# *Next in tech*

## How technology is redefining financial services in 2018 and beyond

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pwc

# Foreword

New-age technology encompasses multiple sectors, and the financial services (FS) sector is no exception. Technology deployed by the FS sector has matured significantly over the last two decades. We have witnessed a transition from the simple automation of paperwork in bank branches to today's branchless banking paradigms that employ new-age contactless technologies. In fact, the pace of technological advancements is increasing with every passing day, leading to an increasing threat of disruption.

These technological advancements have ushered in new-age FinTech players who are continuously challenging and disrupting traditional models. In the near future, we can expect modern technologies to continue to transform the business models of financial institutions and service providers, and the ways customers interact with them.

This report captures the overall impact on customer experience. It discusses the key imperatives for offering FS in the future, such as customer delight, enhanced risk management through new-age models, financial inclusion, back-end transformation and omnipresent banking.

I hope you find this report insightful.

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**Vivek Belgavi**

*India FinTech Leader and Partner, Financial Services – Technology Consulting*


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# In this report

# 1. Technology-driven evolution of financial services

Technology has always been a key enabler for the financial services (FS) industry and has played an integral role in building internal efficiencies, enabling innovations in product design and significantly improving customer experience. The impact of technology on this industry, however, has seen a distinct shift—from enabler to positive disrupter.

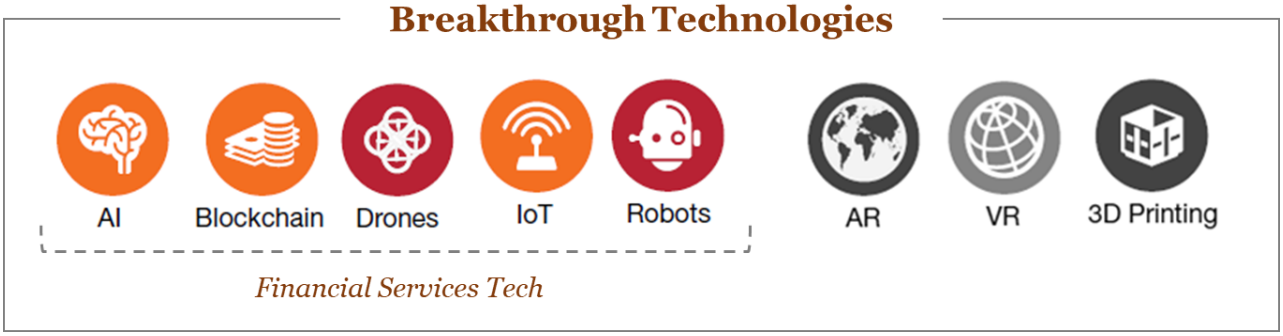
The role of technology has evolved from being another cog in the strategic framework of companies to driving, shaping and redefining business models and revenue streams. The democratic access to the latest technological capabilities, coupled with the breakneck speed of change, have destroyed industry barriers to entry and have allowed tech-centric start-ups to compete with FS behemoths. Disruptive as the latest FinTech wave is, the inflow of traditionally 'non-FS' ideas and models has transformed how industry players do business today. Furthermore, the collaborative ecosystem approach, as opposed to competition, has emerged as the new order.

> 'The ability to create ecosystems across FS and non-FS players to provide financial services at the point of customer engagement is going to be key.'
>
> – Vivek Belgavi, India FinTech Leader and Partner, Financial Services – Technology Consulting

This report looks at the next wave of ground-breaking technologies that are already making their mark across the FS value chain and presents our point of view on where the industry is headed.

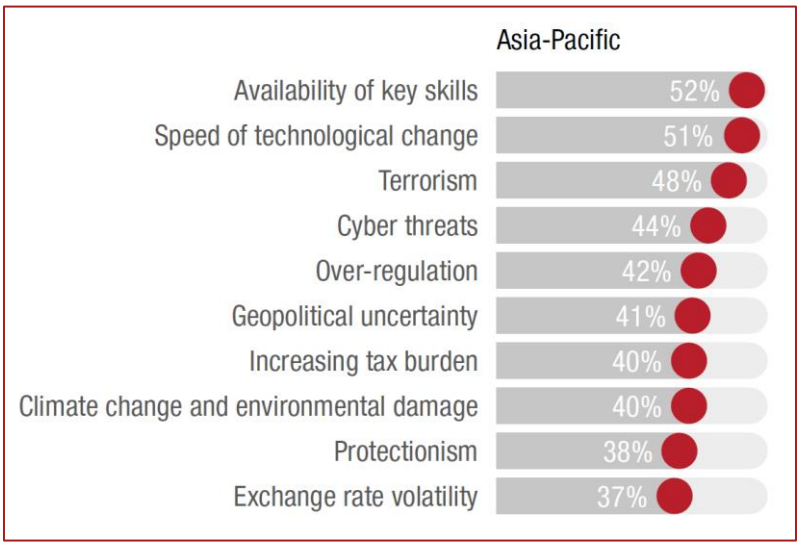
## 1.1. Keeping up with the lightning-paced growth of tech

The rate of change and evolution of technology have reached unprecedented levels. In 2016, PwC published the 'Tech breakthroughs megatrend' report that covered the eight breakthrough technologies that were set to redefine business models across industries.[1] Eighteen months since then, five of these eight technologies have already embroidered themselves into the FS fabric.



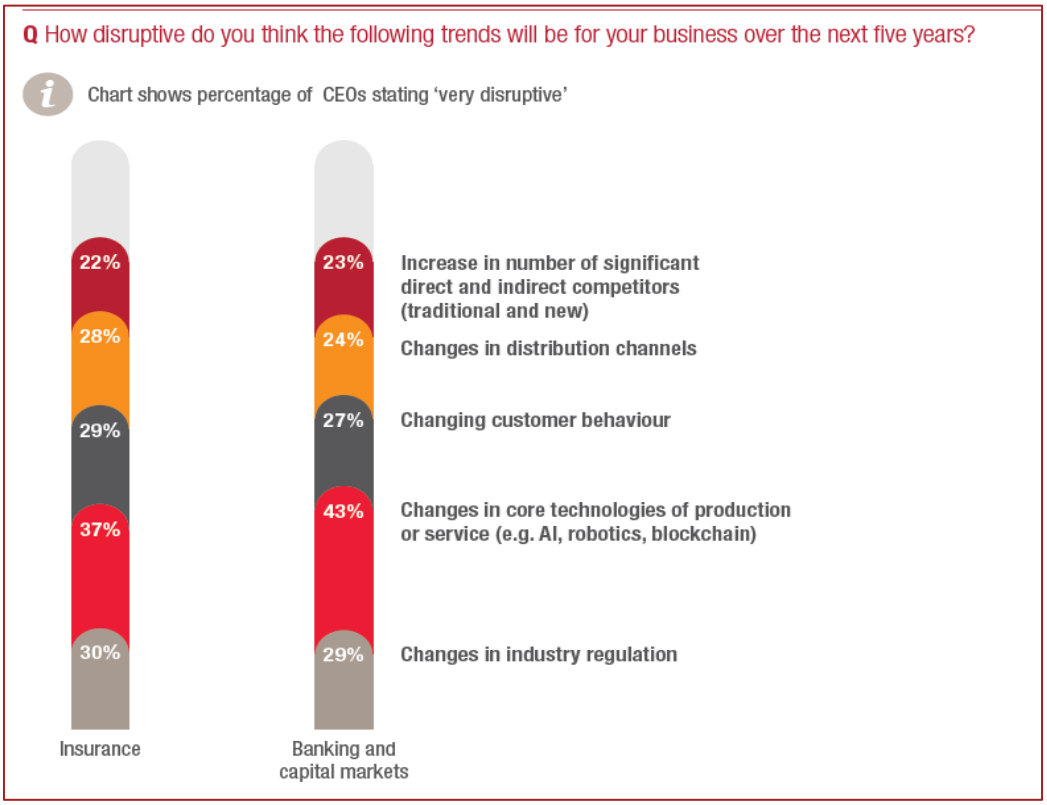

The importance of matching this high speed of technology proliferation is becoming more apparent to organisation leaders across industries and geographies. Particularly in FS, CEOs of top players across the globe acknowledge the need for staying abreast with the speed of technological change, as well as investing sufficiently in technologies that safeguard the industry from the cyberthreats that come with such high-speed technology adoption:

[1] PwC. (2016). Tech breakthroughs megatrend. Retrieved from https://www.pwc.com/gx/en/issues/technology/tech-breakthroughs-megatrend.html (last accessed on 9 May 2018)




*Considering the following threats to your organisation's growth prospects, how concerned are you about the following?*

*Source: PwC's 21st CEO Survey*




Source: PwC's 21st CEO Survey

'Speed of technological change' and 'cyberthreats' are among the top four threats that Asia-Pacific CEOs are concerned about. Even at a global level, 'changes in core technologies of production and service' are the biggest disruptive force that is expected to affect businesses in the next five years, according to CEOs in the banking, capital markets and insurance sectors.

The advent of such core technologies is not only refining products and improving services but also completely redefining business models. The disaggregation of the FS value chain, where FinTech companies are picking up

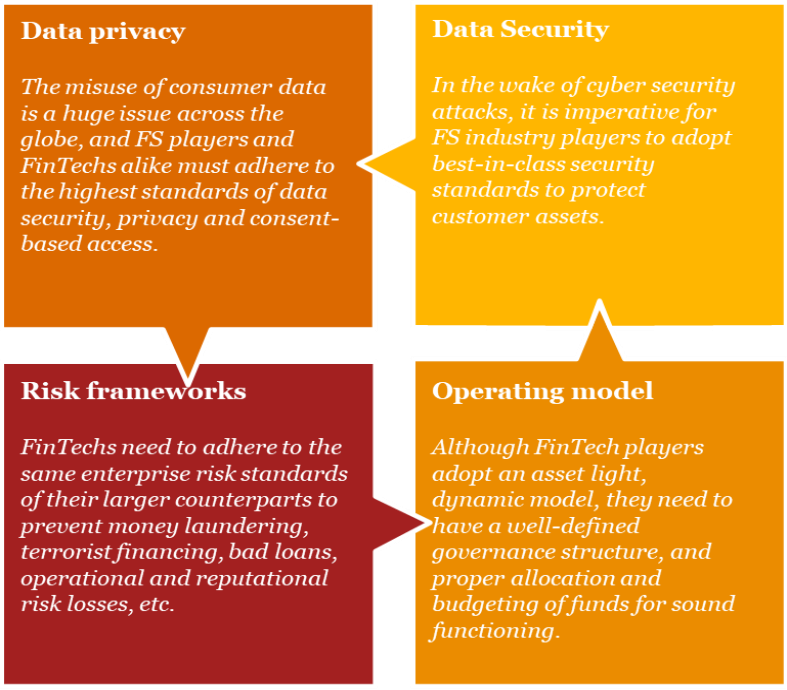
specific pieces in the chain and using technology to redefine how such activities are carried out, has turned out to simultaneously be a threat and an opportunity for incumbents. While FinTech competition has made incumbents stand up and take notice, the form in which these technology-led solutions aim to tackle precise parts of the entire business model has allowed incumbents to fill in gaps in their value chain through strategic partnerships while maintaining the integrity of other superior processes.

This disaggregation of business model components has also provided opportunities for innovation in revenue streams, going beyond the more traditional partnership approaches. For example, the application programming interface (API) driven approach, where FS players provide specific APIs for consumption by third parties for further down-stream services, is a prime example of breaking down data/services into smaller nuggets that can then be individually monetised through revenue-sharing or pay-per-use models. In turn, third-party API consumers use such access to develop meaningful customer propositions in return for transaction fees or subscription models with end customers. Business models have evolved to the extent that the loop is now being closed with some players acting as marketplaces/aggregator platforms for these disaggregated distinct service offerings.

