomous vehicles. No doubt, AI is revolutionizing the world at an unprecedented pace indeed.

### **More substance than hype**

Banking is no exception. AI is impacting banking industry no less than any other. Discussions in the media around the emergence of AI in banking range from the topic of automation and its potential to cut countless jobs to startup acquisitions. Despite the media hype, AI and machine learning (ML) is increasingly embedded into bank’s everyday business including chatbots, robo-advisors, intelligent fraud detection tools, robotic trading, and document analysis and classification for legal and compliance.

The depth of knowledge levels required for AI often leads to tremendous efforts and investments for AI projects, and there are limitations and downsides to these AI enabled services as well. Many robo-advisors in banking don’t offer common sense financial advice other than rebalancing automation on ETFs. Many of these expert systems did not anticipate the vast amount of implicit knowledge we all share about the world and ourselves – common sense problem is still considered to be among the hardest in all of AI research. Although deep learning – which is driving today’s AI explosion – is undeniably mind-blowing, it is still weak in abstraction and reasoning. Humans can learn from very few examples and can do very long-term planning. On the other hand, deep learning requests tremendous data and relatively straightforward pattern recognition. Today’s deep learning techniques cannot be

scaled to achieve general intelligence – they could only be designed to address a niche problem in banking. Even for a specific task, deep learning appears still “unreliable” and sometimes makes mistakes humans usually don’t make (Hackers could purposely attack ML with adversarial examples). And, the transparency of deep neural network used for risk and compliance (such as credit scoring) concerns regulators.

Despite all these limitations, AI is poised for great market expansion and is ready to transform the entire banking sector. AI, one of the three key themes to form the basis for Gartner’s report “Top 10 strategic technology trends for 2017”, is becoming a critical competitive advantage for banks. The top challenge that keeps bank CIOs up at night right now is about how – not whether – they should invest in artificial intelligence.

### **Five problems machine learning can solve in banking**

In a broad concept, the technology stack of AI includes machine learning, NLP, robots, and many others. A recent McKinsey report<sup>10</sup> says ML and deep learning attracted almost 60 percent of AI investment, and it is an enabler for so many other technologies and applications, such as robotics, NLP and speech recognition. However, for bankers, many confusion of AI could also be traced back to understanding machine learning properly.

There are many ways to classify machine learning relevant technologies – ML is a combination of informatics, analytics, and computer science. Depending on the engineering approach, machine learning tasks are typically classified into a couple of broad categories: supervised learning (labeling data), unsupervised learning

### **AI and ML are ready to become bank’s internal combustion engine to power banks’ future in coming years**

(understanding data), reinforcement learning (algorithm learning to react to an environment to perform a certain goal) and others. Machine learning tasks could also be categorized by the outputs from statistics perspective: classification, regression, clustering, dimensionality reduction and others. There are also different classes of algorithms: Linear Regression, Logistic Regression,

Decision Tree, SVM, CNN, RNN, kNN, GAN, seq-2-seq, and LSTM. All these definitions and classifications – some overlap each other – lead to confusion for banks' senior executives: What are the right use cases? Which are the best-fit AI technologies? Am I deploying an approved mature technology?

Yet CEOs and senior business bankers don't look at machine learning in above ways – it could be a painful experience to explain GAN to a banker. Instead, use cases including the benefits and risks are the common language understood by business users: fraud prevention, risk management, digital assistants, or financial advisors. Unfortunately, there are disconnections between these use cases and the technical terms.

To address that, we recommend to categorize machine learning by what type of real-world problems ML could help to solve in banking: scoring, tactic, labeling, recommending and pricing.

These five problems have successful AI implementation cases in banking and other industries – be it Netflix recommendation or Google photo tags or Uber price hike. Therefore, bank executives are assured not to be guinea pigs. We recommend Bank CIOs to use this classification to explore different niche use cases based on local context – it simplifies bank executives' process to explore AI use cases and saves efforts of consulting from external parties.

### Scoring

An objective of scoring is to provide a score – for instance, between 0 and 1 – given a sample with the help of deep learning. One of the basic examples of scoring is the

**AI becomes the touch point embedded in every digital channel, the critical factor that will determine its success is how well banks are able to humanize the experience**

calculated probabilities in a word prediction algorithm that forms the basis for Natural Language Processing (NLP). The same technique has been widely adopted and enhanced by industry, for instance, diagnosing cancer. AI-based credit scoring models which could make sharper predictions of credit risk is a classic "scoring" use case in banking. Loan default rate, customer loyalty, and customer's total relationship value are among other potential use cases.

### Pricing

An objective of pricing is to identify the optimal route (price setting) that could map to your customer. Different from traditional rule-based pricing, regression technique can be used to build and forecast a continuous curve of dynamic pricing. Uber uses artificial intelligence to figure out customer's personal price hike. Potential use cases in banking include customer preferential pricing.

### Labeling

An objective of labeling is to separate undesirable samples from desirable samples, or vice versa. It uses both supervised (classification) and unsupervised learning (clustering) approach for anomaly detection, for instance, trash email categorization that used by Gmail and Yahoo Mail. Potential classification use cases in banking include transaction fraud detection and document classification. Potential clustering use cases in banking include automated customer segmentation.

### Tactic

An objective of tactic is to interact with one counterparty or many of them with a belief to achieve. It may use reinforcement learning to maintain some belief about the counterparty, refine the belief, and then act accordingly. As we all know, game playing is so far the most popular research field to practice tactic techniques. For instance, Google's AlphaGo is now literally the best Go player in the world, and Elon Musk's OpenAI has beaten the world's best Dota 2 players recently. One of the potential "tactic" use cases in banking is trading. For instance, JPMorgan's LOXM has been used in the bank's European equities algorithms business since the first quarter.

### Recommending

An objective of recommending is to learn a user's tastes and preferences.

Imagine a user x product matrix – some metrics have scored, most entries are missing – and AI could fill in the missing entries. It uses multiple techniques from collaborative filtering, matrix factorization, ensemble learning to latent variable modeling. Researchers started by using supervised learning approach, and are taking reinforcement learning approach recently to build a "feedback system" to continuously enhance the efficiency



and accuracy. Netflix and Amazon are among of those famous examples using AI for the recommendation. Potential use cases in banking include financial advice, product recommendation and portfolio recommendation.

## The way forward

For banking executives, despite all the challenges, AI and machine learning have become increasingly crucial to make banks keep up with the competition. As every bank has its unique characteristics and context, the best practice for ML investment will differ among banks – it is influenced by different factors including technology, regulation, talents and the bank's local business context. However, based on research and experience, there are four key pieces of advice that will have a major impact on AI implementation decisions.

**Despite the media hype, AI and machine learning (ML) is increasingly embedded into bank's everyday business**

## Identifying niche use cases

Scientists are not yet ready to overcome the limitations of machine learning and proceed toward general artificial intelligence in near future. Instead, there could be an explosion of specific, highly niche artificial intelligence systems in banking.

It looks a platitude to say identifying a right use case is one of the most important things to start with ML – it is true for any new technology, but it is particularly critical for ML. Some of unsuccessful AI implementation is largely due to bringing in an ML platform without knowing the specific problem to solve. However, the breadth and details of ML knowledge are enormous; it has become a hurdle for bank CIOs to evaluate ML use cases effectively. Investment in ML demands more efforts of researching and consulting than it in others - bank executives could use our recommended five problem types that machine learning can solve to conduct a mapping from use cases to the technology stack for a better selection of use cases. An alternative is

to seek help from external AI platforms – for instance, Nia from Infosys – with pre-built banking use cases that can fit the bank's context.

## Exploring democratized AI tools

An AI enthusiast may lobby IT executives to use Google's Tensor Processing Unit (TPU) replacing Graphics Processing Unit (GPU) to greatly accelerate their neural network computations behind the scenes. But the chip has been specifically designed for Google's TensorFlow framework, and only available to external by Google Cloud (for now). Even if Google makes TPU available to bank's data center in future, there are still concerns: GPU can be scaled for VR streaming and other high-performance computing tasks easily but TPU cannot.

So, many factors need to be considered from selecting AI frameworks to deciding supporting hardware. Fortunately, open source and cloud computing – both are key catalysts for ML and deep learning infrastructure - are now allowing banks to simplify the implementation of deep learning without having to set up or maintain any other infrastructure. For instance, Google's TensorFlow is the most popular framework on GitHub and highly flexible and portable (but maybe slower than others; well, Google doesn't agree on that); Facebook's Pytorch may be faster (but needs better documentation); CNTK makes Microsoft's open source efforts one step further but it is not licensed for commercial use; banks choose Deeplearning4j largely due to the benefits of leverage existing JVM stack and resources (but Java is unpopular in ML research); and, many of these open source platforms are not commercially supported. If banks are more comfortable with commercial support, business platforms like Infosys Nia is an alternative to help bank build an integrated and licensed AI and ML platform.

## AI as an experience

Conversational User Interface (CUI) - for instance, chatbot - has become a different type of interface to get banking business done. Best-of-breed vertical chatbots support contextualized conversational experience, by remembering the dialog context and understanding the small talk.



