Banking of the future: embracing technologies
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Foreword

The Indian financial service sector continues to rapidly embrace digitization aided by the advent of new technologies and greater government push. This trend has been further fueled by the emergence of FinTech players, who are playing a significant role in the banking value chain.

According to the EY FinTech Adoption Index 2017 report, India is ranked second globally in the adoption of FinTech services (at 52%) and is second only to China (at 69%).

The emergence of FinTechs has had huge implications for incumbent banks. The banks that had become accustomed to traditional ways of operations are now either upgrading their digital infrastructure or collaborating with FinTech companies in order to develop such technologies. The pressure on the bottom line due to deteriorating asset quality and Basel III implementation is also driving banks toward digital. The digital path chartered by banks in India has brought the following areas into focus:

- **Emerging technologies transforming the value chain of banks**: The proliferation of personal digital devices has led to a profound shift in the way customers prefer to interact with their banks. In response, banks are investing heavily in adopting emerging technologies such as blockchain, artificial intelligence (AI) and robotics process automation (RPA) in several processes, including KYC procedure, cross-border payments, trade finance and smart contracts. Several studies have estimated that AI will have a profound impact on businesses. Around 40% of CMOs and CIOs see cognitive as a key future technology in the coming three to five years. However, it is to be noted that players in the financial services sector will have to answer critical basic questions such as how AI can help increase profit and reduce cost, whether there is a need for fresh investments and does it build on existing infrastructure.

- **Banks and FinTechs can co-exist**: The debate over the threat of FinTech for banks in India has been raging for some time. In the meanwhile, Indian banks, with RBI's backing, are increasingly collaborating with FinTech companies. Our analysis also suggests that the inherent strengths of FinTechs can drive away the weaknesses of banks and vice versa. Some of the engagement models between banks and FinTechs can include investment, collaboration, M&A, in-house product development and joint FinTech program.

- **Tackling cybercrimes for safeguarding the future**: With growing adoption of digitization, IT infrastructure remains exposed to cyber-attacks and data privacy breach. Further, with banks introducing mobile wallets and payment apps on the back of the Government’s digital agenda, there is an increased motivation for cyber criminals to take advantage of these known vulnerabilities. Against this backdrop, the key stakeholders, including the Government and regulators, need to be prepared with frameworks and processes to safeguard themselves from potential cyber threats. Disruptive technologies such as AI, blockchain and big data can play an important role in protecting against cyber threats.

- **Payments and alternative lending market to dominate**: The Indian payments landscape has evolved rapidly over the past few years, driven by an increase in the number of digitally initiated consumers, rising personal consumption expenditure, increase in use-cases supporting digital payments, urbanization and improvement in technology and mobile data usage. We also believe that India is ready for an alternative lending revolution, as a low financial literacy rate (estimated at 24%) and limited coverage by existing financers have given rise to the need for simple, transparent and low-cost lending products.

Going forward, while the adoption of these technologies is likely to surge, banks will have to address issues such as being flexible to the evolving needs of customers, adapting to different regulatory standards and ensuring the smooth transformation of the front- and back-end systems.

V.G Kannan  
Chief Executive,  
Indian Banks' Association

Abizer Diwanji  
Partner & Leader - Financial Services, EY
Digital innovation transforming financial services
India is on the cusp of a digital revolution amid proliferation of new technologies and growing use of mobile data and smartphones. The financial service sector also continues to build on its rapid adoption of digital driven by greater push from the Government and the advent of innovative technologies. This transformation encompasses viable digital alternatives to banks, non-banking financial companies (NBFCs) and insurance companies across the value chain. Indian banks, insurance companies and NBFCs are increasingly embracing emerging technologies to cut down operating costs amid rising pressure of higher provisioning and capital requirement and to deliver superior customer experience. Further, rapid innovation by non-financial services digital players (FinTech companies) in areas such as payments, alternate lending and wealth management are also driving disruption in the sector. There is tremendous potential in India for the emergence of new-generation banking, driven by digital. During the past five years, the country’s banking infrastructure – technology and regulatory framework – has rapidly progressed. The Reserve Bank of India (RBI) has been steadily promoting a digital agenda to deepen and broaden banking services in the country.