## *1.2. The evolution of regulations in FS tech*

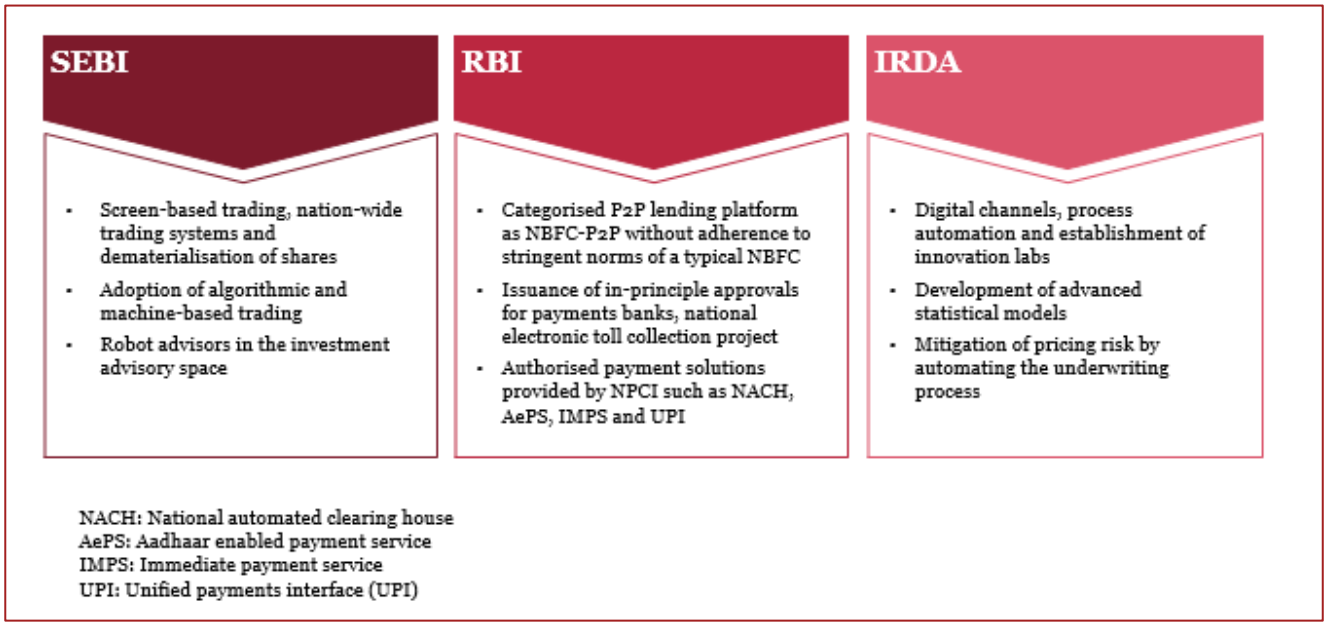
The role of regulators such as the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI) and Insurance Regulatory and Development Authority (IRDA) in the FS ecosystem cannot be overstated. Apart from providing legitimacy to new ways of doing business and formalising processes and practices, regulators also ensure consistency, structure, stability and safety of the new FS models that have emerged in the Indian FS landscape.

With continuous disruptions in the form of innovative FinTech business models redefining how start-ups and incumbents alike do business, the need for clear guidance from regulators has become all the more important.




Source: PwC's FinTech Insights

To this end, India's FS regulators have responded with a number of relevant guidelines related to recent technology-driven models so as to provide transparency and direction to industry players.




Source: PwC analysis and Vinyamak (Financial Regulatory Technology Insights 2018)

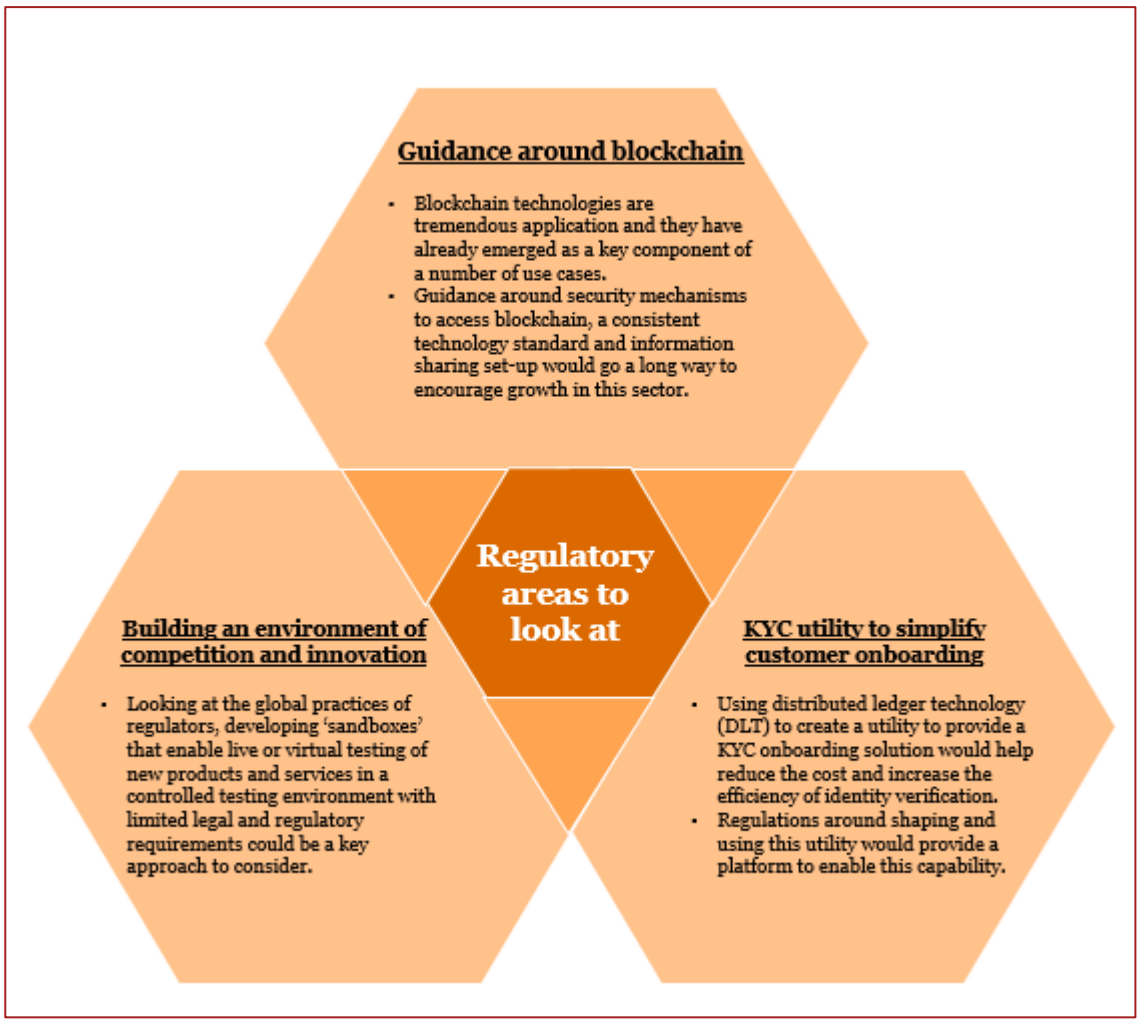
The active participation of the regulators in the FS ecosystem is encouraging. The direction provided by these entities will go a long way in shaping the next stage of India's FS space. Given the major trends expected to impact this industry, regulators could consider focusing on the following areas:[2]

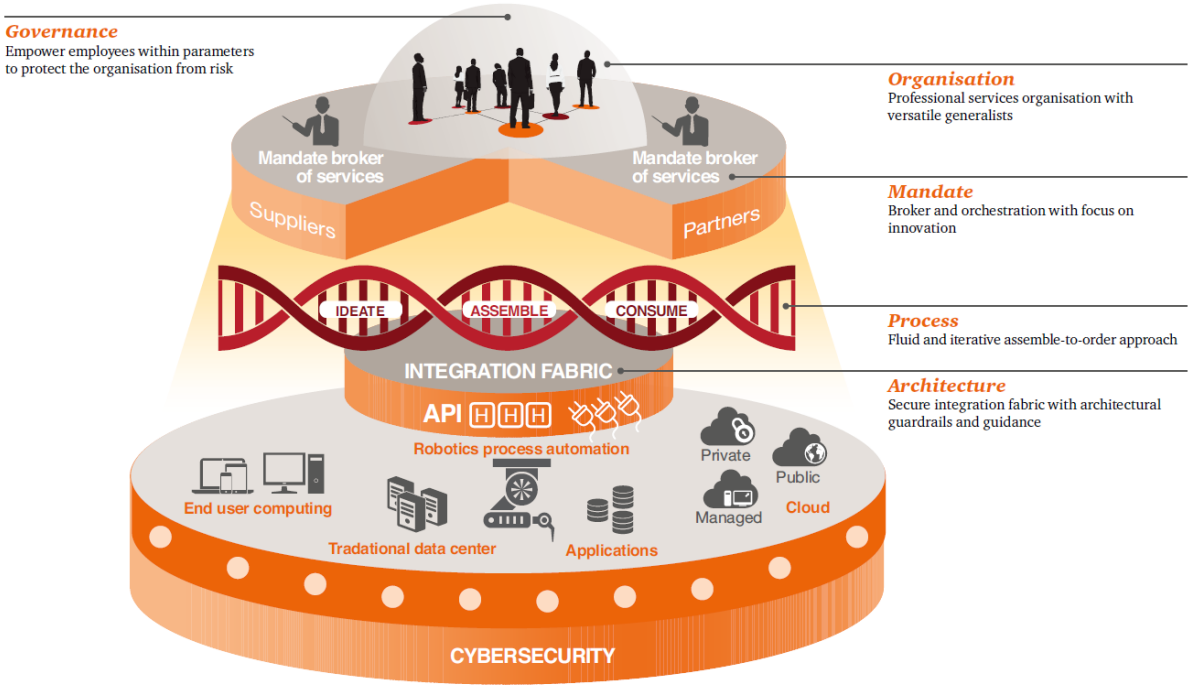
[2] PwC's Vinyamak (February 2018). Retrieved from https://www.pwc.in/consulting/financial-services/fintech/point-of-view/financial-regulatory-technology-insights-newsletters-vinyamak/february-2018.html (last accessed on 9 May 2018)

# What should industry players do?

## 1.3.1 Reimagining the IT operating model

As technology impacts almost every aspect of the FS value chain, organisations will need to focus on evolving the IT operating model to align themselves with new modes of doing business.