Artificial intelligence will be the main way that banks interact with their customers within the next couple of years. Once AI becomes the touch point embedded in every digital channel, the critical factor that will determine its success is how well banks are able to humanize the experience - friendly chat messages, emojis, happiness, empathy, customer's personal financial plans, and everything else that comes with it - and yet it is as much a design problem as it is a technical problem. In fact, moving forward, this "human touch" experience will be one of the most critical elements that separate a good CUI from a great one.

### Addressing regulatory concerns

To use ML specifically in credit scores and models, transparency could be an issue to regulators. Regulators are worried that AI-enhanced credit scores could become a "black box", with full underwriting process not transparent to consumers. Furthermore, machine learning and deep neural networks could make it harder to provide the needed "reason code" to borrowers for credit denial. Bank executives need to work on techniques that would make AI credit-based score decisions more explainable and auditor friendly.

### Bottom line

Early this year, we have said AI is going to become the competitive advantage for banks in the future<sup>11</sup>. Today, despite the media hype that industries are being replaced by machines – AI is indeed a fantastic beast revolutionizing banking at an unprecedented pace. AI and machine learning have demonstrated its ability and potential to redefine customer experience, automate processes more smartly, and manage risks more effectively. AI and ML are ready to become bank's internal combustion engine to power banks' future in coming years. But are banks ready for the changes?



**Ethan Wang**  
Product Manager, Infosys Finacle

# Case Study: DBS Bank

A revolutionary new way  
to bank



## Profile

DBS is a leading financial services group in Asia, with over 280 branches and 23,000 employees across 18 markets. It is headquartered in Singapore, with a growing presence in Greater China, Southeast Asia and South Asia. DBS Bank was named the World's Best Digital Bank by Euromoney in 2016.

DBS had started on its digitalization journey a few years ago by adopting a strategy to enable growth and expansion, and investing more in its technology infrastructure. In doing so, the bank needed to embrace technology, reimagine the customer journey, and transform the company culture. The next few sections will elaborate on some of the technology initiatives of DBS Bank in their journey to become the World's Best Digital Bank.

### DBS Bank: Emerging Markets and Overseas Countries (EMOC) Core Migration

Back in 2009, DBS Bank looked to expand its presence in overseas markets, specifically the Asian region. To do this, DBS Bank needed a core migration.

As it was, DBS Bank's Emerging Markets and Overseas Countries (EMOC) were running numerous different legacy systems. The loose connection of fragmented systems hampered the bank's abilities to optimize its overseas entities, limiting expansion into those markets. To support its vision, DBS launched the EMOC Core Banking program. The operation was a regional, phased rollout of the Infosys Finacle platform to 13 locations over a period of 20 months. Deployment was a model of efficiency, going live in almost a branch a month at its height. From cost savings, to reducing human resources, the benefits were far reaching. DBS Bank exemplified how a core transformation does not have to be a painful process, but one that can be fairly quick and efficient, even on a global scale.

### DBS Hong Kong reinvents its core with Finacle Transforming legacy systems and driving digital transformation

With 34 branches and over 4,000 employees, DBS Hong Kong provides a full range of services in consumer,

SME and corporate banking solutions. DBS Hong Kong believed in making banking easier and more intuitive for customers. As one of the most progressive banks in the country, DBS was looking to grow its digital banking initiatives. Its legacy systems were hampering this growth, and where limiting the bank's ability to launch new services and solutions. Meanwhile, customers were becoming increasingly digitally savvy, and expected their bank to keep up.

DBS Bank needed a flexible, scalable and resilient core banking platform that would help deliver simple, convenient, and secure banking for its customers. It also needed robust internet and mobile banking platforms to align to its overall digital journey.

As such, DBS chose the Finacle core banking platform, and embarked on a major transformation project to scale up the overall core banking system along with redefining the internet and mobile banking platforms. The entire project, from testing, implementation and migration, was completed in 24 months.

**The core solution delivers comprehensive, unified, real-time, and contextual insights on customer relationships across multiple channels**

### Key business drivers

There was a need for the bank to decommission its legacy core system, to contain recurring high maintenance costs, and transform its core platform to an open and scalable system that could support the latest protocols and technologies.

It wanted to enable its business teams to roll out new banking services and initiatives as well as shorten time to market for products. DBS Hong Kong was looking to align the application landscape and processes with regional standards, and provide a stable, digital-bank-ready foundation for future growth. Some of its key challenges include:

- High turnaround time for account opening and customer servicing;
- Delays in new product and services launch due to technical and system limitations;
- Duplicate data capture;
- Master account concept not supported by legacy system;
- Unavailability of data in Chinese, an important language in Hong Kong;
- Many mainframe legacy systems were at sunset point; and
- The need for automation in many clearing and manual data entry processes.

The Bank needed a core banking solution that could transform its business.

**With digibank, DBS wanted to offer customers a simple, convenient and secure way to bank while on-the-go**

### Implementation highlights

The project involved implementing the Finacle core banking platform, along with redefining internet and mobile banking. The Finacle team partnered with DBS to define the key objectives and outline the expected outcomes of the project. The team used process improvement events and Lean methodologies to focus on customer experience for system design.

Design thinking principles were introduced, and user interface (UI) prototyping was planned to collect feedback on design and navigation of the new teller screens and workflow from the branch's operation users. The team effectively leveraged the experience of the centralized applications and infrastructure, and reused the existing interfaces being in other DBS Finacle locations.

The Finacle team divided the implementation into phases and worked with the Bank to complete each of them. The phases included preparation, design workshops, post workshop design sign-off, build delivery execution, testing and implementation support, and performance testing and migration.

In the first phase, the team created a foundation layer for the customer master. In the second phase, DBS Hong Kong went live on Finacle with multiple product lines including CASA and term deposits.

Despite multiple challenges, the team completed implementation within the desired timelines.

Heavy integration was required with 109 upstream and downstream systems with a variety of integration protocol. The team developed generic APIs to cater to the requests coming from multiple systems. Multiple hops were avoided for frequently used static data by building cache in middleware with online notification from Finacle. To minimise overall batch window, new Java based batch utility ExecSP was developed for heavy data extraction. Switch-based multi-entity handling ensured ease in specific functions and enablement of features as per business requirements.

Product enhancements were identified at multiple stages and delivered within short timelines. This included support for autopay and clearing requirements, authorisation matrix for non-amount based exceptions and workflows, and enhanced credit limit lines features to support complex business requirements.

This was also a high-risk implementation involving critical systems including ATM, internet banking and mobile banking. The cutover was de-risked with a staggered implementation approach. A pilot cutover with technical source deployment and configuration was rolled out in production a month before the actual cutover. This helped narrow the overall implementation window and

**In India, Digibank has gained over 1.8 million customers within 18 months of launch**

minimised system downtime during actual migration. A mini version of the migration was carried out to verify the migrated data with some internal accounts to ensure data integrity and upfront verification of key data set.

The team applied a design thinking approach to reduce extraction time to more than 100% by writing an advanced Java-based extraction utility. This is beingre-used in other DBS branches as well.



This was by far the biggest core transformation program for DBS in one of its key markets. The implementation program won the 'Core Banking System Initiative of the Year – Hong Kong' in The Asian Banking and Finance Awards 2017.

### Key benefits

Meeting the demands of a digital oriented generation of customers was a primary objective of the core transformation at DBS Bank Hong Kong. With Finacle, the bank can now design processes and products that will deliver personalized and contextual experiences for its customers. The core solution delivers comprehensive, unified, real-time, and contextual insights on customer relationships across multiple channels.

## DBS Bank is now able to provide greater convenience to its high-net-worth customers, with 24/7 account access availability over channels

The Finacle platform offers a range of flexible capabilities that enables the bank to launch products and services in a shorter timeframe. The time to launch new products has been reduced. This gives the bank greater agility for continuous innovation and accelerated growth.

Finacle offers DBS Bank extensive automation and straight through processing opportunities that leverages business rules, user-driven parameterisation, and APIs. The bank now has a robust infrastructure with high availability technology stack to ensure increased availability and support for aggressive digital/channel expansion.

Some of the operations have seen a reduction in processing time. Some examples include:

- Cash and non-cash payments are now completed in half the time taken earlier;
- Time taken to process cash deposit and cash withdrawal are now down by 40%;

- Time taken to process account transfers are reduced by 20%; and
- Foreign exchange, cheque withdrawal and credit card cash advance are now processed in half the time.

Overall, DBS Bank Hong Kong operations now have a flexible, scalable and resilient core banking platform with Finacle helping to deliver simple, convenient, and secure on-the-go banking for customers.

### Digibank by DBS

A few years back, DBS wanted to create a mobile-only bank with all the major banking functionalities to expand its presence in selected markets. To start, digibank was launched in India and Indonesia. Digibank is India's first mobile-only bank that is completely paperless and branchless. This appeals to the mobile-oriented generation and tap into the ongoing technological and digital revolution in the country.

With digibank, DBS wanted to offer customers a simple, convenient and secure way to bank while on-the-go, while eliminating the tedious manual processes required for opening an account. To do so, DBS bank needed a flexible, scalable and resilient platform that would enable them to launch new features and offer diverse functions. The bank chose Finacle core banking solution as the platform of choice for digibank in both the countries.