The key technology-led trends that are collectively driving the digital transformation include cloud computing, big data and analytics, blockchain/distributed ledger technology, Internet-of-Things (IOT), robotic process automation (RPA) and artificial intelligence (AI).

Emerging technologies transforming the value chain of banks

Cloud computing is an internet-based model for delivering information technology (IT) services. It employs a network of remote servers that enable IT resources to be centrally pooled, rapidly provisioned and quickly redeployed. The cloud computing market in India is expected to contribute US$17.2 billion in new business revenues and create around 1.1 million jobs by 2022\(^1\). Cloud computing offers an asset-light and low-cost operating model to banks by offering the option of outsourcing a number of non-core activities. Some of the major banks in India are already collaborating with technology companies for implementing cloud computing in their system. The sector is expected to witness an increase in collaboration between banks and FinTech companies as pressure to maintain profitability increases on Indian banks amid increasing capital provisioning requirements of Basel III and Indian Accounting Standards. However, data privacy remains a concern and many banks prefer private clouds over public clouds for data storage\(^2\).

Big data is typically characterized by the 3Vs — volume, velocity and variety\(^3\). Big data technology enables sourcing, aggregation and analysis of such data. Analytics, which includes behavioral analytics, predictive analytics and sentiment analysis, is used to gain more precise insights about the customer. Globally, the trend toward the increasing use of analytics in banking is driven by a slowdown in economic growth and pressure on margins. Banks in India are facing similar issues, leading to increased adoption of analytics. Many Indian banks are using analytics across a multitude of functions, including managing customer relationships, reducing credit losses and NPAs, countering fraud/money-laundering, managing risks mapping networks etc.\(^4\).

Blockchain technology is a decentralized digital ledger distributed across a network of computers known as nodes, which maintain a growing list of transactions between participants. The transactional record is synchronized, as each copy of the record is identical and automatically updated, and immutable, as data cannot be modified, but only few records can be added. In addition to providing enhanced security and control over data, blockchain can help banks in cutting transaction times and reduce costs. Indian banks have already started to implement blockchain solutions for implementing KYC protocols and executing overseas transactions such as remittances. A 30-member consortium of public and private sector banks and NBFCs in India, known as Bankchain, has been formed to implement a blockchain solution for the due diligence of corporate borrowers, evaluation of corporate lending risk and vendor management. The blockchain solution is expected to streamline KYC implementation procedure as banks will be able to share information such as risk profiles for corporate customers and suspicious transactions with other banks on the network\(^5\).
The IoT is the network of internet-connected sensors that can be embedded into physical devices (things). These devices can collect data and share it across the web with people, applications and other devices. Data collected through the IoT can aid banks in decision making by helping them to gain insights into their customers' spending patterns, ATM-usage and financing needs. The IoT can boost rural banking services in India in a big way. The simplest application could be banks negotiating financial agreements with a farmer after calculating yield by tracking the condition of crops.

RPA involves automation of routine processes that are high in volume but carry low value. RPA has progressed from enhancement of manual, repetitive tasks to the automation of intelligent processes and augmentation of human resources. Many large private banks in India have already implemented RPA for improving customer service, facilitating account modification in retail banking and checking documentation for the letter of credit in corporate banking.