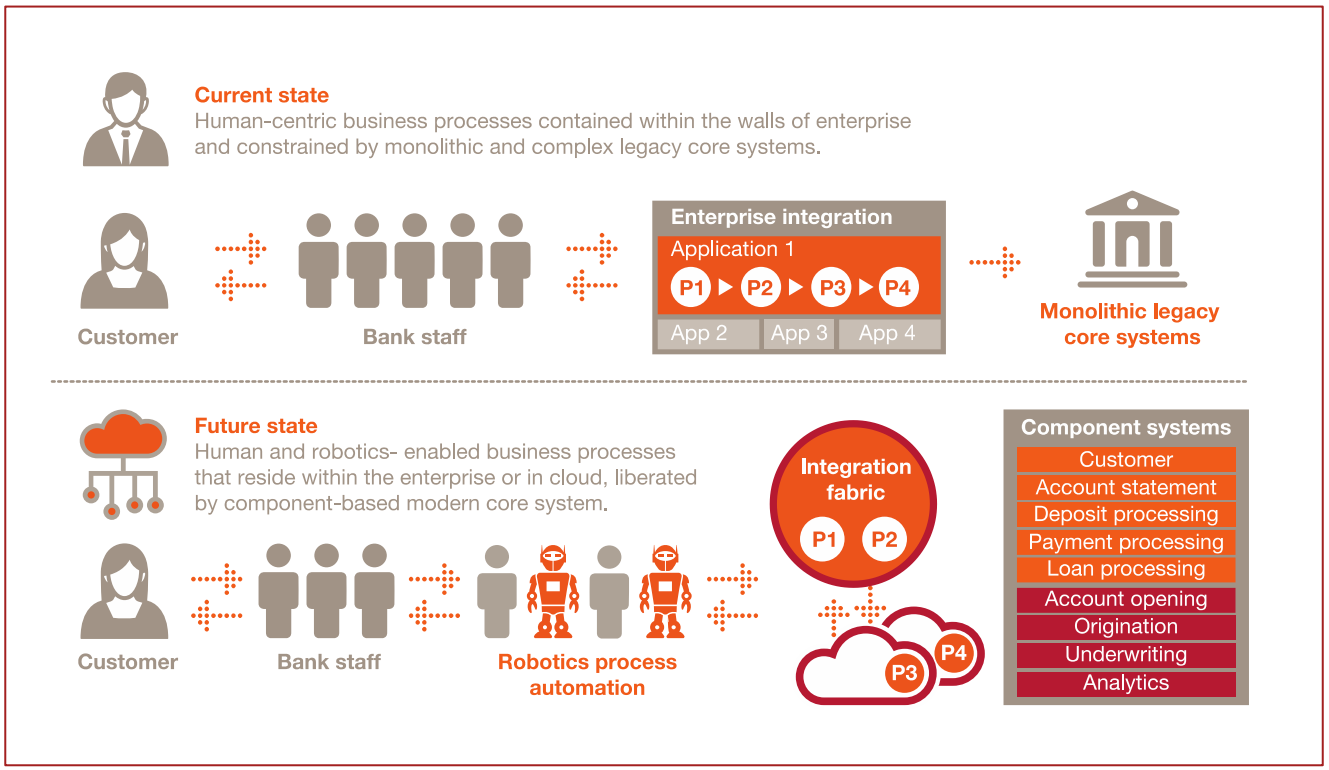



Source: PwC's Financial services technology 2020 and beyond: Embracing disruption

The role of IT in the organisation will expand beyond its traditional definitions to a synergistic role with business needs as technology and functional requirements converge. With data becoming the new valuable commodity, ensuring the flow of information through the organisation and providing support and capabilities for embedding analytics and artificial intelligence (AI) in business practices will become the new normal. A well-defined architecture that facilitates this free flow and access while balancing the need for security and safety will tie the different operating model components together.

## *1.3.2 The new face of data and analytics*

Data and analytics will go beyond a front-end/customer experience capability to pervade the workings of the entire organisation. Moving to the next phase of AI, machine learning (ML), robotic process automation (RPA), and data and analytics technologies have already re-established simple processes, provided efficiency gains within the organisation and facilitated insight-driven business decisions.

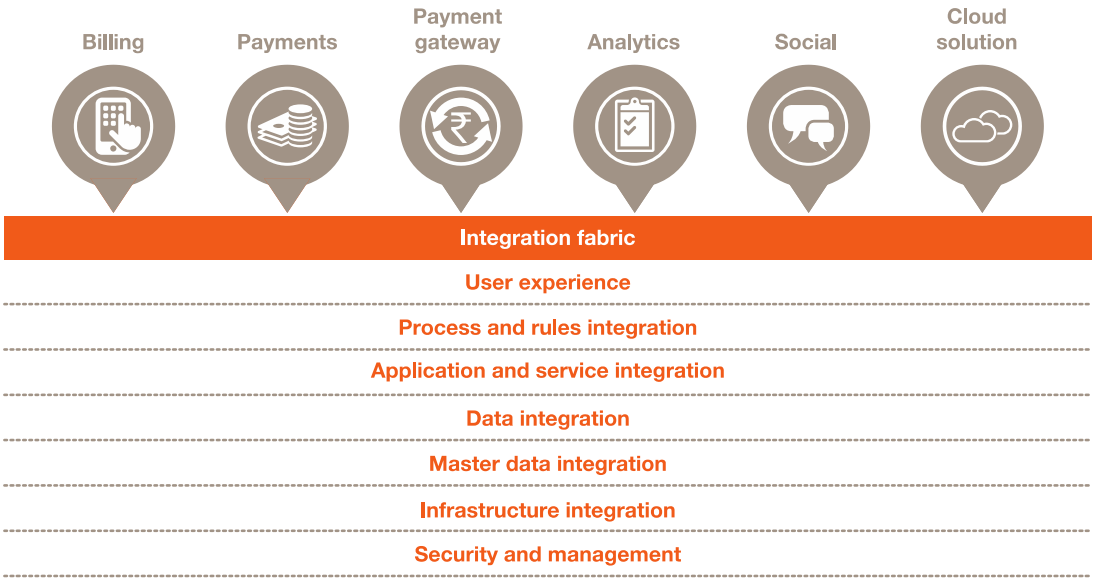



Source: PwC's Financial services technology 2020 and beyond: New age customer support technologies

The key will be to evolve the organisational culture of the industry so as to align the operating model with the new technologies. The role of organisation leaders will be vital in transitioning their respective companies to this new mode of work.

## 1.3.3 Leveraging the ecosystem

One of the main lessons from the FinTech boom is the need for collaborations and the building of a fluid ecosystem. As the 'compete vs collaborate' debate raged, Indian players benefited from the joint propositions built by leveraging the technological advancements made by FinTechs. Therefore, organisations now need to redesign their architecture to facilitate easy integration and collaborations.




Source: PwC's Financial services technology 2020 and beyond: Next generation technology architecture

One common strategy FS players have considered is building APIs rather than applications. This has been witnessed in the payments space particularly, as APIs allow payments players to integrate with existing technologies and leverage legacy systems without a major investment in infrastructure to enable digital payments in a cost-effective manner. Industry players can leverage a number of existing interoperable platforms, such as NPCI's Unified Payment Interface (UPI), which offers an architecture and a set of standard APIs to facilitate the next generation of online real-time payments, taking advantage of trends such as increasing smartphone adoption, Indian language interfaces, and universal access to the Internet and data. Other facilities such as Bharat Bill Pay System (BBPS), BharatQR and Aadhaar Pay aim to achieve the same objective as NPCI has created common standards and has made available APIs that industry developers can piggyback on.

Apart from designing new revenue streams, today, FS players are also expanding their core customer services. An integrated view of all these services will be the key differentiator to truly understand customers and meet their needs and desires in a contextual and timely manner. Designing the architecture to allow for seamless integrations and collaborations while simultaneously facilitating ease in data flow and analytical insights is what FS organisations are looking at.

The following sections explore 'next in tech' trends that are reshaping models and streams across the different FS sectors, and identify new opportunities for industry growth and customer delight.

# 2. What's next in customer delight? Enriching customer experience using modern technology

Technology continues to impact the way customers interact with FS. Driven by increased adoption of mobile channels, FS players are constantly evolving every interaction point: from innovative customer touchpoints, to integrated application journeys, to consistency of experience across digital and human sales and servicing channels. Institutions providing hassle-free services, zero or low physical interaction and tailored solutions are attracting customers. Customer satisfaction has become a primary growth driver for FS.

## 2.1. Redefining conversations

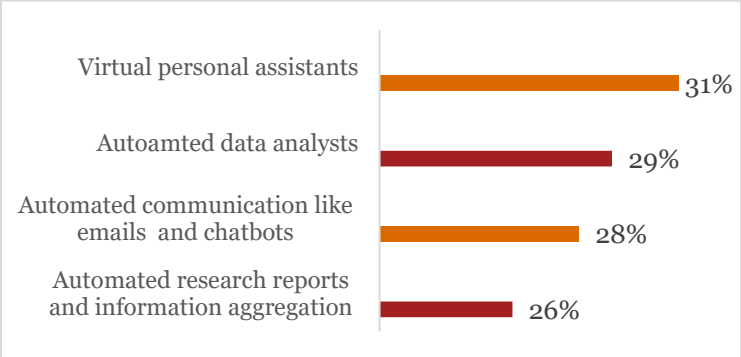
Firms are looking at ways to harness the combined power of independent yet complementary technologies to enhance user experience at all touchpoints. As AI and natural language processing (NLP) technologies continue to become more sophisticated, organisations across industries are using them to redefine how their consumers interact with brands. Consumers who are comfortable with digital channels for communication are moving into the most profitable segments for FS players, and incumbents and FinTechs alike are realising the benefits of using these channels for opportunities beyond simple customer servicing.

Chatbots are disrupting various forms of customer engagement as they effectively meet customer needs for enhanced user experience through AI. To enhance consumer communication, chatbots can utilise NLP and AI to provide relevant information to customers. FS players have adopted them not just for instant customer servicing but also for payment transactions, customised alerts, sales reporting and assisted sales.

With the augmentation of computing power, chatbots have evolved from being simple FAQ-answering tools to digital assistants. Led by an increase in the capabilities of AI and the usage of digital channels to deliver real-time, context-driven insights directly to consumers, chatbots can facilitate better decision making, advisory delivery and product sales.

The next logical step in the evolution of chatbots is voice-related AI. A number of technology leaders already provide sophisticated voice-based digital assistants that take AI and NLP to the next level. PwC's Consumer Intelligence Series Report (Bot.Me) highlights the growing comfort of consumers with digital assistants: 42% of consumers, 72% of business executives and 53% of millennials are already using digital assistants.[3] What's more, business executives are looking at virtual personal assistants as key channels for consumer conversations and engagement.

According to you, which AI-powered solutions has the largest impact on your business?

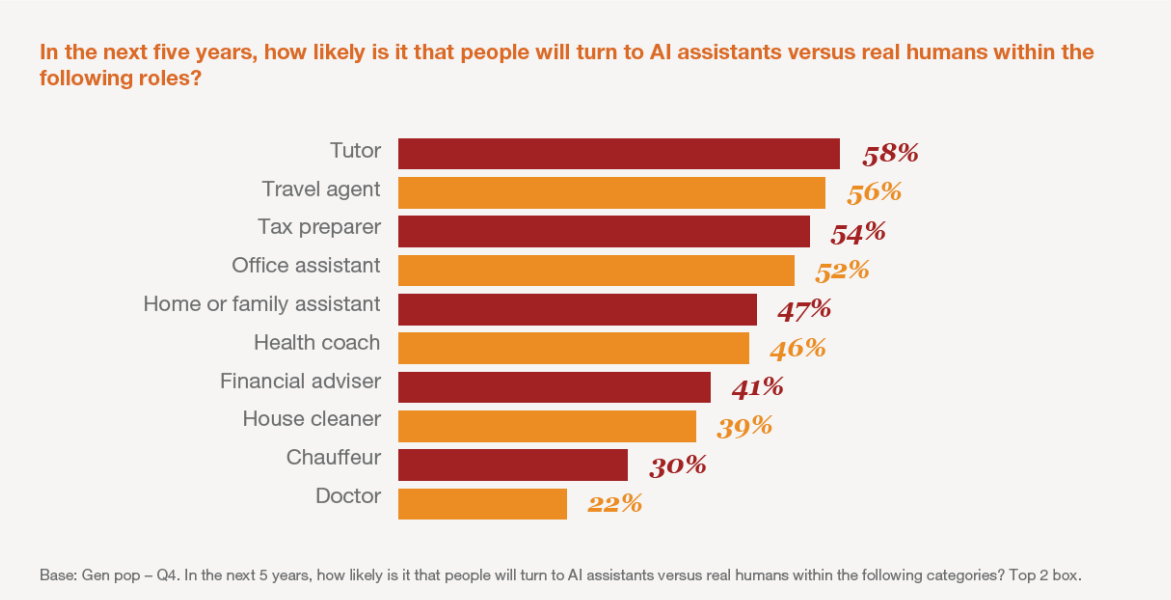



Source: PwC's Bot.Me: A revolutionary partnership report 2017

The adoption of such platforms would be beneficial for FS players, given the penetration of virtual assistance channels in terms of overall consumer experience delivery. A number of such platforms feed into Internet of

[3] PwC US. (2017). Bot.Me: A revolutionary partnership. Retrieved from https://www.pwc.in/assets/pdfs/consulting/digital-enablement-advisory1/pwc-botme-booklet.pdf (last accessed on 9 May 2018)

things (IoT) devices to develop consolidated views of consumers and provide relevant insights. ML algorithms allow these assistants to evolve and understand context so as to deliver meaningful information. More and more consumers are relying on these channels for information and recommendations, particularly from an FS perspective. According to PwC's Bot.Me survey, 41% of respondents are likely to turn to AI assistants for financial advice instead of humans in the next five years:[4]




Source: PwC's Bot.Me: A revolutionary partnership

Conversational FS is becoming more established as FS players have started using these virtual assistant platforms for service delivery. A number of banks, for example, have already developed voice-based payment solutions to allow customers to complete transactions via voice commands. These channels have the potential to develop the homes of customers into a new channel for FS players, allowing consumers to use the comfortable, familiar environment of their homes to not only get easy access to relevant information and advice, but also follow through with product purchases. Security and authentication will be a major area to look at, though voice biometrics have already entered the fray as a means for establishing identity.