In Indonesia, DBS leveraged digibank to provide customers a mobile platform to check their profile, account details and conduct financial transactions, in the absence of the internet banking channel.

### Implementation highlights

Using the incremental development principle of Agile delivery, DBS and Infosys Finacle team were able to break down the project's overall delivery requirements into sets of work items that would be completed in sprint cycles. As part of the requirements gathering phase, the team conducted design workshops.

Design thinking principles were used during the requirement gathering and design stage. In Indonesia, the UI prototyping was planned to take upfront feedback on design and navigation for the new teller screens and the workflow of branch operation users.

The bank incorporated the virtual assistant from Kasisto to assist customers with their enquiries pertaining to their account and features available. Digibank also offers personal finance management powered by MoneyThor, which helps users with budgeting and financial planning. With Finacle, digibank has a robust integration platform

## As one of the most progressive banks in the country, DBS was looking to grow its digital banking initiatives

that hosts all the digital banking capabilities by interfacing with multiple service providers in both online and batch mode 24/7 through a variety of integration protocols. Finacle core banking solution interacts with multiple interfacing systems to help DBS deliver a world class banking experience to the customers.

In India, the implementation was completed in a year and launched in April 2016. In Indonesia, the public launch took place in August 2017.

## With Finacle's wealth management solution, DBS Bank has the flexibility to tailor solutions and create new products for emerging customer segments

### Benefits

In India, Digibank has gained over 1.6 million customers within 18 months of launch.

The prospect customer creation in Finacle core banking solution was designed to maintain continuity. So, when the customer logs in again, his journey will continue from the point where he had last dropped off.

Creation of a customer ID and opening an account through the mobile app is now done with minimum data being collected from the customer.

The bank has taken precautions about security and authentication. A savings account is created in Finacle core banking solution only once the customer completes his /

her personal ID verification and biometric validation.

Finacle handles the extraction of data and provides functional logic to the other systems for analytics and 24/7 dashboard monitoring. DBS wanted to provide real-time notifications to the customer for all transactions, financial and non-financial, and on both customer profile or account. This involved the use of topics and publish-subscribe logic to send notifications to multiple systems. The notification framework designed for digibank is now being used in other DBS projects.

Digibank has made an impact in these countries. To increase its presence in India and Indonesia, digibank has been one of the great outcomes of DBS' strategy to grow and expand its reach through digitalisation.

## DBS – Getting Ready to Conquer Asia's Wealth

### Business Drivers

DBS knew that a modern, robust IT backbone was essential for achieving its goal. To this end, the Bank assessed its infrastructure requirements in its key markets, starting with Taiwan, China, Indonesia and India, and decided to migrate to Finacle's wealth management solution platform. The bank initially evaluated and implemented the mutual funds and structured products modules of Finacle wealth management solution. Having

seen significant benefits, the bank's improved confidence in the solution led to implementation of other modules such as insurance, margin finance and IPOs. The bank is also evaluating equity and financial planning modules for future roll-outs.

Infosys proposed to implement the required modules from the Finacle solutions suite.

### Implementation Highlights

The modules were implemented in quick succession in the four target emerging markets, and subsequently rolled out in the home markets of Singapore and Hong Kong. There were many innovative elements including new front-end screens for the applications, a special dashboard for

Singapore users, an advanced branch verifier module and several new business and operational functionalities. For the first time ever, device integration was done using thin-client architecture with a Puma server.

Naturally, an implementation of this scale and geographic footprint came with several challenges. In India, where the Bank was already running its operations on Finacle Core Banking Solution, the solution needed enhancements to align with

Indian market practices. The go-live was one of the key achievements for the bank in India and paved way for the launch of the digibank.

In Hong Kong, where structured products were an important part of the business, the challenge was to integrate the Finacle solution with 109 upstream and downstream systems built using diverse protocols and technologies.

The project was done through agile methodologies and different units of the team formed the scrum cells with a common objective to deliver.

The implementation also sunset few of the legacy applications.

In the words of Siew Choo, Head of Core System Technology, DBS, "Thanks for the fantastic job, this is a big milestone in DBS' technology transformation journey! Congratulations to Infosys Finacle for actively partnering with DBS in our transformation journey and thereby, taking our partnership to the next level."

## Benefits

DBS has gained a lot from this pan-Asia implementation:

With Finacle's wealth management solution, DBS Bank has the flexibility to tailor solutions and create new products

for emerging customer segments. The bank can add innovative functionalities and features to their offerings without changing the source code of the application. In markets like Hong Kong and Indonesia, the faster time resulted in greater revenue.

The transformation program has enabled DBS to increase its wealth management customer base substantially and grow wallet share of customers. The Finacle solution also helps DBS Bank calculate fees and commission, and curb revenue leakage with stronger reconciliation mechanisms. Overall, DBS is seeing increased business growth in this segment.

The Finacle wealth management solution enables DBS Bank to derive rich integrated insights about its high-net-worth client's investment portfolio. Sophisticated analytics, relevant financial planning, and asset allocation tools can be configured to leverage the opportunities presented by this customer segment to explore prospects for right-selling and fee-based personalized advice.

With its multi-currency and local regulation support, Finacle's wealth management solution allows for smooth and easy migration to new markets. DBS Bank has reduced the processing time of dual currency deposits by 90%.

Finacle wealth management solution provides DBS Bank with a flexible solution to manage multiple products and effectively process investment products across diverse asset classes including structured products, mutual funds, insurance, margin and IPO.

Being a stable and scalable platform, DBS Bank is now able to provide greater convenience to its high-net-worth customers, with 24/7 account access availability over channels.

# How to Deliver Delightful Customer Experience in the Digital Age







Truth be told - my 5 year old son is a fan of "Pokémon Cartoons". He would ask me or my wife to type the relevant text in google and then watch the episodes on our iPad. Seeing that he was getting hooked onto this a bit, we would periodically refuse to type. Then suddenly one day, we saw him ask Google "Hey google show me Pokémon cartoons"!! And lo! In a click he was watching his favorite stuff.

What he had achieved was "self-service" - cut out the intermediary agent i.e. elders at home and got the thing done himself! There are several lessons from this on customer experience in the digital age.

When one thinks of Customer Experience in banking, quite so often the focus is on interface technologies which are touted as promoting "friction free" experience. Yet truly delightful customer experience requires a systemic view of processes and needs to be thought through end to end.

A whole new wave of technologies such as Robotic Process Automation, Natural Language Processing (NLP), Artificial Intelligence (AI), Chatbots, Speech recognition etc. are maturing rapidly opening up new possibilities for banks.

Investments in these technologies are expected to increase at a rapid clip. Forrester estimates that investments in Artificial Intelligence will hit \$48.5 B by 2021, meanwhile investments in Robotic Process Automation will be around \$2.9B by 2021.

In this paper we attempt to dwell into how banks can leverage these emerging technologies to deliver truly delightful customer experience.

## Customer Experience in the digital age

Banking relationships tend to be 'sticky'. If you have a salary account with a bank, you are more likely to opt for loans /deposits and other products from the same bank. This has led to banks focusing more on business product

## Leveraging the right technology for the right problem set can help banks deliver a delightful customer experience

features as compared to Customer Experience. Indeed, C-suite executives (CxOs) would be more inclined to fund a project that has tangible revenues attached as compared to a project on customer experience with no guaranteed visible outcome.

A potent mix of regulations such as Payment Service Directive 2 (PSD2) -Europe or Account number portability -India (enabling customers to easily switch), rising customer expectations and a wave of new technologies is however at the doorstep and can cause significant alterations in customer behavior. A meaningful response from banks is in order and this requires banks to approach this often neglected topic with a disciplined and cohesive approach.

In the new world, where banking products are more or less comparable, customer loyalty can only be guaranteed by consistent and superior customer experience. (And yes, it is different from customer service). Indeed in today's digital world, a great customer experience can provide banks a competitive advantage that elevates and supplements great products and services.

Faced with the customer experience question, the impulsive reaction would be to create that new app or revamp an existing application with a shiny front end. Truly delightful customer experience is however all encompassing and extends much beyond the user interface.

## Defining Great Customer Experience

A great customer experience provides customers access to products and services on demand, everywhere and consistently. It adopts a self-service approach wherever possible and encourages processes that are straight – through in nature i.e. require little manual intervention from backend teams.

## The STP Mantra

You can't improve something that you can't measure – while "number of clicks" and "words typed" are traditional ways to measure customer experience, they do not provide a holistic measure of the customer experience. A good starting point for banks is to measure the percentage of processes which are STP (Straight through process) in nature. Over a period of time this percentage has to move upwards. This methodology can also be used to report progress to CxOs who want to see quantifiable improvements for \$ spent.

But what are tools that enable banks to have higher STP processes? The next section delves into details on this aspect.