A large Indian private bank has deployed software robotics to automate over 200 business processes across several banking functions, including retail banking operations, agri-business, trade and forex, treasury and human resources management. Software robots have helped the bank to reduce its response time to customers by 60% and increase accuracy to 100%. The bank is able to process over 1 million transactions daily by using software robots, leading to higher operational efficiency and accuracy and reduced processing time for customer services.
Way forward

Adoption is at nascent stage and the sector remains exposed to challenges:

Banks that are facing pressure due to poor asset quality and high capital requirements are increasingly looking at technologies such as AI and RPA to cut down operating costs by automating process-oriented and data-intensive banking operations. Several banks, including an arm of the RBI, are planning or conducting pilot tests. RPA is expected to generate 200,000 jobs in India by 2021. Already major banks in India are using AI and RPA in the form of chatbot in customer support services. Despite banks increasingly looking to leverage these technologies (especially in the routine operational areas), its adoption remains in the nascent stage. While the benefits of these technology are available today, for many financial services firms, deriving full value from widespread adoption will take some time.

Going forward, adoption of these technologies in the Indian financial service sector is likely to surge in the medium to long run. The blockchain market in India is expected to grow at a CAGR of 37% till 2024 with several finance functions, including KYC procedure, cross-border payments, trade finance and smart contracts, getting implemented through blockchain.

While the new technologies will revolutionize the Indian financial service sector, banks will have their fair share of failures as they remain exposed to major challenges such as being agile to the evolving need of sophisticated customers, adapting to different regulatory and compliance standards across globe and transforming front-and back-end system to ensure greater customer value. Also, adoption of new technological innovation over current legacy IT systems will be a major challenge.

Comparative maturity and impact model for emerging technologies

Banking of the future: embracing technologies
Cognitive data analytics and AI for a fully automated digital banking user experience
The buzz around AI and cognitive analytics

Data analytics has emerged as one of the most important business agendas for the banks in the past few years. Businesses worldwide have started realizing that leveraging AI is the next significant evolution in their analytics journey. Studies have estimated that AI will have a profound impact on businesses in the near future. However, businesses, particularly banks, currently lack a clear understanding of what AI and cognitive analytics are and how they can help them increase profits and improve cost efficiency. Is it the next stage of evolution in the traditional analytics maturity model or does it represent an entirely new paradigm? Most pertinently, with so much investment already made in analytics by businesses, will AI require fresh investment or does it build on existing data infrastructure?

AI systems are capable of ingesting information and instructions, learning from interactions with humans and responding to new situations and questions in a human-like way. In addition, AI complements technologies such as RPA, as it involves systems that do not just follow rules but can also recognize patterns, learn and adapt to new situations. For example, rules-based automation approaches often run up against exceptions to the defined process, and AI can be used to target those exceptions.

AI and Cognitive Analytics as evolution of analytics

AI is often considered the next level in the traditional analytics maturity curve. However, cognitive analytics is a new branch of analytics that leverages AI tools applied to specific business objectives to produce programs that can function intelligently and evolve.

The AI spectrum spans across a wide-ranging level of methods and capabilities that mimic human intelligence. Which method to apply depends on the complexity of the process, volume of data and type of data.

**Rules-based (Robotics):** Where automation is required for business processes that are highly repetitive and rule-based and use structured data — essentially a form of automation based on domain knowledge.

**Machine learning:** Where a higher-level decision making will be required and data volumes are large — the beginning of a machine with the ability to self-learn with the use of statistical and optimization techniques.

**Deep learning:** Where higher accuracy is required on more complex tasks — involves a complex branch of machine learning that applies neural networks to mimic the functioning of the human brain.

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Source: EY Analysis
What is needed to take advantage of AI and cognitive analytics?

Most financial institutions (FIs) have either invested in big data platforms or are in the process of doing so to help deal with large volumes of data (a lot of which is unstructured), real-time data processing and analysis, as well as implement advanced machine learning algorithms. All these are the building blocks of cognitive analytics as well, and therefore businesses can leverage their existing infrastructure investment in big data to adopt cognitive analytics and AI.

Source: “Getting started with Advanced analytics,” Intel Corp., 2017
Can AI and cognitive analytics help banks?