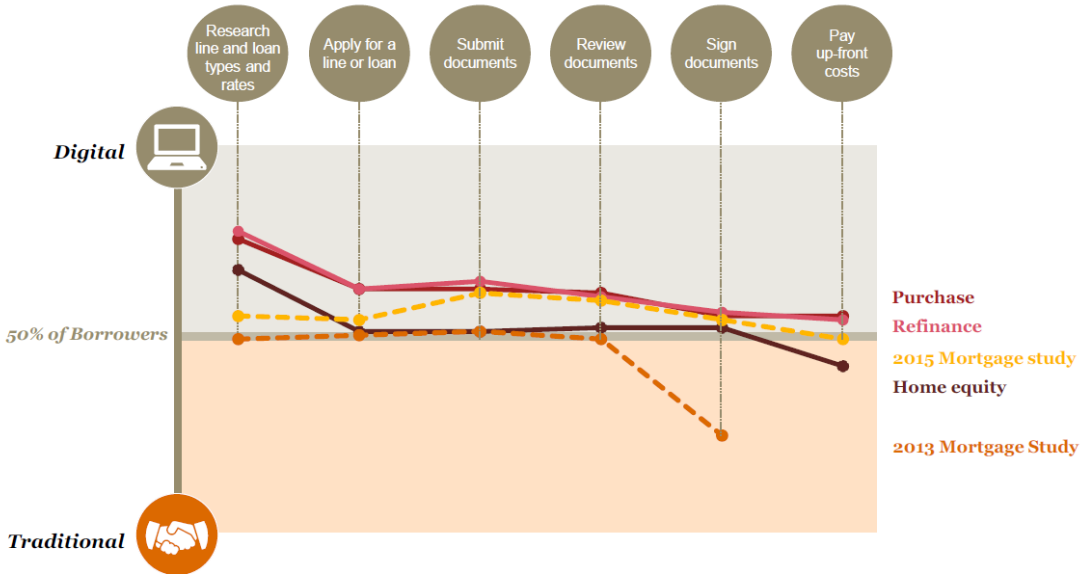
## 2.2. Simplifying traditionally cumbersome experiences

Digital technologies have already been utilised to reduce the dependency on manual processes and improve customer experience. Be it in providing faster resolution to queries to completely digitising the application experience, consumers have grown to expect certain minimum standards of comfort and simplicity.

One space where there is a marked need for better digital processes is mortgages. PwC's Home Lending Experience Radar 2018[5] finds that consumer preference for digital has increased even further across the various touchpoints of the mortgage process.

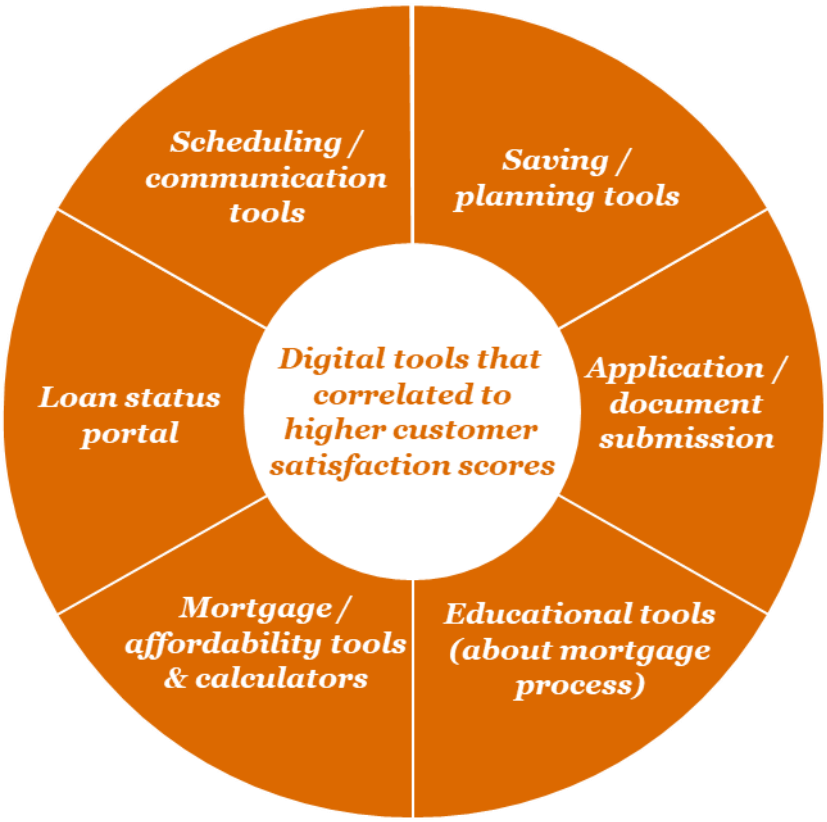
[4] PwC US. (2017). Bot.Me: A revolutionary partnership. Retrieved from https://www.pwc.in/assets/pdfs/consulting/digital-enablement-advisory1/pwc-botme-booklet.pdf (last accessed on 9 May 2018)
[5] Hernandez, R. (8 April 2018). Digital Mortgage 2.0 – A paradigm shift in customer experience – Key trends. Retrieved from https://www.linkedin.com/pulse/digital-mortgage-20-paradigm-shift-customer-key-trends-hernandez/ (last accessed on 9 May 2018)

*Figure 1: Consumer preference for digital continues to increase...*




Source: PwC's Home Lending Experience Lending Radar 2018

The increased comfort with digital technology across the mortgage process is a clear signal to mortgage providers. While lenders know that digitisation leads to higher customer satisfaction, the PwC study identifies specific areas where using digital tools for insights led to better customer satisfaction in the mortgage experience.




Digital tools for a new-age and customer-friendly mortgage process

Key insights from the study point towards a growing need for lenders to shift to a new paradigm for understanding digital experiences. Consumers are no longer satisfied with a digital application process that then migrates to a disparate set of online and offline tools. Instead, they are looking to tailor their own experience and choose which channels they use across the entire mortgage life cycle.

# 3. Tackling risk with AI/ML

## 3.1. Next-generation AI for fraud risk assessment

Digital disruption has opened up exciting avenues for businesses to capitalise on. While these disruptions have enabled companies to enhance user experience manifold, they have also exposed them to numerous digital threats. In an increasingly digital ecosystem, where millions of terabytes of data are being generated and shared on a daily basis, it is not surprising to see Internet fraud losses of companies running into worrying levels each year.

PwC's 21st CEO Survey[6] reported that 40% of CEOs across the world are extremely concerned about cyberthreats. From the back office to front-end application users, security needs to be embedded as the core strategy to build strong connected ecosystems, spanning boundaries and technology platforms. AI is fast emerging as the best option to handle the growing volume of transactions and consequently curb fraud arising from data and identity breaches, thereby protecting businesses against hefty losses.

### From rule-based to intelligent safeguards

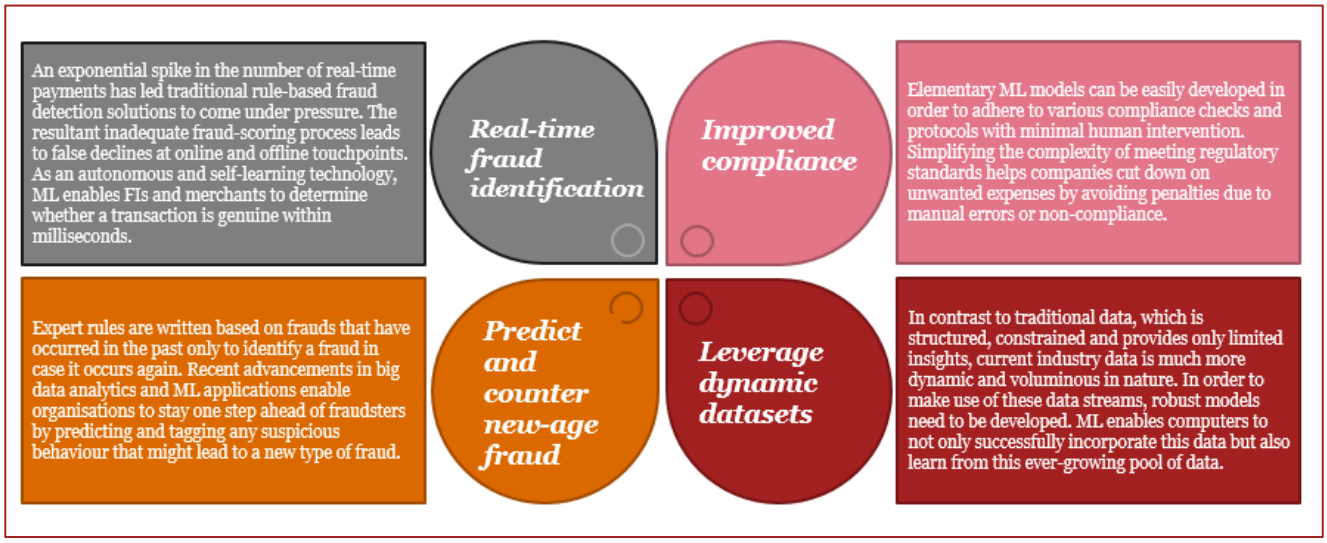
Traditionally, companies used fraud detection systems that based on expert-driven rules to make automated decisions. These companies followed the pre-defined 'if X then do Y' logic to flag suspicious users to the transaction processing engine and prevent them from completing transactions. However, with the ever-growing digital penetration leading to steep growth in the number of transactions taking place every day, it becomes impossible for experts to study every data point, identify patterns and come up with intuitive rules to flag outliers. Additionally, these rules can generate false positives or false negatives. Hence, the traditional methodology is not robust enough to handle data mining required to reveal risk predictive relationships. That is where ML engines come in; ML systems allow for more accurate rule creation and pattern building, developing insights purely from data.

Large data pools are leveraged and analysed continuously to understand the subtle patterns of fraudsters' behaviour that changes frequently. Advanced analytical models use sophisticated algorithms to generate probabilistic scores, which enable the model to efficiently identify fraud cases and predict suspicious behaviour for future scenarios. For instance, a user performs the following activities on his net banking account: login -> check balance -> transfer money to a known beneficiary -> logout. This sequence is typical and the probability of occurrence is high and therefore considered as a normal series of transactions. Alternatively, another user follows this sequence: login -> password change -> add a new beneficiary -> transfer money -> delete beneficiary -> logout. All actions performed separately don't raise any suspicion but ML algorithms are able to identify this as an anomalous and highly improbable sequence of actions, resulting in a considerably low probabilistic score. An organisation can choose to block this transaction or add an extra layer of authentication to avoid blocking the account of a legitimate customer. Hence, ML techniques can assist businesses with detecting suspicious transactions and prevent them from incurring monetary loses.