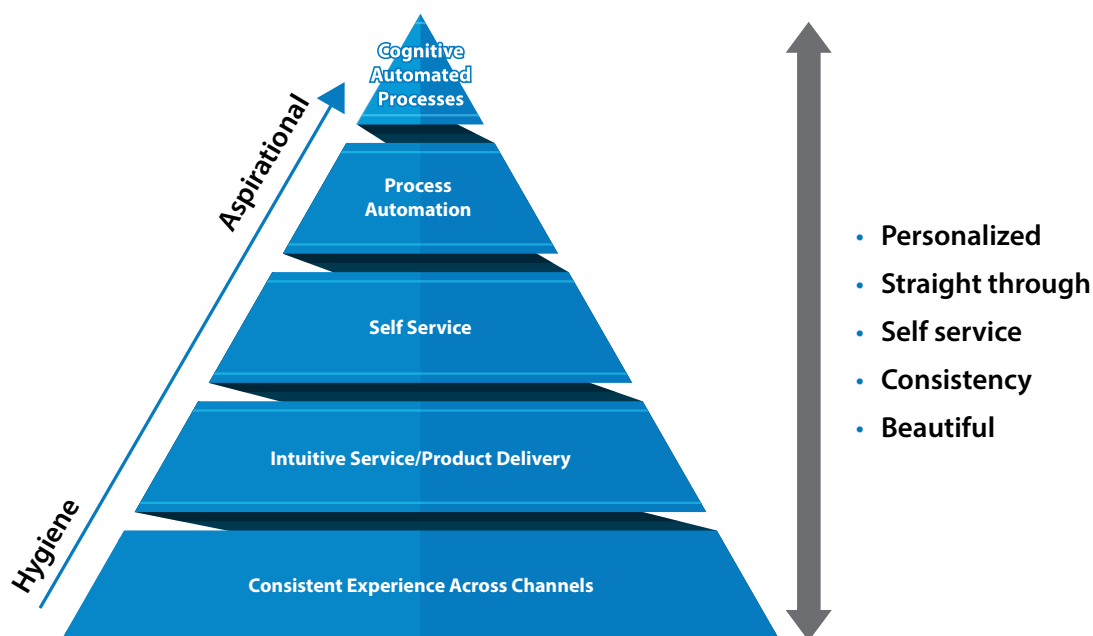


Fig 1. Dimensions of customer experience

### A Model for Customer Experience

Banks seeking to provide a superior customer experience need to adopt an approach that addresses 5 dimensions of customer experience.

- **Consistent Customer experience across channels**

Customers interact with the bank through multiple channels. Having a consistent experience and access to services and products across channels is a Hygiene requirement. Customer preferences and personalization

**Yet truly delightful customer experience requires a systemic view of processes and needs to be thought through end to end**

features need to be consistent across channels. For this Validations, rules and Application Programming Interface (API) configurations on services accessed across channels need to be consistent. Omni channel hubs and frameworks such as Finacle Omni Channel Hub helps banks set up common rules, validations and APIs across channels providing a seamless and consistent user experience. e.g. ICICI Bank uses Finacle Omni Channel Hub to provide a rich and consistent user experience across Channels.

- **Intuitive Service /Product delivery**

This area relates to “User Experience”, a term that is frequently confused with “Customer Experience”. Intuitive service delivery requires a seamless User Experience.

This can be facilitated by investing in intuitive screen layouts and simplified user interfaces. The customer must be able to access features and functionality with ease, in the least amount of clicks, and must not be required to spend time searching how to get a particular task done.

Measuring the “Click score” (# of clicks required to access functionality for each process) and “Type count” (number of places the customer is required to use the keyboard) is good way to start getting quantifiable data on how good the user experience is. Industry leaders typically allocate 7-10% of development project cost to user experience. In case your organization does not have an allocated budget for User Experience, it maybe time to start thinking what percentage of development cost must be allocated to this area.

User experience is amplified by use of frictionless technologies such as “Voice Banking”, “Biometric authentication” and “Touch” (instead of Type) interfaces. The focus of these “user experience amplification” technologies must be to eliminate the need for a customer to “type” anything to achieve a desired result.

Further, unstructured search and Recommendation engine functionality can be used to reduce the “click Score” and create a “personalized” experience.

Proper thought needs to be put to find which interaction technology is made available for which service e.g. Voice banking is probably the most friction free form of interface

technology, however, customers are unlikely to issue commands to inquire on their account balance in public places.

- **Self Service**

Let's face it, customers do not want to go to a branch or speak to a call center executive to get small clarifications or tasks done. From a bank's perspective, these channels represent necessary operating expense to provide customer service. Given the expenses involved, banks need to graduate these channels to providing more sophisticated services to customers. Menial tasks such as a password reset or interest rate inquiries need to be exclusively in "self-service" channels.

Chat-bots, virtual assistants and Natural Language Processing (NLP) interfaces provide a mechanism where customers can get answers and clarifications on banks' services and products.

For example, Capital One's chatbot Eno uses Natural Language Processing (NLP) and Natural Language Generation (NLG) to render conversational services to customers

Further utilities such as online password reset promote "low touch" service to customers and promote self-service.

Analyzing call center /branch data on services provided can provide pointers on which services are needed to be catered to by chat-bots, virtual assistants and utilities.

Promoting self-service can be a key lever to reduce costs of service delivery.

McKinsey estimates \$65B in service delivery costs can be saved by use of Chatbots alone across Financial services industry.

- **Process Automation**

So, you have sorted out the customer touch points, have a great user interface, have cross channel consistency, have chat-bots and virtual assistants. Are you now in the promised land of great "Customer experience"? Probably not, as an end to end process view is required. Remember

**Banks seeking to provide a superior customer experience need to adopt an approach that addresses 5 dimensions of customer experience**

the goal is to have a high percentage of transactions flow end to end in STP mode (i.e. with little or no manual intervention).

Robotic Process Automation (RPA) replicates the actions of humans operating computer systems to run business processes. Processes eligible to be automated through RPA need to be rules-based and repetitive, and will generally

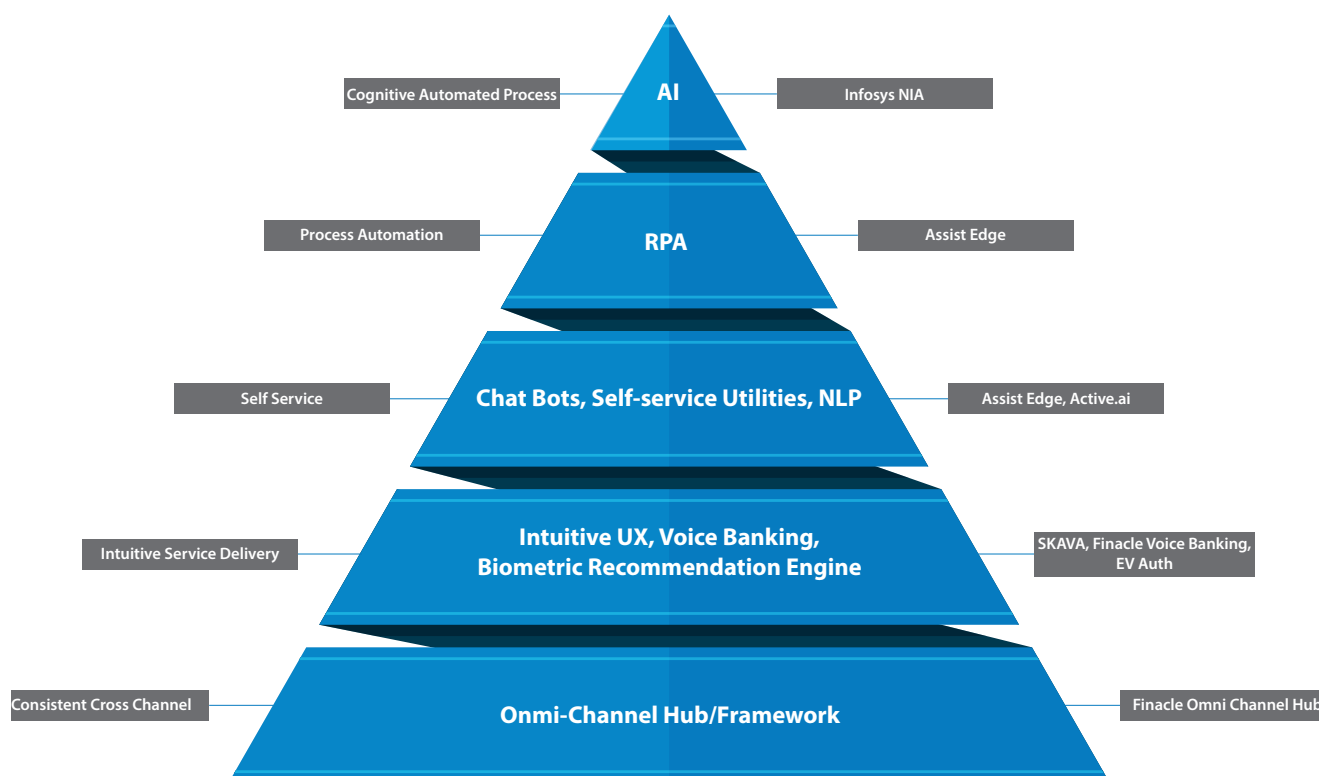


Fig 2. Customer Experience Toolkit

involve processes running across a number of different systems. Customer on-boarding is a good candidate for RPA as it involves quite a few process steps and systems. However, each of these steps are predictable and are generally rule based.