The proliferation of personal digital devices has led to a profound shift in the way customers prefer to interact with their banks. In response, banks are investing heavily in developing digital channels for servicing their customers. However, this shifting paradigm also presents new opportunities for banks and requires new ways of thinking and new tools to capitalize on these opportunities. Banks need to start looking beyond the traditional analytics maturity models and start leveraging cognitive analytics and AI to provide the seamless experience that customers expect from digital banking.

Difference in customer experience under digital and traditional banking

In traditional banking, branches are a bank’s key touch points for customer interaction. They are the focal point for maintaining relationships, cross-selling the bank’s products and resolving customer issues. However, this model suffers from several drawbacks:

- High cost of setting up and maintaining branches
- Dependence on customers reaching out to the bank
- Limited or no ability to regularly target a large number of customers
- Limited hours of availability of banking services to customers
- Inconsistent and sub-optimal customer experience due to limited staff and hours

However, with digital banking, banks can place banking at the disposal of the customers. As a result, customers today have several means to interact with their banks, avail services and conduct transactions anywhere, anytime.

The following are the key pillars of customer experience in digital banking:

**Instant**

Digital banking: Most of the transactions, from account opening to payments, enabled instantly

Traditional banking: Takes time to process the paperwork and fulfill the requests

**Anytime**

Digital banking: Most of the services are available 24/7

Traditional banking: Limited to branch or customer service operation hours

**Anywhere**

Digital banking: Customer can initiate a request from anywhere in the world

Traditional banking: Requests are typically taken in a branch and the customer has to make an effort to visit

**Customer centric**

Digital banking: The digital properties are designed for customers’ ease of use

Traditional banking: Branches are designed with operational efficiency in mind

**Platform agnostic**

Digital banking: Allows customers to conduct a variety of transactions across different entities, such as bill payment

Traditional banking: Limited number of services available outside the bank’s network

**Comprehensive**

Digital banking: Customers able to manage all relationships with the bank in a single place

Traditional banking: Multiple passbooks, processes and people for multiple relationships
The data advantage of digital banking

The foundation of the opportunities that digital presents is the real-time and detailed data generated on customer behavior, such as buying habits.

This data, which is objective and gathered without human intervention, can show how customers behave across channels. When data from multiple channels is combined, it can present a more clear and complete picture of customers.

Application of AI and cognitive analytics in digital banking

In digital banking, there are several new applications of cognitive analytics and AI that are aimed at improving customer experience, increasing engagement, gaining a deeper understanding of customer behavior and making the customer interactions with the bank frictionless. In many instances, AI-powered bots are already beginning to perform functions that require complex thinking and contextual understanding.

Customer service

| Chatbot for customer queries | Intelligent chatbots can allow customers to have a natural conversation, as they would with a customer representative, and allow businesses to understand customers’ needs and emotions by analyzing the text of the chats. |
| Case study | India’s largest public sector bank launched an AI-powered chatbot in 2017 to address customer inquiries. It will help customers with everyday banking tasks just like a bank representative would, reducing significant operational expenditure for the bank over time. |
| Smart assistant in mobile apps | A personal assistant integrated into the banking app can anticipate customer needs and guide them in performing various functions through the app. |
| Case study | In 2017, one of the largest banks in the US launched an AI bot to help customers make smarter decisions. This digital assistant is available in the bank’s mobile app, enabling customers to chat via voice or text message to manage their basic banking needs and build better money habits. And in return, as the bot learns (thanks to AI, predictive analytics and cognitive messaging), it can serve as each customer’s own proactive, personal financial advisor to give a heads-up on fund management, approaching payment dates, spending habits and cash rewards. |
| Robo receptionist in customer lounge | Humanoids can assist customers of the banks in not only navigating the large premises but also in resolving routine customer queries such as where to make a deposit. |
| Case study | One of the public sector banks in India has deployed two robots in its premises. While one uses speech and face recognition and interactive gestures to greet customers in local language and helps them in navigating the branch, the other is designed to supplement the human resource and answers 215 preset customer questions in English. Other private banks are also deploying robots in their customer lounges as well. |
Customer advisory