### Integrated views give greater insights

The uses cases for ML are bound by the data available to such technologies to view and learn from. The next stage of utilising such technologies for more robust risk and fraud monitoring would be to integrate data across touchpoints and channels for stronger monitoring and more meaningful pattern recognition. Organisations should leverage the ability to consume and integrate data from different digital channels to create single views that could provide more insights than disparate monitoring. Coupling this with real-time alerts delivery to relevant internal stakeholders and utilising similar digital channels of communication which also allow users to respond with equal levels of urgency (e.g. chatbots) would especially improve company defences against fraud and cyberthreats and align organisation abilities to the real-time nature of such threats.

[6] PwC. (2018). 21st CEO Survey. The anxious optimist in the corner office. Retrieved from https://www.pwc.com/gx/en/ceo-survey/2018/pwc-ceo-survey-report-2018.pdf (last accessed on 9 May 2018)




*Benefits of leveraging AI to counter fraud*

## 3.2. Using AI and ML to improve prevention and cure strategies

As more firms become familiar with the role of AI and ML in detecting frauds and improving defences against fraud risk, the applications of these analytics technologies to manage other risks will expand.

The insurance space is unearthing major opportunities for using AI and ML to impact points across the business model—from product design, pricing and underwriting, to operations and claims handling. Combining big data technologies that increase the flexibility of consuming unstructured data, insurance companies can leverage ML techniques to continually improve the efficacy of underwriting models so as to more accurately price risk using a wider range of data made available from increased digital channel consumption. Utilising AI practices such as natural language understanding (NLU)—which focuses on the ability of machines to draw inferences from unstructured textual data—insurers can, for instance, deploy machines to comb through reams of textual data from social platforms and thus develop more complete personas of applicants. More accurate underwriting and pricing would enable insurers to cover claims risks more efficiently and improve business performance.

AI and ML can also improve insurance claims processes. Apart from aiding in identifying fraud patterns, ML techniques can help uncover patterns that can determine 'straight-through processing' queues to significantly reduce claims the workload, providing bandwidth for robust checks on more complex claims.

ML also has a vital role to play in managing credit risk. With the continued growth in the level of non-performing assets (NPA) in the Indian banking sector, the need for more robust strategies of risk assessment and NPA resolution is critical. While the RBI has taken proactive steps to set up a more streamlined framework for detection and resolution, FS players can look at intelligent technologies for solutions.

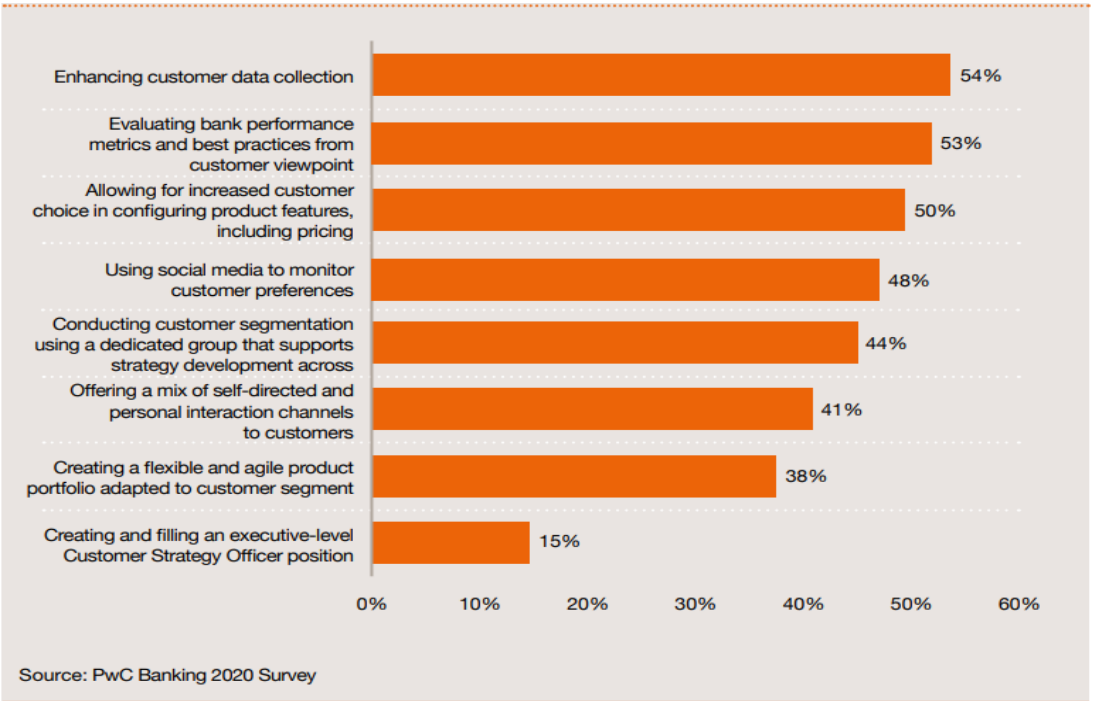
AI and ML technologies can significantly improve the efficacy of early warning signal models, providing organisations with better insights into which accounts are headed towards NPA status. Proactive strategies to focus on such high-probability cases would enable more efficient deployment of resources and reduce the inflow of NPAs. Leveraging alternative data to further enhance such early warning signal models is one of the many strategies that FS players are already adopting in an effort to manage credit risk exposure.

Another area where AI and ML can play a significant role is resolution. The recent RBI guidelines on NPA resolution focus on the need for a 'resolution plan' for accounts in default. Lenders can use ML techniques to develop more meaningful and specific resolution plans that would have higher chances of success by learning from patterns in resolution based on strategies deployed, customer segments, product types and other factors. Collection efficiencies can also be streamlined by providing insights to collection channels on successful strategies based on the type of account being resolved. A few start-ups are already providing AI-driven collection solutions that aim to provide collection agents with not just the digital infrastructure to streamline collections processes, but also insights on successful strategies so as to improve collection success. These insights would also play a

major role in the overall collection strategy, providing more clarity on which cases can be resolved via low-cost call centre channels and which cases require physical collection.

## 3.3. Building a future-ready and secure ecosystem

In PwC's Retail Banking 2020 Survey,[7] the key areas which were identified as significant effort drivers revolved around customising products, building customer relationships and getting detailed customer insights. All of these efforts will require a holistic data capturing, storing and analysis framework, spanning various customer touchpoints.

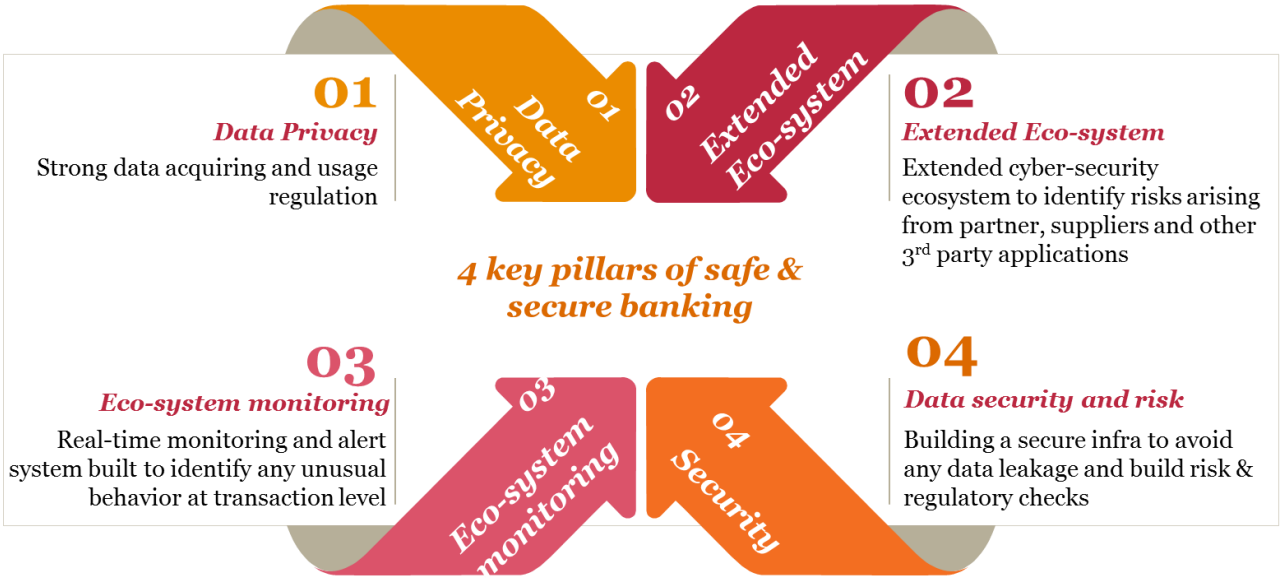



Drivers for a future-ready ecosystem

Obtaining the right information from customers at the right time and in a fair manner would be the key for any company to be at an information advantage. By ensuring the delivery of contextual insights within the same time span, the company would be able to provide its customers with a differentiated experience. Such a capability would require multiple integrations with enterprise applications and other third-party applications. While a number of organisations have already acknowledged the advantage of such a set-up, there is a need to ensure that such real-time data access and storage is protected and safe.

[7] PwC. (2014). Retail Banking 2020 Survey – Evolution or revolution? Retrieved from https://www.pwc.com/gx/en/banking-capital-markets/banking-2020/assets/pwc-retail-banking-2020-evolution-or-revolution.pdf (last accessed on 9 May 2018)

A safe and secure technology ecosystem will be built on four key pillars:




*Four key pillars of a safe and secure set-up*

1. **Data privacy**
   A number of recent high-profile data breaches, including social platform data leaks and usage of user-level private data, have engendered fear and uncertainty and eroded customer trust. FS players will have to deploy advanced cyber security policies in terms of data procurement, data capture, data usage and user permissions management. It is expected that many third parties will come up with solutions around data capture and usage regulations along the lines of the General Data Protection Regulation (GDPR).

2. **Extended ecosystem**
   With the ever-increasing usage of IoT devices, mobile applications, open APIs, partner and third-party API integrations, there is a significant risk of potential cyberattacks arising from any one of the weak links in the network. Companies therefore need to have an extended cyber security strategy which will monitor any potential threat from outside. An audit control mechanism should be put in place to evaluate the security mechanisms implemented by the organisation's partners, suppliers, service providers and across cross-boundary business networks.

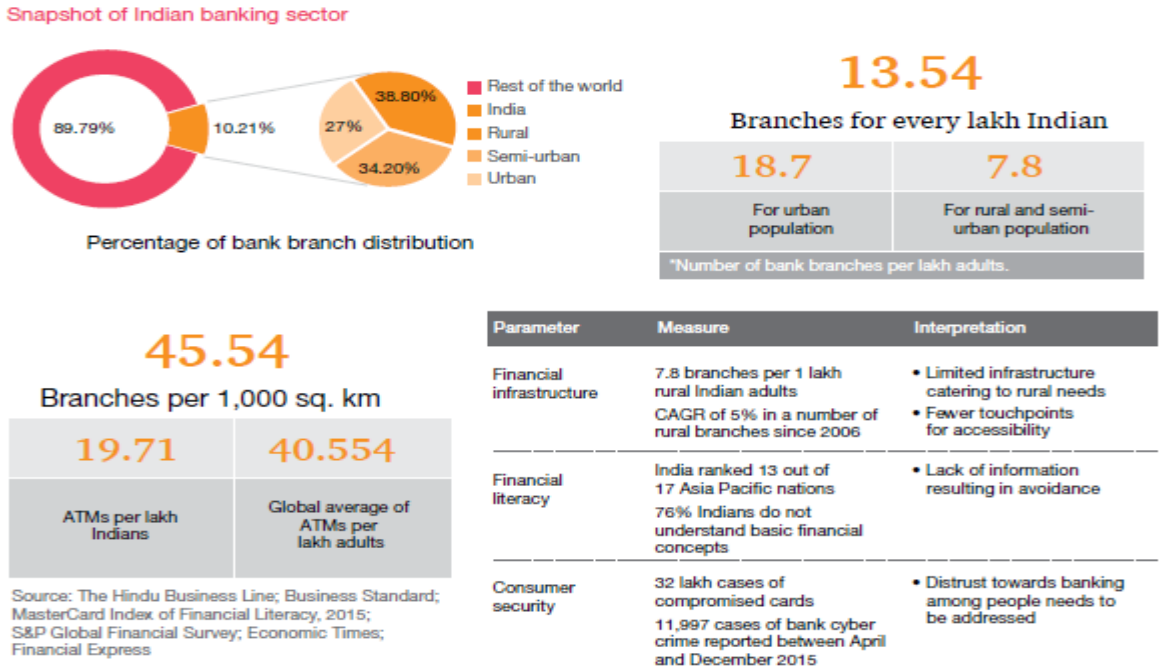
3. **Ecosystem monitoring**
   Advanced AI algorithms can be set up to validate each transaction at runtime and help in identifying frauds and system compromises. These algorithms are event driven rather than request driven, thereby preventing potential frauds and misuse at an event level rather than during the audit/analysis stage.