In general, high volume processes present a stronger business case however one can consider low volume processes for RPA if accuracy is crucial.

Two sub-categories of Robotic Process Automation (RPA) exist:

- a) Attended RPA: Automation that interacts in real time with humans who initiate and control robot tasks, often embedding functions within apps.

This category is generally associated with front-office, agent-led activities.

- a) Unattended RPA: Automation that replaces a complete human function in a 'lights-out' "batch-oriented" manner, creating a virtual workforce.

This category is generally associated with back-office activities.

Using an engine such as AssitEdge and have mapping the right process can help banks achieve higher STP in their process landscape.

For example, ICICI Bank has deployed RPA in over 200 business processes across functions, over a million transactions are processed by robots

#### • Cognitive AI aided processes

Customers want personalized products and services. Artificial Intelligence enables banks to deliver 'personalization at scale'. Also applications of AI in the middle office and back office function can help banks achieve a higher degree of STP processes.

Artificial Intelligence (AI), is an umbrella term for a machine's ability to imitate a human's way of sensing things, make deductions and communicate.

Robots in RPA will do exactly what you tell them to do, and they will do it exactly the same way in a repeatable fashion. This is great for rules-based processes where compliance and accuracy are critical. However, for processes with an element of ambiguity, AI is the appropriate technology to use because it can manage variability and, most importantly, get better at it over time through its own experiences. Examples include cases where the inputs into a process are unstructured or where there are very large amounts of data.

Another example is PayPal, that leverages machine learning, to identify legitimate & fraudulent transactions among millions of transactions.

A lot of middle office and back office processes can be automated with cognitive, self-learning processing that is made possible by AI. Indeed even customer interfaces such as chat bots can be powered through Cognitive AI and hence the impact is pretty much across the board.

## Mapping Technologies to the Customer Experience Principles

As is obvious from the above, it is not about investing in one technology or the other. Each of the technologies outlined above are inter-linked and are all essential ingredients in the recipe for a "Delightful customer experience".

The technologies listed above tend to form a continuum, which means, while one can invest in parallel in all of them, investing in one might either accelerate or reduce the need for the other.

E.g. Fragmented applications at the bank drive Robotic Process Automation, hence system modernization can reduce the need for it. Similarly, self-service channels and Natural Language Processing (NLP) interfaces will reduce the need for background RPA tasks.

Organizational context therefore plays a critical role in driving impactful change.

## Conclusion

Customer Experience is not about focusing only on the superficial user interface. It requires banks to take into account the 5 dimensions of user experience outlined in this paper with a view to promoting self-service and straight through processing. The opportunity for banks to deliver a delightful customer experience is bigger than ever as several enabling technologies outlined in this paper are rapidly maturing. Leveraging the right technology for the right problem set can help banks deliver a delightful customer experience which can serve as a competitive advantage in today's digital world.



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# FinTech Alliance Assessment

## Four criteria that matter



The success of a FinTech partnership traces back to a very early stage of the alliance, namely at the assessment and selection phase. Infosys Finacle has identified four key assessment criteria that matter: novelty, complementarity, compatibility and viability. A combination of these 4 criteria gives banks a balanced view of “FinTech alliance value”.

We have long recommended that banks must partner with the FinTech ecosystem. FinTech can bring the value of new technologies to traditional banking firms. Apart from that, it also has an impact on corporate culture in the areas of innovation, talent, and process. Recognizing these benefits of the FinTech ecosystem, banks have started to collaborate, rather than compete with FinTechs.

Massive investments of time, resources and capital are injected into the processes related to FinTech alliance programs. One of the major challenges for banks is selecting the right FinTechs to partner with. Banks are usually lacking in the manpower and experience required to assess FinTechs’ readiness in the context of the banks’ infrastructure and demands. On the other hand, there are potentially hundreds of FinTech candidates even for a niche market in a specific business domain, in stages

ranging from incubation to post-series-C funding. Banks need to be clear about their criteria for filtering these candidates and make the best assessment in line with their digital strategy.

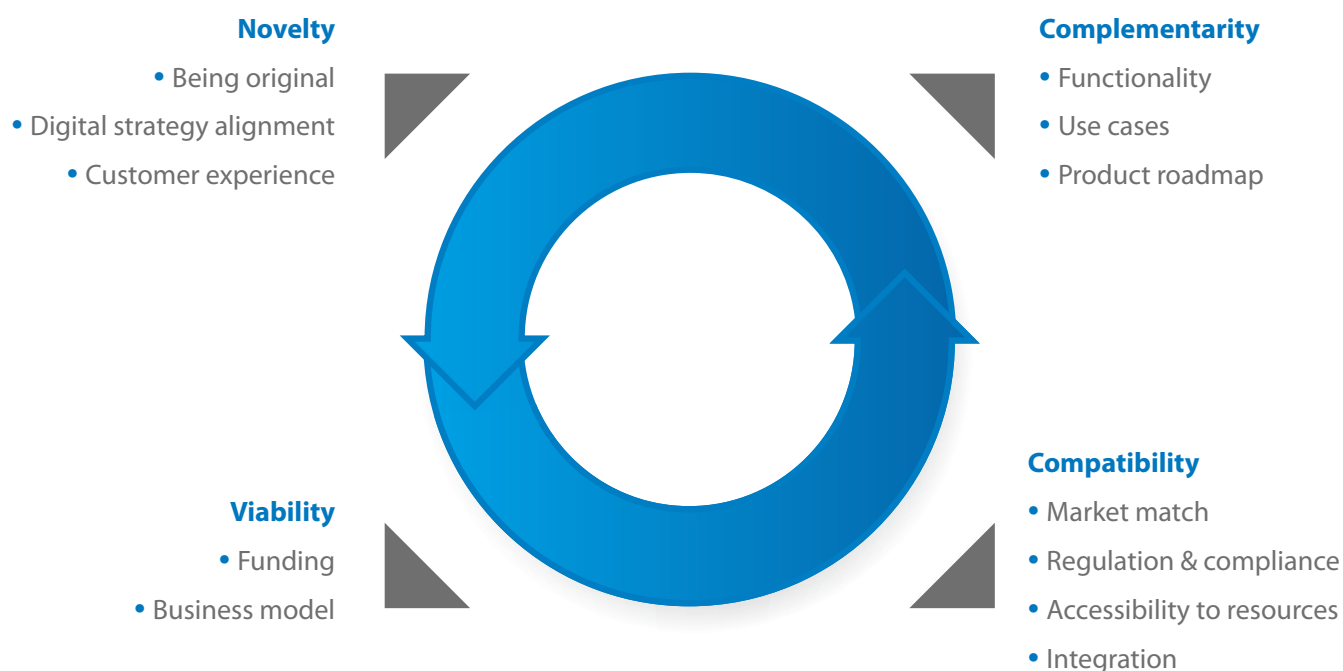
### Key Assessment Criteria

A FinTech alliance plays a significant role in a bank’s digitalization strategy. Digital banking, combined together with FinTechs’ complementary capabilities, results in a digital ecosystem that can give a bank an edge over rivals. However, bank executives usually don’t have the same insights and visibility of a FinTech solution as bank’s

**Compatibility with the fintech firm is a significant factor in leveraging the business potential of the alliance**

internal systems. The success of a FinTech partnership traces back to a very early stage of the alliance: the Know-Your-FinTech stage. As is the case when selecting a technology vendor, selecting the best-fit FinTech requires a bank to carefully consider a set of different rules and criteria, in the absence of a one-size-fits-all formula.

Figure 1 FinTech Alliance Assessment Criteria



Source: Infosys Finacle Research, 2017

Some elements are common to all FinTech assessments, such as functional fitment to a bank's existing business, business model, and client references. In this article, we have identified 4 key FinTech assessment criteria: novelty, complementarity, compatibility, and viability (refer to Figure 1). A combination of these 4 should give a bank a balanced view of the FinTech alliance value contained in a particular partnership. That being said, a greenfield digital-only bank that aims to be an innovation leader should value novelty over compatibility, and a classical regional bank may want to prioritize local regulatory compliance ahead of novelty and uniqueness. Therefore, a bank should calibrate these criteria according to its own business context and digital strategy.

## Criteria 1: Novelty

*Novelty is the quality of being new or following from that, of being striking, original or unusual.*

### Being original

FinTech, by definition, is an industry composed of companies that use new technology and innovation with available resources to compete in or complement the marketplace of traditional financial institutions. Therefore, novelty, a word quite relevant to new and innovative, is the primary reason that banks are seeking partnership with FinTechs. By doing so, banks hope to have more access to new ideas and strengthen their capacity to implement the same.

## A partnership is nothing but to access each other's knowledge and resources

Although it is difficult to make a quantitative measurement of novelty – which may be the shared experience of an organization or the subjective perception of an individual – one way to score novelty is in terms of its originality: be it technology, use case, or business model. This is particularly important to banks that target to become innovation leaders. A bank that aims to be a digital pioneer looks for FinTechs equipped with innovative use cases backed by technology, for instance, eye-print enabled authentication, machine learning based product recommendation, or shared-ledger based record management. These kinds of alliances will enable it to access emerging technologies, rebuild a robust artificial intelligence based infrastructure, and implement new digital offerings for consumers.