| Robo investment advisor | AI-powered advisors can analyze a large volume of market data, predict stock movement and advise investment techniques and stock picks to clients based on their investment strategy and risk profile. |

| Case study | A Vancouver-based financial investment company has launched a new AI robo-advisor platform to help them make informed decisions in investment portfolio management. The company’s platform utilizes AI to track and recommend investment diversified portfolio, enabling banks and private wealth managers to invest while mitigating market risk. The program analyzes historical economic and market data going back to the 1960s to spot trends, look for better performance and downside protection, and make asset allocation decisions. |

| Personal financial planning | Robotic financial planners can analyze information about a client gathered through a detailed questionnaire and devise the appropriate financial planning strategy for them to enable them to meet their financial goals. |

| Case study | A New York-based FinTech company has developed what they claim is the “world's first AI financial advisor.” The company’s model based on AI requires customers to input their long-term goals, which can be updated at any time, as well as three months of their spending data, to help the AI tailor its plan to a particular spending habit style. Factors such as inflation, taxes and market conditions are then added to the mix to create an 80-year financial projection. The model adapts to changes in personal finances or the global economy to update the projections automatically. At the core of company’s AI framework is a feed-forward neural network, which looks at different answers from consumers and offers various solutions as a response. |

Marketing and cross-sell

| Real-time smart offers | AI can facilitate an end-to-end automated process where customers are presented a loan offer and the whole cycle from response to disbursal progresses quickly without human intervention. |

| Case study | A Dutch multinational bank implemented a centralized campaign management program to improve the relevance of its marketing campaigns. The program uses AI to analyze historical and recent customer interaction data and produce individual product offers for each customer. These personalized offers, created in real time and delivered through multiple channels, have enabled the bank to increase its average campaign response rates. |

Automated customer self-service

| Automated loan offer to disbursal | AI can facilitate an end-to-end automated process where customers are presented a loan offer and the whole cycle from response to disbursal progresses quickly without human intervention. |

| Case study | One of India’s largest private sector banks is in the process of digitizing its retail loan business using technology and eliminating the use of paper. Traditionally, loan processing can take around 7–10 days, involving loan application, credit bureau’s scrutiny, verification of other documents and final disbursement to the applicant. By digitizing this process, the bank aims to complete it in less than 30 minutes, allowing customers to get instant conditional approval using their mobile device and a popular messenger app. Each customer can get customized solutions on products, pricing and eligibility. |

| Automated insurance claim processing | AI can power a process to make the claims process faster and eliminate the need for a human survey in 100% of the cases, reducing claims processing costs. |

| Case study | One of the largest banks in Australia has revealed that it is exploring image recognition and augmented reality-based enhancements for its insurance claims process, adding to the AI systems it deployed in 2017. Partnering with a leading AI company, it has already started testing a software program to automatically determine who is at fault in a vehicle accident. The AI software has since been integrated into the digital claims process at the company’s several insurance brands. It is also working on using image recognition to assess the type and extent of damage, augmented reality that would enable an off-site claims assessor to discuss and assess damage and obtain telematics data from increasingly automated vehicles. |
Cybercrimes and safeguarding the future
With growing adoption of new technologies, IT infrastructure is exposed to several types of risks related to the increasing use of technology – for example, cyber-attacks, data privacy breaches, brand or reputational damage, financial loss, fraud and business interruption. Moreover, in the connected and convergent world, the digital landscape is vast, with every asset owned or used by the organization representing another node in the network. This provides cyber attackers a bigger opportunity to compromise an environment. They are well camouflaged: exposing the attackers requires cybersecurity defenses that identify a threat even when it adopts the colors of its immediate environment.