4. **Data security and risk**
   For building a holistic customer profile, innovative data sources are now being used as a key advantage for performing strategic decision making. Such data sources capture user data from website clickstreams, social media, mobile apps and transaction logs, which is further used in decision making like alternative financial scoring, social profile rating, alternative underwriting, location-based profiling and transaction behaviour analysis. It will be vital to build an end-to-end data protection framework to understand from where and how the data is acquired, the quality of data acquired and, most importantly, whether digital customer approval has been taken for using such data.

# 4. Financial inclusion: Towards a greater positive social impact

With over 1 billion mobile phones, 325 million broadband connections and 306 million new bank accounts, India has the potential to become a model for digital financial inclusion, driven by Jan Dhan, Aadhaar and mobile (JAM).[8] Such efforts have already brought in more people into the formal FS ecosystem, and FinTech innovations have helped create solutions that can be customised for different strata of customers.

Historically, financial inclusion efforts have been hindered by structural issues on both the supply and receiver side. On the supply side, FS companies are limited by infrastructural challenges which cascade into a high cost of acquisition and servicing customers, which in turn leads to below optimal return on investments (RoI). On the receiver side, a lack of awareness of financial concepts results in confusion, apprehension and obstacles that prevent people from availing of many financial products and services. According to a survey by a rating agency, 76% of Indian adults are unable to understand key financial concepts.[9] This figure is seven percentile points lower than the worldwide index.




## 4.1. Digital transformation enabling financial inclusion for the masses

Payments and financial technology is one of the areas experiencing maximum enablement and, hence, transformation in the Indian market. A major breakthrough in digital transformation, which offers the potential for wider financial inclusion, has resulted from the support of regulators in laying down the foundation for extensive technology innovation in this field. The introduction of India Stack, Unified Payments Interface (UPI), National E-Governance Services Ltd (NeSL) and Bharat Bill Payment System (BBPS) are a few of the efforts in this direction.

[8] PwC. (2017). PwC's FinTech Insights. Retrieved from https://www.pwc.in/assets/pdfs/consulting/financial-services/fintech/point-of-view/pwcs-fintech-insights-december-2017.pdf (last accessed on 9 May 2018)
[9] PwC and CII. (2017). Inclusion 2.0: Leveraging technology disruptions to realise India's digital economy. Retrieved from https://www.pwc.in/assets/pdfs/publications/2017/inclusion-2-0-leveraging-technology-disruptions-to-realise-indias-digital-economy.pdf (last accessed on 9 May 2018)

### 4.1.1. Tackling inclusion through merchant acceptance and consumer awareness

Government- and RBI-backed payment technologies provide consumers with a plethora of digital payment options: BHIM-UPI, bank-specific UPI payment options, Bharat QR, UPI QR, Aadhaar Pay, Aadhaar Enabled Payment System (AEPS), cards, wallets, and mobile payments. In an effort to promote the usage of digital channels for payments, the government has sought to incentivise merchant acceptance of such payment modes. Merchant acquirers have found themselves facing challenges like diminishing returns, fraud and security concerns, and commoditisation of business. To boost payment digitisation, over the last few years, the government has brought about several changes to the merchant discount rates (MDRs) to increase acceptance by a wider set of merchants. This includes reimbursing the full amount of MDR applicable on transactions made through debit cards, UPI and AEPS (for transactions less than 2,000 INR) for a period of two years.

Another strategy has been to adapt legacy point-of-sale (PoS) systems to accommodate newer modes of payments. Given the vast array of digital payment options, retail merchants face the task of ensuring acceptance of different payment modes. A few technology players have developed platforms that provide an integrated payment solution to merchants that can interact with the different digital payment channels available. These tech players are focusing on the untapped unorganised retail sector to expand their reach.

On the consumer front, preferences are slowly but surely transitioning from card-present to card-not-present (CNP) modes of payment. The arrival of a number of technology-first companies in the payments space has led to the introduction of many innovative digital payment solutions that aim to further boost consumer digital adoption. A leading technology company's payment app, for example, features a technology called 'Audio QR' that allows users to transfer money using sounds to pair two devices.

Digital payment players and other ecosystem entities are also working on new strategies to promote digital payments by focusing on digital awareness and educating consumers about digital payment solutions for day-to-day transactions. For example, the Ministry of Electronics and IT (MeitY) has launched a new scheme titled 'Digital Finance for Rural India: Creating Awareness and Access through Common Service Centres (CSCs)' under Digital Saksharta Abhiyan (DISHA) with the objective of enabling the CSCs to become Digital Financial Hubs. In line with this objective, MeiTY will be hosting awareness sessions on government policies and digital finance options available for rural citizens as well as enabling various mechanism of digital FS such as IMPS, UPI and Bank PoS machines.

### 4.1.2. P2P remittances as a gateway to larger financial inclusion

The smaller the remittance size, the higher is the transaction cost percentage, which makes access to remittance channels extremely difficult for rural and remote masses. Technology is being leveraged to solve this problem. Many start-ups have entered the space and have simplified mobile money transfers. One such application facilitates P2P money transfers for customers of banks without using bank account details. Likewise, several leading banks are leveraging National Payments Corporation of India's (NPCI) Immediate Payment Service (IMPS) platform to launch their own mobile wallets. In some cases, digital wallets are integrated with social media apps for payment solutions enabling money transfer, P2P transfer, etc. This feeds into the wallet model that runs on utilisation and balances that are driven by volumes. While a number of big players are already embedding their wallets as a payment solution across key consumer touchpoints, tapping into the large volume of under-serviced segments is an attractive proposition from a business standpoint.

Building such a consumer base through digital channels provides other key opportunities for service delivery as the same mobile channels can facilitate the acquisition of customers for other financial products. There are already various use cases of e-wallet FinTechs expanding their services to include small ticket size loans based on wallet behaviour. A more niche area that is picking up is that of providing channels for investment access. Some industry leaders in the payments space have started offering their customers the opportunity to invest in mutual funds, trying to democratise such investment practices by simplifying the process of set-up and investment through the same mobile channels. This would be a tremendous opportunity for asset management players to expand their services beyond their existing city reach, apart from being an opportunity for FinTechs and FS players to target the traditionally underbanked segments, especially with the potential of bringing traditional savings and investments into the formal sector.

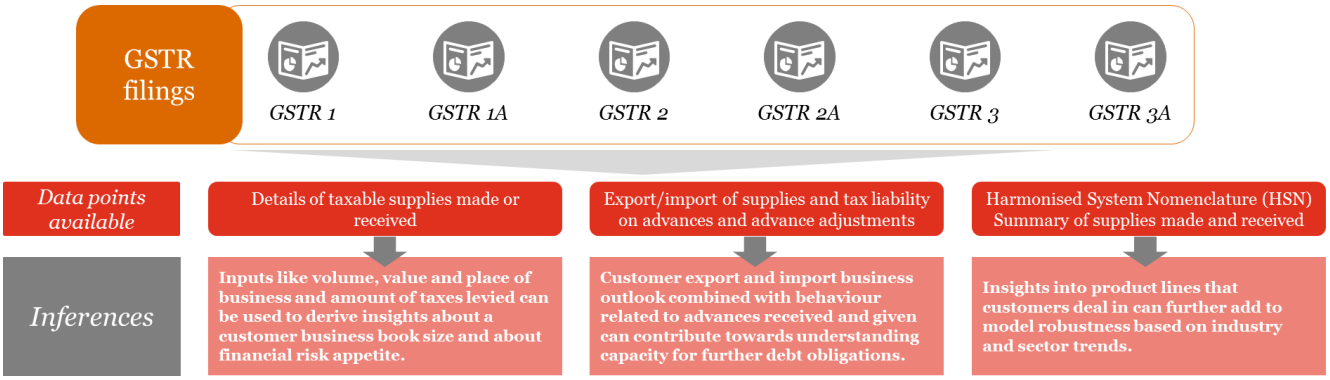
## 4.1.3. Financial inclusion through alternative lending

One of the key strategies of alternative lending players is to focus on underserved customer segments without access to formal credit lines due to lack of sufficient credit history. Alternative lending platforms leverage non-traditional data and digital technologies to make more informed credit decisions and also utilise such channels to streamline the lending process. A number of digital-only acquisition platforms are now available that can engage, acquire, approve and disburse loans in a matter of minutes.

The key implication of such a model is the reduction in acquisition costs, which provides greater flexibility in product design and ticket size. These developments are significant from a financial inclusion perspective as traditionally underserved segments tend to have higher acquisition costs and relatively smaller ticket sizes. PoS loans are a prime example: these digital buy-now-pay-later facilities with lower ticket sizes attract new-to-credit and thin-file customers and allow lenders to provide loans based on information available at the POS.

Another segment that has started to grow with the advent of technology is lending to small and medium enterprises (SMEs). The SME sector in India contributes around 37% of the GDP and provides employment to around 80 million people;[10] however, the customer segment continues to face hurdles when it comes to credit access. The need for small ticket size loans, large underwriting and acquisition costs due to limited digital data access and the lack of a formal credit rating framework have been major roadblocks for lenders.

A majority of these challenges can be overcome through the application of technology. Banks are partnering with FinTech firms and are taking the entire process online to reduce the transaction cost and turnaround time. A common data acquisition strategy adopted by a number of players involves providing certain free services to SMEs in exchange for data. For example, some lenders and FinTechs are looking at providing their SME customers with digital technology-driven facilities that provide ease of doing business and manage finances for the SME customers while providing consent to lenders to access relevant financial information that could aid in better credit underwriting. Goods and Service Tax (GST) solutions that aid SMEs in their necessary regulatory filings are a prime example of models that provide lenders with rich sales cycle information to make credit decisions.




## 4.1.4. Drone-based technology: Reach the unreached

Access to locations and lack of communication channels are other factors that prevent the spread of FS access to key population demographics. Drone-based technologies can help FS reach out to such users in a more efficient

[10] The Institute of Company Secretaries of India. (June 2017). Handbook for MSME entrepreneurs. Retrieved from https://www.icsi.edu/Webmodules/ Handbook_for_MSME_Entrepreneurs.pdf (last accessed on 8 February 2018)

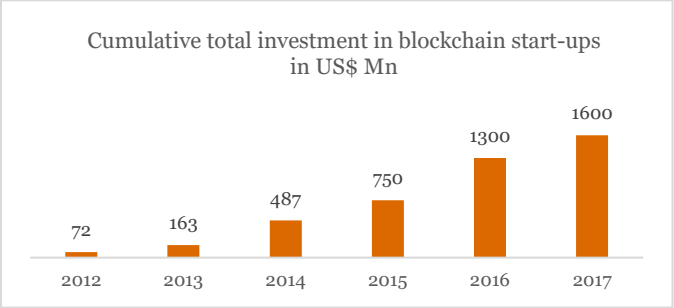
manner. These technologies will impact how users transact with their financial institution (FI) in the future. The use of drones can involve two scenarios—one where a customer has his/her own drone or one where an FI can offer drone services to its customers. Personalised drones can enable individuals to interact with their FI wherever they happen to be by delivering items and transacting on behalf of the user. In addition to delivering paper documents and other physical items, drones would also be able to provide additional services such as taking photos and performing a notary type function.