## Digital strategy alignment

Some financial institutions may err on the side of being too original. There are other factors to calibrate novelty. In circumstances where a bank is taking a progressive approach to digitalization. For a major multinational bank, the alignment of the FinTech with the potential bank spend is critical to ensure a proper business potential. The less aligned the FinTech is with a bank's overall digital strategy, the greater the chances of the partnership creating undesirable outcomes.

Our research indicates that only 31% of organizations believe they had a systematic digital strategy at the end of 2016<sup>12</sup>. A digital strategy is designed to help a bank to understand its position in its journey of digital evolution, be it classical, adaptive, or shaping. Digital strategy is a guide for bank executives to decide what kind of digital ecosystem to create, and what kinds of FinTechs to include in it. Without a digital strategy, a FinTech alliance could end up as a short-term tactic – like a one-off program – rather than a long-term effort to build the bank's digital competitive edge.

A bank should ensure its digital strategy is ready before taking any strategic FinTech alliance decisions and ensure its overall FinTech program is aligned with the digital journey. For instance, a digital lending platform for small and medium enterprises could play a value add to the bank's financial inclusion strategy.

## Customer experience

Novelty should be evaluated not only from a technology perspective but also from a customer experience standpoint. Customers are the lifeblood of an organization, and a unique customer experience is probably the most important way by which a business can truly differentiate itself from competitors. We are already seeing many exciting innovations to realize the value of exceptional customer experiences, using mature technologies. On the other hand, technologically new and original doesn't necessarily translate into a positive customer experience. We have seen customers contorting their hands into awkward positions to make their wearables work, or being put off by the number of details they had to supply to set up PFM goals.

The evaluation of novelty has to be set in the context of customer experience and digital strategy. For instance, the novel idea of using only facial recognition technology for authentication may come a cropper in a dark

environment. But bank could still offer a better customer experience by making facial recognition a complementary authentication approach in specific customer journeys. For example, facial recognition could add on extra security for a large-value mobile payment. It could also provide additional support for two-factor authentication when customers are accessing banking with Wi-Fi only tablets.

## Criteria 2: Complementarity

*Complementarity is a relationship in which the FinTech company and the bank can improve each other's qualities in digitalization.*

### Functionality

The future of FinTech and banking is more digitally reimaged than disrupted. A collaboration between FinTech and financial services is a joint endeavor of complementary strengths.

Many FinTechs are creating separate constructs of traditional banking services, for instance, PFM in retail banking, and robo-advisors in wealth management. Other FinTechs are enabling banks with better digital experience and optimized efficiency, by using machine learning in trade fraud detection for example. Indeed, FinTech functions that could complement their own legacy capacity are exactly what banks are looking for in a FinTech alliance.

In any review of a FinTech product, a visible and simple metric is the presence of complementary functions. Nevertheless, bank executives should assess the startup's functional fitness within the broader context of a digital ecosystem, rather than solely based on the bank's existing business capacity. A cloud-based SME accounting software company might be a good partner to provide cross-sell prospects for a bank to finance small-medium enterprises. A wearable device solution might be a nice add-on to mobile banking features – imagine a Fitbit Charge 2 paired with a mobile phone that can switch to a snapshot of the customer's account balance by simply rotating the wrist.

### Use case

A use case is a list of actions or event steps, where interactions are defined and functions are performed. Some FinTechs are use case neutral, for instance, a sound-wave communication technology could potentially be

used in many scenarios, starting with proximity payments. Some FinTechs could be tightly coupled with use cases, such as those specializing in AI-based trading fraud detection.

To make an effective partnership assessment, the bank should define a priority list of use cases where a FinTech can add value based on the bank's needs and the FinTech's capabilities. This is particularly important for FinTechs that are use case neutral. Lacking focus and a sense of priority in use cases – and this happens often – may waste both effort and investment. A typical example here is partnering with a FinTech that is strong in advanced analytics and AI technology but does not know which business problems the bank should address. In this case, the FinTech alliance may not be able to fulfill the bank's biggest business needs and will end up disappointing it.

**Bank executives should assess integration not only from the organization's point of view but also from the ecosystem's perspective**

### Product roadmap

It is also worth pointing out the importance of understanding the roadmap of both banking and FinTech products. Banks and FinTechs are both organic organizations that change constantly. An outline of future plans is a guideline to examine any overlap of mid-to-long-term goals between a FinTech and a bank.

A bank with its own artificial intelligence center with a dozen AI scientists may hesitate to partner with a third-party AI startup with a similar use case roadmap. On the one hand, bank executives want to avoid wasting their research investment; the decision not to partner may cost the bank an opportunity to absorb the latest machine learning ideas. In this circumstance, a combined approach – a short-term FinTech alliance effort together with a long-term plan to build in-house capabilities – might be an option worth considering.

## Criteria 3: Compatibility

*Compatibility is the state of being compatible in which FinTech and bank are able to work together in combination without conflict.*



## Market match

Compatibility with the FinTech firm is a significant factor in leveraging the business potential of the alliance. Market segmentation is a starting point for evaluating compatibility. Typically, FinTechs don't have a conflict with banks in terms of targeted markets because they usually focus on a slender niche in the broader retail or business banking market. Nevertheless, bank executives need to have a clear idea of what customer segmentation the FinTech targets. For instance, a robo-advisor with powerful algorithms to utilize ETF – which is targeted to mostly private banking – may not fulfil the needs of a retail premier banking business. Instead, a digital portfolio tool that can easily allocate customers' assets to mutual funds and structured projects may be a better fit to retail wealth management in this case.

Things get more complicated when, for instance, a regional bank is searching for best-of-breed FinTechs across the world. A best-in-class banking-vertical chatbot based in the U.S. may have limited market penetration in Germany, and also not know the local language. If this is a problem, the bank should explore another option, such as a local chatbot. Fortunately, in many cases, FinTech solutions are region, culture and language independent.

It is also important not to overvalue the importance of the market match. Bank executives should bear in mind that in most circumstances, a bank's marketing and sales team plays a leading role in the alliance when it comes to marketing and re-selling to supplement the FinTech's limited capacity in these areas. It is up to the bank to integrate with the FinTech's solution and explore new markets and opportunities.

## A partnership is nothing but to access each other's knowledge and resources

### Regulation and compliance

Innovation comes together with risks.

Banking is probably the most regulated industry in the world. Although regulation usually does not subject banks to certain technology requirements or restrictions – it focuses more on business guidelines – they need to make adoption of any new technology transparent, especially when there is an impact on customers.

FinTechs are often consumers of emerging technologies. Therefore, bank executives should assess their compatibility, together with their situation with respect to data privacy, digital security, outsourcing, and cloud adoption. In circumstances where it is less clear whether a particular FinTech solution complies with regulatory requirements or poses unacceptable risks, it may be wise to experiment with it in a "sandbox" environment. Bank executives should also conduct due diligence as per corporate IT policy, for instance, in the use of open source tools and public cloud.

### Access to resources

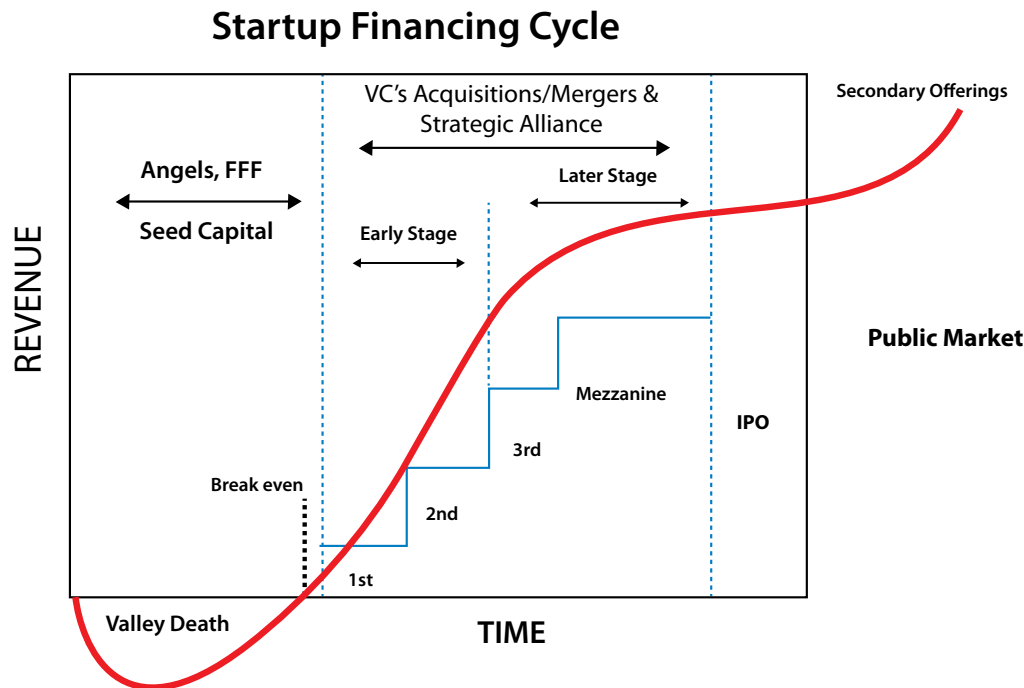
A partnership is nothing but to access each other's knowledge and resources, in terms of communication, discussion, engagement, and implementation.