Further, drones may also be used to streamline and improve the back-office operations of banks by further automating the delivery and handling of physical items. The usage of drones for emergency communication and services would lead to increased resiliency of FIs. For example, drones may be used to quickly deploy the infrastructure of an emergency communications network by both delivering the needed system parts and serving as relays to fill gaps in coverage.

# 5. Under-the-hood technologies impacting FS

## 5.1. Large-scale adoption of blockchain proofs of concept (PoCs) for instantaneous services

Companies across industries are realising the business use cases of blockchain (distributed ledger technology or DLT), which is evident from the increased funding trends for this technology.




Source: PwC analysis of data from 1 June 2012 to 9 November 2017[11]

As per PwC's Global FinTech survey 2017, the most likely business cases of blockchain, according to 55% of the respondents, are payments infrastructure, followed by fund transfer infrastructure (50%), and digital identity management (46%).[12] In India, the most notable use cases of blockchain technology have been POCs for cross-border remittances, trade finance and vendor financing.

Blockchain can play a major role in streamlining the entire KYC process of organisations. A centralised identity platform has real benefits in terms of making the KYC process more efficient, economical, indisputable and secure. This use case can also be extended to other forms of document management and authentication, especially in processes requiring large amounts of verification, including underwriting processes. Due to its low transaction costs and reduced settlement time, blockchain can also help create new business models based on micropayments in segments such as savings, loans, insurance and investment.

Other blockchain applications such as smart contracts are bound to see increased adoption in the future. These smart contracts automate the exchange and finalisation of complex agreements such as mortgages, derivatives, insurance policies and letters of credit, where all parties validate the outcome instantaneously.

Three trade receivables discounting systems (TReDs) approved so far by the RBI have jointly implemented a blockchain solution to help banks reduce frauds in bill discounting and receivable financing. This is India's first live blockchain implementation in the enterprise financial segment.

Blockchain could be used with other advanced methods, tools, and technologies to improve information security and predict, detect and analyse frauds. A unified infrastructure with all related parties on board could help avoid events like the recent bank guarantee/letter of undertaking (LOU) related frauds.

[11] PwC. (2017). Blockchain in financial services. Retrieved from https://www.pwc.com/us/en/industries/financial-services/research-institute/top-issues/blockchain.html (last accessed on 9 May 2018)

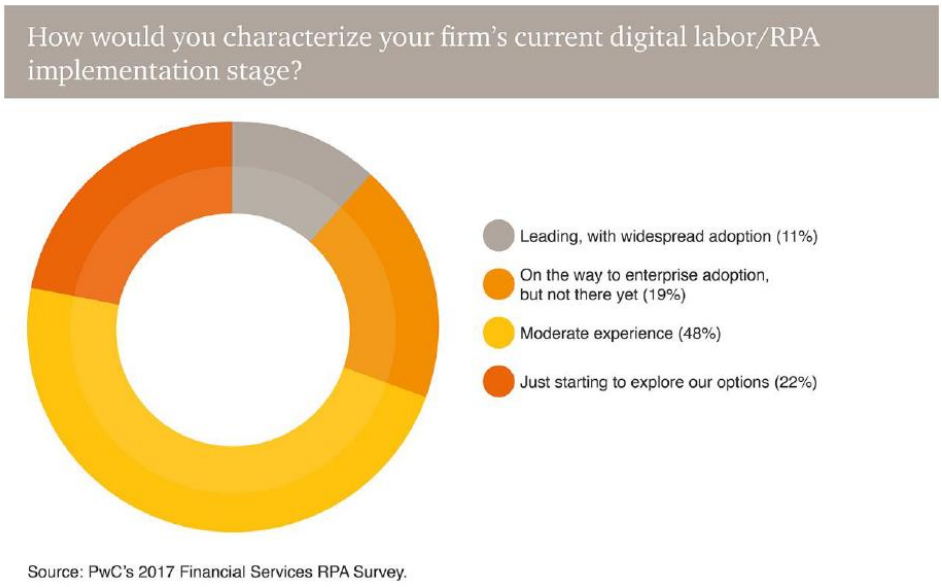
[12] PwC. (2017). Global FinTech Report 2017. Retrieved from https://www.pwc.com/jg/en/publications/pwc-global-fintech-report-17.3.17-final.pdf (last accessed on 9 May 2018)

One of the leading public sector banks in India has announced that it will use blockchain technology in its reconciliation, remittances and trade finance operations from the next fiscal year.

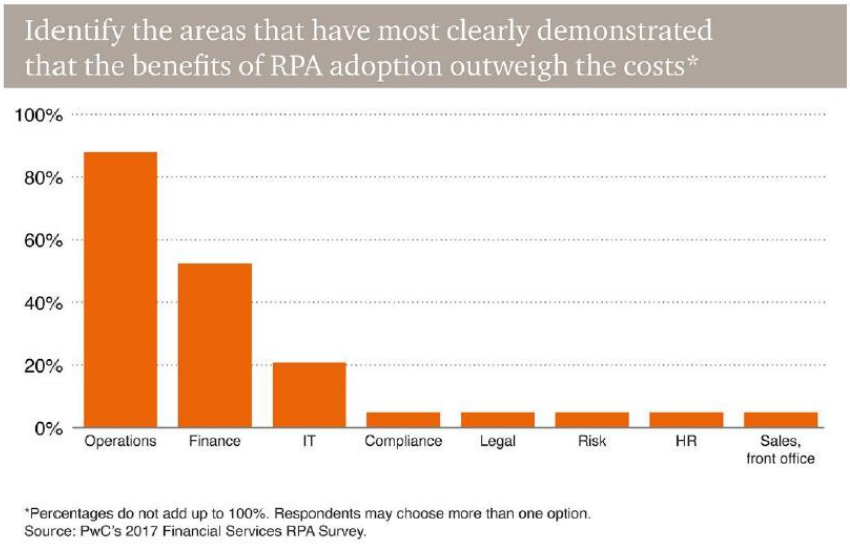
The RBI and the government have acknowledged the immense benefits of blockchain technology in ushering in a digital economy, and, consequently, many FS players have started moving blockchain solutions out of the development labs and into the marketplace. It is, however, necessary to bring in legal and regulatory clarity, and expand the scope of blockchain solutions to customer-facing processes, in-house operations and risk management practices to reap their full benefits.

## *5.2. Streamlining processes through RPA and IPA*

RPA technologies have found application in a number of internal FS processes, and FS firms have started to transition RPA options from experimental and exploratory exercises to relevant mainstream processes. PwC's 2017 Financial Services RPA Survey highlights the growing acceptance of RPA and its applications across FS areas:[13]




Source: PwC's 2017 Financial Services RPA Survey.



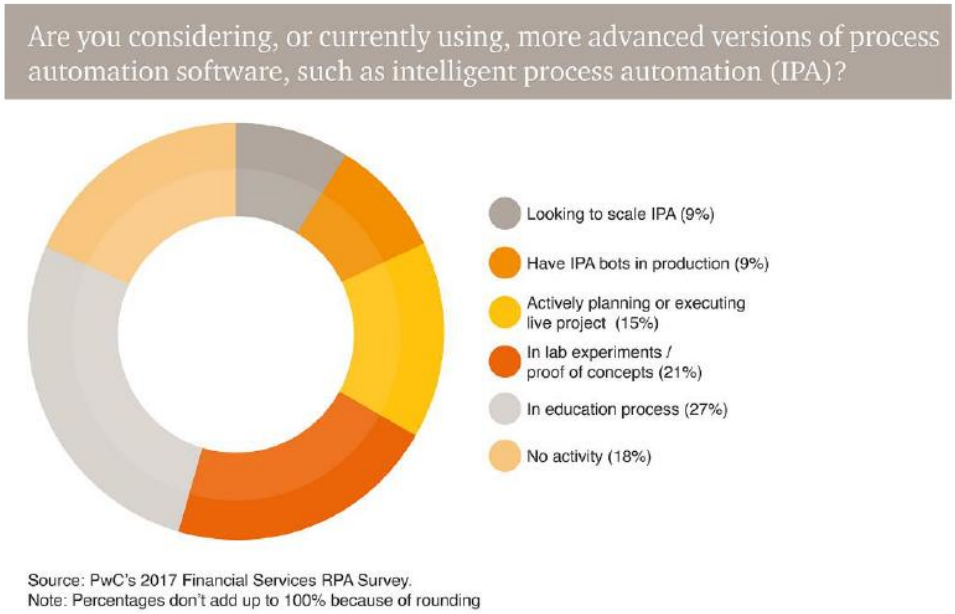

*Percentages do not add up to 100%. Respondents may choose more than one option.
Source: PwC's 2017 Financial Services RPA Survey.

[13] PwC. (2017). 2017 Financial Services RPA Survey. Retrieved from https://www.pwc.com/us/en/industries/financial-services/library/2017-rpa-survey.html (last accessed on 9 May 2018)

While RPA technologies are capable of taking on low-value activities in a quick and efficient manner, the next phase is leveraging artificial intelligence to deliver intelligent process automation (IPA). IPA technologies will allow bots to not only automate standard processes, but also learn from prior decisions, deviations and patterns to improve decisions, thus further reducing the need for human oversight and increasing efficiency gains in internal processes. The combination of these capabilities with other relevant technologies such as optical character recognition (OCR) and NLP could lead to a completely new digital back office.

Combining IPA and OCR technologies has helped insurance firms streamline and automate their claims processes. Asset management firms are using IPA along with NLP to automate portfolio commentary communication to customers, and a number of banks are using intelligent automation to streamline and improve transaction processing.

FS firms are already taking note of these developments, as our survey results show.




Source: PwC's 2017 Financial Services RPA Survey.
Note: Percentages don't add up to 100% because of rounding

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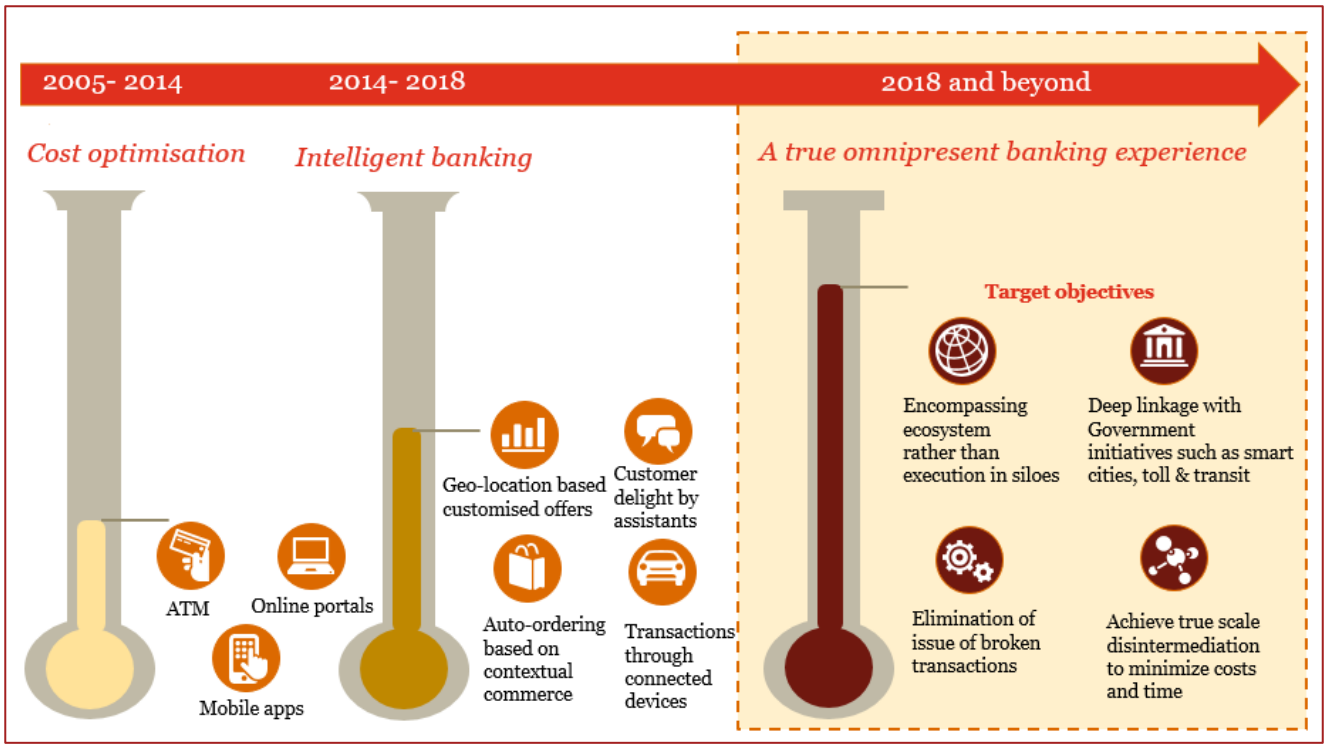
[14] PwC. (2017). 2017 Financial Services RPA Survey. Retrieved from https://www.pwc.com/us/en/industries/financial-services/library/2017-rpa-survey.html (last accessed on 9 May 2018)

# 6. Omnipresent banking: Redefining the financial supply chain

Banks have always tailored the delivery of products and services around the latest technologies. With the proliferation of smart devices and the increased availability of information from such devices, banks are now leveraging such data access to evolve to a 'banking of things' (BoT) model. By enabling banking services over smart devices such as wearables and sensors, banks can reduce visits to banking touchpoints such as branches.




Raising the bar for omnipresent banking

Banks worldwide are already making efforts to leverage the increasingly sophisticated technology built into end-user devices to generate rich real-time insights. However, such efforts have been restricted to disjointed use cases in specific closed loops. As a result, customers have still not been offered a seamless experience when they transition from a service provided by one firm to another.

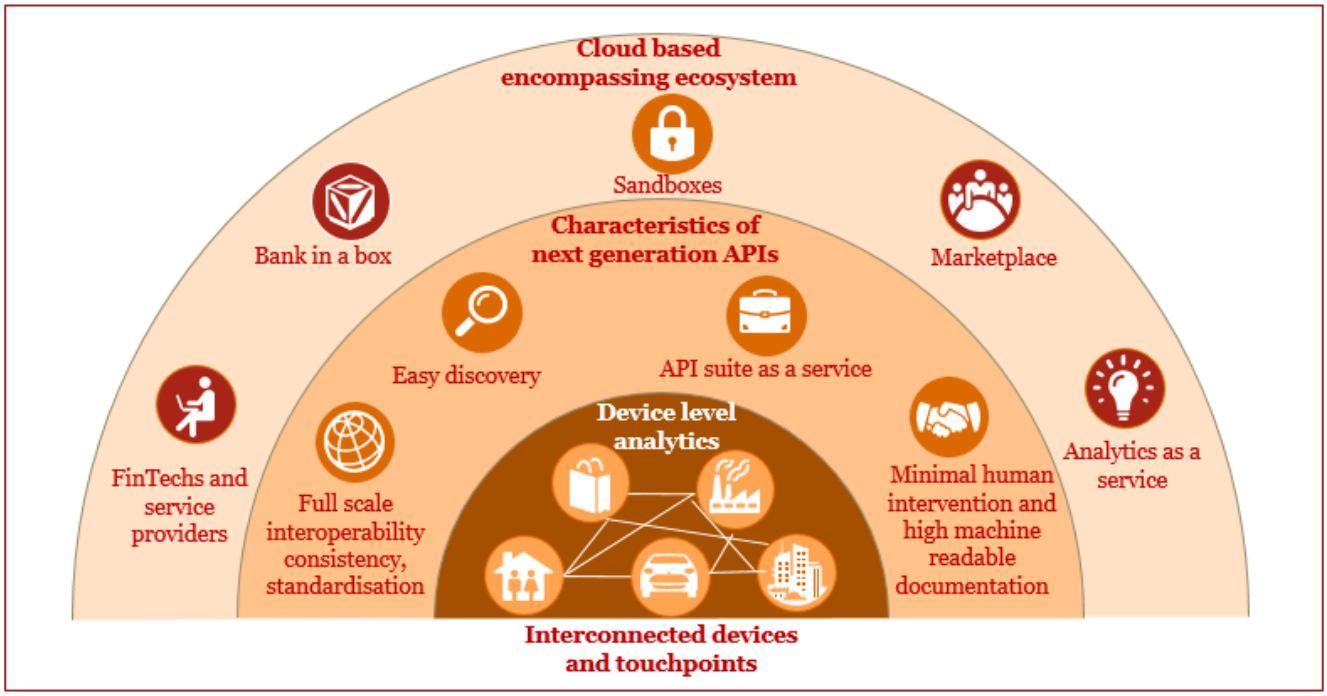
The space is thus ripe for a transformation through the development of a seamless interoperable ecosystem for truly omnipresent and invisible banking. Omnipresent banking will no longer be just about fancy devices that are connected to the Internet. The concept will evolve to include multiple parties seamlessly working together to offer a hassle-free transaction environment.

**Let's take an example**: A person staying in a smart city needs to urgently complete a cross-border transaction on behalf of his client and discuss the same during a client presentation once he reaches his office. While travelling in a cab to work, he authenticates himself through social media login and initiates the transaction through a dashboard. He then boards a metro and chats with the correspondent bank official over a video call enabled by a digital assistant, and the transaction is authorised. All transaction details are automatically embedded in the client presentation and all expenses incurred during travel by cab and metro are automatically forwarded to the person's manager for approval.

Such a scenario involves multiple IoT touchpoints and stakeholders across the globe, but from a customer's point of view, it is seamless, invisible banking. The need to separately and visibly avail of services offered by various providers is eliminated and the supply chain is redefined.

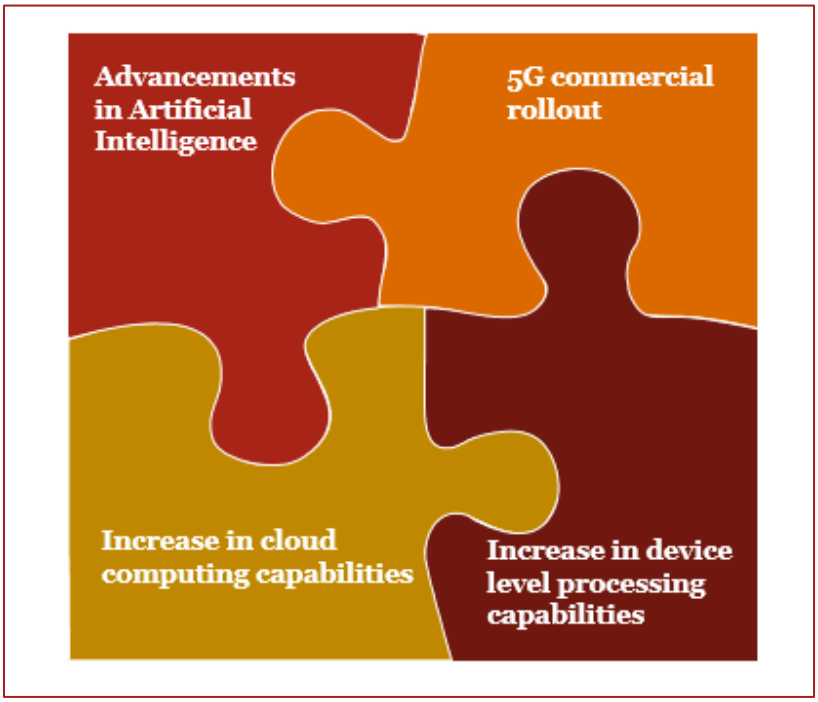
## 6.1. Achieving a seamless omnipresent banking experience

As discussed above, an encompassing ecosystem will require participation from multiple stakeholders. Along with technological advancements, the key drivers would be interoperability and standardisation. Banks are no longer strangers to such models of openness. One of the major learnings of the FinTech wave has been the value of collaboration and building an ecosystem of partners. Banks and other FS players have realised the need for partnering with technology-forward start-ups, and must now look at restructuring their architecture in order to provide banking services beyond the traditional FS touchpoints.



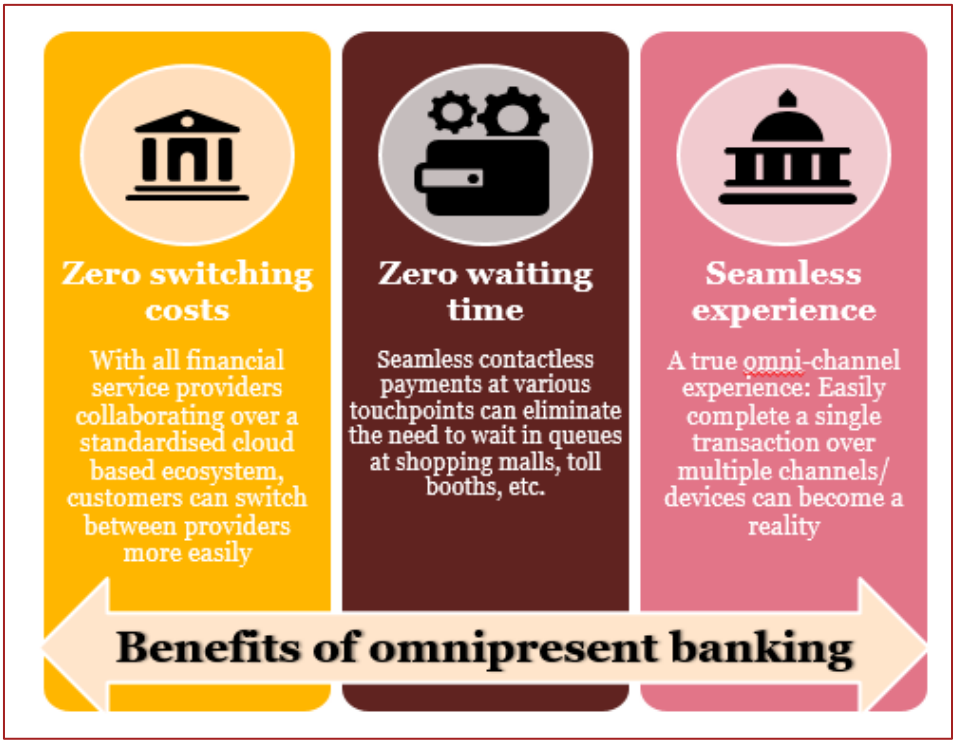

A full-scale ecosystem for omnipresent banking

Thus, with large-scale participation of stakeholders and interoperability, we would be able to realise the complete benefits of BoT, standardise the supply chain and achieve omnipresent banking. Advancements in the following interconnected fields will further help achieve the objective:




## 6.2. A potential future state of omnipresent banking

The standardisation of banking touchpoints and next level of usage of interconnected devices will transform the customer experience, and potentially lead to a state of true consistency:




Customers will be able to enjoy the benefits of ready access to FS products and services without any differentiation in experience across channels and touchpoints. By increasing the points of interaction with customers, banks and FS players can develop richer insights and create highly customised products and services. While we should be mindful of challenges such as security and privacy concerns, low visibility of RoI, implementation issues and technological fragmentation, there is huge potential to change the game and make banking absolutely seamless.

# Conclusion

The Indian FS industry continues to enjoy phenomenal innovation in terms of customer experience and service delivery. Industry players across FS sectors have already experienced the benefits of partnering with FinTechs who bring with them different technological capabilities and advantages to provide unique engagement options to customers. However, the ownership and final control of such propositions have remained predominantly with industry incumbents.

The current trends provide opportunities for superior technology companies and non-FS players to enter the FS space, as consumer experiences previously catered to by disparate industries begin to converge through digital platforms. Recent moves by global technology giants signal a changing landscape. Industry incumbents would need to step up their technological capabilities in order to continue to enjoy a superior economic position in such an environment.

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