The accessibility issue is often due to the constraints of resources, not location. Some, if not many, FinTech alliances have been made remotely – that is to say, between a bank in one country and a FinTech in another one. A bank in Singapore may decide to work with a FinTech headquartered in London. Bank executives may be less concerned about this, given that high-speed internet and VPN technologies can support remote integration, and that local resources can also be arranged.

However, FinTechs, especially good ones, are often constrained by very limited resources. A startup may have only few staff to answer proposals and run projects. Bank executives need to assess the FinTech's capacity before signing an alliance deal: For instance, how many projects are they running? How many banks are they working with? What are their available resources? And what is their human resources plan? A delayed response from the FinTech firm in the early negotiation stage could be a sign that it may not be able to commit its efforts to the future relationship.

Generally, accessibility is a concern mainly for established FinTechs, but not for incubation startups such as those selected from accelerator programs or hackathons. These early-stage FinTechs usually take an all-in attitude in a relationship with a bank, given that if it were to fail, they may not have a second chance at survival.

Figure 2 FinTech Financing Cycle<sup>13</sup>



#### Integration architecture

FinTechs are often designed based on the latest architecture, for instance, service-oriented architecture (SOA), RESTful API, and micro-services. The flexibility enabled by these modern, componentized architectures explains why integration with FinTechs is usually less of a concern for bank executives. This is important in particular for FinTechs that have tightly embedded their use cases into banks' infrastructure. For instance, a PFM tool with many exposed services to be built tightly with a bank's existing digital offerings will need a flexible integration framework such as open APIs that the bank could work with.

Bank executives should assess integration not only from the organization's point of view but also from the ecosystem's perspective. A chatbot FinTech that work perfectly well together with the bank's digital banking platform and a FinTech's PFM tool creates the synergy needed to make a frictionless customer experience.

#### Criteria 4: Viability

*Viability is the ability of a FinTech to survive or do business successfully.*

#### Funding

FinTech is a diverse industry that includes startups using new technology to facilitate online lending, payments, money transfer, insurance and stock trading. In recent years, it has attracted investor attention for its potential to upend traditional financial systems.

The FinTech funding landscape has changed significantly over the past few years. While five to ten years ago the

### A fintech alliance plays a significant role in a bank's digitalization strategy

options available to startups were few, lately we've witnessed an important surge in VC (Venture Capital) available for startups at all stages (refer to Figure 2) from seed to growth, from Series A to Series C.

There is certainly no one-size-fits-all rule to select an appropriate FinTech based on funding. FinTechs in early incubation stage may be too small to offer a mature and approved solution. FinTechs that have passed Series C or even E funding may be too independent to rely on banks for business expansion. The bottom line is the company should be financially healthy with reasonable cash flow to support its daily business, regardless of whether it is self-funded or funded by VCs.

### Business model

A report on revenue and cost is an effective touchstone for understanding a FinTech's "real world" business. In spite of the fact that many FinTechs are still in the growth stage with negative net profit, and not able to provide detailed financial reports, understanding the business model properly is an alternative to analyzing business potential. Be it a monthly subscription model based on the number of customers, software license model, or fee generation model, a proper and clearly articulated business model is critical for understanding how the revenue stream is generated and how revenue could be split between the bank and the FinTech, and importantly, for assessing any financial impact to customers who use the services: a FinTech alliance relationship is fundamentally a commercial contract between two parties.

### Reference it

Many times, a bank doesn't have experience or experts to analyze FinTechs based on the above criteria. Using a reference is an alternative approach for evaluating the "real world" potential of FinTechs.

A good reference will be a strong backing for the FinTech in almost every aspect. A reference can justify its novelty if it is adopted by one of the world's leading digital banks. A reference can prove the FinTech's functional fitment if it is used by a bank with a similar business landscape. A reference can prove the FinTech's solution is regulation compatible since it has fulfilled to the regulation requirements in another bank. Therefore, bank executives need to collect a full list of FinTech customers for easy assessment. Bank executives need to review the list carefully given the FinTech may provide a mixed list of solutions running in production environments and also pilots.

It is important to point out that a client story is not the only type of reference that could justify a FinTech's value. Other forms of reference, for instance, industry awards from a competition or hackathon, and funding from an accredited acceleration program or organization could be also taken as a sort of endorsement of its potential. Bank executives should review all this information to gain a balanced view of the FinTechs under consideration.

## Collaboration between fintech and financial services is a joint endeavor of complementary strengths

Using references could be an effective assessment approach. Meanwhile, in order to be a digital leader rather than a follower of other banks, a bank would need to be equipped with FinTech experts so that it can do first-hand analysis and be able to select best-of-breed FinTechs from hundreds of young candidates.

### Recommendation

There has been a strong growth in FinTech across the globe, sparking a digital revolution within traditional financial services. Banks have started partnering with FinTechs to address these challenges. To select the right FinTechs to work with, bank executives should:

- Make sure FinTech candidates align with the bank's digital banking strategy. If they haven't got one yet, it is time to create it first before forging a FinTech alliance.
- Assess the value of FinTechs based on the four key criteria discussed: novelty, complementarity, compatibility, and viability in the context of the bank's business focus.

Carefully review the customer list of FinTechs as a strong reference of the assessment criteria.



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# Reimagine Banking

Excerpts from the Efma - Infosys  
Finacle report on 'Innovation in  
Retail Banking'





## Reimagine Banking

The ninth annual edition of Infosys Finacle – Efma report on ‘Innovation in Retail Banking’ report, launch recently, looked at innovation trends in the banking industry amidst increasingly demanding consumer, integrating new technologies and updating legacy systems and cultures. This report was authored by Jim Marous, Publisher, Digital Banking Report. As has been found in previous years’ reports, the innovation agenda has become intertwined with the digitalization agenda, where transforming back-office core processes and customer-facing experiences are brought together by application of data and advanced analytics. The level of investment in both digitalization and innovation has increased in lockstep with each other as a result.

## The technology required to build the invisible bank of the future already exists today

This article covers excerpts from the report.

In order to re-imagine banking in today’s increasingly competitive environment, there needs to be a focus on disruptive technologies and innovations, as opposed to simply an iterative focus. The winners in the future will be defined by those organizations that can leverage digital technologies to deliver a customer experience that goes beyond the ordinary.

More and more financial organizations are embracing the potential of a greatly expanded definition of banking. Leveraging new technology and advanced analytics, the potential for a bank or financial technology firm to be at the epicenter of a consumer’s everyday life is not just possible, it is probable.

With this as a backdrop, the threat of disruption is perceived to be high by banks and credit unions globally. The biggest threat is expected to come from FinTech start-ups (non-bank FinTech firms) and large technology companies. These are the competitors that have best been able to apply data, analytics and advanced technologies for the benefit of the consumer.

With regards to business lines, payments and mobile wallets are expected to be the most impacted, with lending also expected to be challenged by non-traditional sources – especially in the U.S., where competition is fierce.

The benefits of collaboration between banking and FinTech providers have never been greater. FinTech

firms do not have the burden of a dated infrastructure, but have the benefits of innovation agility and focus. Alternatively, FinTechs usually lack an understanding of regulations and have difficulty achieving scale. Legacy banking organizations have the benefits of customer trust, an established base and massive reservoirs of data, but usually lack digital expertise.

## Innovation as a Competitive Weapon

While on the surface, the proportion of banks with a defined innovation strategy decreased significantly from 2016, this was caused by the inclusion of a much more representative sample of smaller institutions being included in the global research compared to prior years. Alternatively, when we look at the level of innovation maturity from the perspective of size of organization, we clearly see that larger financial organizations are more likely to have a clear innovation strategy, to invest in innovation and to have a chief innovation officer.

Across all sized organizations, we continue to see an increase in investment in channels and the customer experience, with sales and marketing innovation continuing to lag. We also see that legacy systems and old technology are challenging institutions wanting to innovate similar to prior years.

## Financial institutions need to develop a rigorous approach to emerging technology and innovation

Taking a ‘wait and see’ approach to innovation is not a viable option. Instead, banking management teams need to commit to investments that limit risk and allow an organization to take advantage of market opportunities. More than ever, the banking industry needs to manage for the long-term, through cycles, even as they adapt in the short term through continuous test and-learn experimentation.

## Digital Transformation and the Customer Journey

As consumers have moved most of their shopping and buying activities to digital channels, the banking industry has responded accordingly. This is important, since recent research shows that the definition of ‘convenience’ in banking is no longer associated with physical proximity, but with ease and functionality of digital capabilities.

There was a shift in many of the digital transformation priorities this year, with digitizing processes for products and services being ranked the highest. Reflecting the current cybersecurity environment, enhancing digital security was the second highest rated digital strategy, compared to being a mid-ranked strategy in 2016. Finally, improving the customer journey was ranked third in this year's study, moving from the number one mentioned strategy in 2016.

When we asked executives of banking organizations worldwide about their aspirations regarding broader banking ecosystems, the majority of firms are either limiting their scope to local ecosystems or are still evaluating to ecosystem opportunities. Interestingly, close to 20% of firms surveyed are considering a global ecosystem.

The technology required to build the invisible bank of the future already exists today. Components such as APIs, cloud-based services, artificial intelligence and mass personalization are already becoming the foundation for the future at many financial institutions. But, in most cases, these technologies are being used in the peripheral systems rather than the core.

## More and more financial organizations are embracing the potential of a greatly expanded definition of banking

### Deployment of Advanced Technologies

The pace of digital change is about to accelerate exponentially, with the integration of AI, robotics, blockchain, open banking APIs and the Internet of Things (IoT). The smarter use of data, combination of non-financial and financial solutions, and new, real-time delivery alternatives could significantly change the entire structure of banking.

As opposed to deploying disruptive technologies, such as augmented or virtual reality, IoT, robotics, blockchain or voice interfaces, most financial organizations are limiting their focus to more traditional technologies, such as information security, advanced analytics and open banking APIs (primarily in Europe). This is in alignment with priorities around risk and the customer experience.

There does seem to be an increasing focus on cloud processing and wearable technology as well according to our research. In many organizations, there has also been an expansion of the view of distribution, from specific devices (smartphone, wearables, etc.) to the broader concept of 'digital'.

The impact of new digital technologies will be felt across the entire banking value chain, impacting the competitive structure and the ways people bank. More than ever, the transaction-based component of banking will be commoditized, with differentiation achieved through the personalized experiences provided to the consumer.

## Across all sized organizations, we continue to see an increase in investment in channels and the customer experience

### Preparing for the Future

Especially for the financial services industry, it is imperative to think beyond individual emerging technologies.

With the advent of open banking APIs as a way to bring external technologies and innovations directly to banking customers, and the emergence of non-traditional banking ecosystems that may include non-banking services — a combination of technologies will become the norm.

For instance, the use of customer data insights and advanced analytics may be combined with IoT technologies to allow payments directly from smart home devices. Likewise, the expanded use of conversational AI and VR devices may come together, providing methods of banking interactions only imagined in sci-fi movies.

Financial institutions need to develop a rigorous approach to emerging technology and innovation — one that includes a formal framework of listening to those on the leading edge, learning the true impact of these technologies, sharing results from pilot projects, and quickly scaling by implementing them throughout the enterprise.

In other words, being a leader in innovation and emerging technology is no longer a luxury only for the big players. It is important for all financial organizations to make innovation and emerging technology a 'core competency,' with engagement throughout the organization (not just the very top). In addition, the focus of every implementation must include internal and external human experiences, as opposed to revenue, profit and cost savings.

Download the full report



# Kaleidoscope

## Singapore: The FinTech Storm Continues





It is the second time that Monetary Authority of Singapore (MAS) hosts the Singapore FinTech Festival on 13-17 November 2017. Last year, over 10,000 tickets have been sold. This year it's even bigger - more than 25,000 participants from over 100 countries. It is open for everybody from FinTech ecosystem to participate, be it a start-up, technology company, investor, financial institution, research institute or innovation professional. It is so far the largest FinTech event in the world.

### A role model

It is just one proof to back the fact that Singapore has become a truly global FinTech hub. According to a study from the Global FinTech Hubs Federation this year – 44 global FinTech hubs have been reviewed – London and Singapore come out on top, based on an analysis of “local

### A truly global hub

The most valuable company in the world by now is Apple. The most valuable company in China is Tencent. Both are digital firms. It is not the same in South East Asia.

In November this year, DBS Group has pushed past Singtel to become Southeast Asia's biggest company by market capitalization. It reaches S\$63.94 billion (\$47.5 billion) – smaller than Ant Financial from China, the largest FinTech in the world, has an estimated business value of \$75 billion.

The success of DBS is no surprise to investors - it worked very hard on adopting a “digital to the core” strategy. Yet it also indicates another fact - digital firms, startups and FinTech in South East Asia still have the space to grow bigger. Despite the encouraging stories of Lazada and

## Hundreds of fintechs have been founded or expanded their business in Singapore in recent years, and the number still grows very fast

market facts, figures and future trends as well as an index performance score that determines the ease of growing a FinTech business in each hub”.

Talents have been attracted from all over the world. Ex-bankers, UX designers, technology enthusiasts from the South East Asia, India, USA, Europe, China and even Israel

### “It's something that the financial sector and the economy as a whole needs a lot more of a spirit of experimentation.”

have been gathered in Singapore due to the appealing business opportunities, not to mention the benefits of low tax and tremendous funding support from the FinTech ecosystem.

MAS itself made significant efforts to push Singapore into pole position in the global FinTech space. A number of initiatives have been implemented or initialized: open architecture framework, cyber surveillance and information sharing, a national KYC utility, and Project Ubin. MAS has made itself a sandbox environment to experiment new technologies such as blockchain and AI. For instance, MAS and the Hong Kong Monetary Authority will jointly develop a cross-border platform for trade finance using distributed ledger technology.

Singapore has become a role model for government to play a catalyst role for innovation.

Grab, it is an undeniable fact that Singapore with 5 million population might be a small market for many FinTechs.

However, as a country with limited resources in technology and talents, Singapore has built its outsized influence on the world as a hub of global finance in the past thirty years. With the help of policy, regulator, and most importantly the supporting ecosystem, Singapore is well ahead of the curve and is reinventing itself into a center and hub for financial technology innovation.

- Singapore has become a hub for FinTech startups. Many FinTechs based in Singapore are doing business in South East Asia, India, and expanding to the rest of the world.
- Singapore is also a hub for FinTech investments. Looking beyond ASEAN, companies from China, Japan, and Silicon Valley are actively investing in Singapore to ride on the trends of FinTech. MAS reported that up to USD \$2 billion was made available to FinTech startups at the annual Singapore FinTech Festival Investor Summit.
- Singapore has also become a hub for innovation centers set up by consulting firms, digital firms, and multinational banks. For instance, KPMG in Singapore has launched KPMG Digital Village last year. Visa has launched their first Innovation Centre in Asia, located in Singapore in 2016. Its peer, Mastercard, has opened its largest innovation lab space here in Singapore in 2017.



## Fail fast, and fail cheap

The “too big to fail” theory asserts that financial institutions are so large and so interconnected that their failure would be disastrous to the greater economic system. On the other hand, it indicates how sensitive it is for the word “failure” in banking.

However, failure is exactly what will happen – quite often many times – in the FinTech world. I personally have met a founder of a blockchain startup and this is the third blockchain company that he started – he failed the first twice. I have also met a startup CEO that recently shifted his business focus from P2P payment to P2P lending – and he is moving to a new strategy again to survive.

The FinTech festival is not just about good news and success stories. If spending lots of time doing chitchat with people in the event, they are actually also talking about failures and importantly – how to learn from failures. During different panel discussions, “fail fast, and fail cheap” is a popular advice to banks, and any other organizations that are determined to invest in innovation. It is a change not only in mindset but also in infrastructure and process – proper sandbox environment might be required for FinTech experiments. MAS has made it clear in their presentation:

“It’s something that the financial sector and the economy as a whole needs a lot more of a spirit of experimentation.”

## The storm continues

A year has passed since we published an article 3 Lessons Banks Can Learn From the Singapore FinTech Ecosystem. The FinTech storm gets stronger in Singapore this year. It is easy, with all the optimism and hype about FinTech in digital medias and newspaper articles and the mushrooming number of conferences on the topic, to think that FinTech ecosystem goes well.

Of course, every ecosystem is different and unique. For Singapore, the development of FinTech ecosystem is

driven by a mixed factor of regulation, business and technology – and very importantly digital (on the other hand, we see lots AI happenings in China this year). Singapore is better positioned than most of other Asian countries to cash in on an increasingly digital world. Singapore was ranked 6th out of the 135 countries in the Enabling Digitalization Index. Lots of FinTechs have been developed based on the unique character that Singapore holds as a global financial center – for instance, robo-advisor to automate a scalable wealth management services, and blockchain to optimize the efficiency of trade-finance activities.

FinTechs in Singapore is still a place of many harsh realities and it might yet dent the ambitious growth prognoses. However, despite all different concerns, the city-state has been ranked #1 in The World Bank’s Ease of Doing Business study for the last 10 years. Hundreds of FinTechs have

## Singapore is well ahead of the curve and is reinventing itself into a center and hub for financial technology innovation

been founded or expanded their business in Singapore in recent years, and the number still grows very fast. With an evolving FinTech landscape that is rapidly maturing into the mainstream, Singapore has a solid head start and significant advantages over many other countries, and it wouldn’t be a farfetched prediction to assume that in due time Singapore will take on the mantle as one of world’s FinTech capital.



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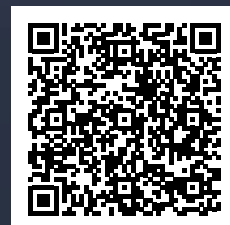
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# ARTIFICIAL INTELLIGENCE POWERED BANKING



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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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