Against this backdrop, organizations must consider their cyber maturity in the context of different categories of threat:

- **Common attacks**: These are attacks that can be carried out by unsophisticated attackers, exploiting known vulnerabilities using freely available hacking tools, with little expertise required to be successful.
- **Advanced attacks**: Advanced attacks are typically carried out by sophisticated attackers, exploiting complex and sometimes unknown (zero-day) vulnerabilities using sophisticated tools and methodologies.
- **Emerging attacks**: These attacks focus on new attack vectors and vulnerabilities enabled by emerging technologies, typically carried out by more sophisticated attackers performing their own research to identify and exploit vulnerabilities.

### Threats and vulnerabilities perceived to have most increased the risk exposure of the respondents, 2013–2017

<table>
<thead>
<tr>
<th>Vulnerabilities</th>
<th>% of respondents stating as top two items to increase risk exposure</th>
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<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>Careless or unaware employees</td>
<td>53%</td>
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<td>Outdated information security controls or architecture</td>
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<td>Unauthorized access</td>
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<tr>
<th>Threats</th>
<th>% of respondents stating as top two items to increase risk exposure</th>
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<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>Malware</td>
<td>46%</td>
</tr>
<tr>
<td>Phishing</td>
<td>51%</td>
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<tr>
<td>Cyber attacks to steal financial information</td>
<td>39%</td>
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<tr>
<td>Cyber attacks to steal IP or data</td>
<td>32%</td>
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<tr>
<td>Internal attacks</td>
<td>64%</td>
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</tbody>
</table>

Source: EY Global Information Security Survey 2017

**Digital and cybercrime: The India story**

The rapid adoption of digitization in the Indian financial service sector amid a growing internet user base has exposed the industry to newer forms of cyber-attacks. The move toward a digital economy means increasing amount of customer data stored electronically and a large number of online transactions by individuals, businesses and government departments.

**The cyber threat landscape is evolving**: The current landscape is characterized by increased sophistication of cyber criminals and the emergence of several types of risks.
As the pace of technological innovation in the financial services industry accelerates, it will continue to drive criminal ingenuity. For instance, smartphones have a number of known vulnerabilities, which, until now, cyber criminals did not have a financial incentive to exploit. However, with banks introducing mobile wallets and payment apps (especially on a fast-track basis in India in line with the Government's push toward a more cashless digital economy), there will be increased motivation for cyber criminals to take advantage of these known vulnerabilities, as well as to find and exploit other weaknesses.

The transient and borderless nature of cyber resources has made it difficult for legal authorities and investigative agencies to control the challenges introduced by rapid adoption of digital initiatives and platforms. The overall posture and preparedness to cybercrime remains low with a pendency percentage rate of 61.9%—11,870 cyber-crime cases pending investigation from the previous year and an addition of 12,317 new cyber-crime cases being reported as per NCRB Crime in India report 2016.

The top three primary motives reported for cybercrime were as follows:

- Illegal gain: 48.6%
- Revenge: 8.4%
- Insult to modesty of women: 5.43%

With “illegal gain” accounting for 48.6% of all cybercrimes, the primary target of cybercrimes are citizens lacking cyber awareness, with the cost of such losses being incurred by banking institutions. Cyber theft of US$38 million was reported in the years 2014–17 by various banks, but the end user impact remains unknown. It is also interesting to note that 81.12% of cyber-crimes were found to be true but lacked sufficient evidence. With increasing complexity of cyber-attacks, a similar trend has been observed in various attacks on Indian banks, where attackers have erased the post-attack forensic trail.
Rising digital adoption with an evolving security architecture and lack of user awareness have made banking institutions and users rewarding targets for frauds and cyber heists.

The following are some of the most notable attacks on India’s banking institutions:

- **Society for Worldwide Interbank Financial Telecommunication (SWIFT) frauds**: SWIFT setups in various banks were targets of cyber heists, leading to regulatory requirements for strengthening payment system security.
- **UPI compromise**: Insecure implementations of UPI were targeted by malicious users to withdraw money for illegal gain.
- **Indian debit card hack**: About 3.2 million debit cards belonging to various banks were compromised, resulting in reputational and financial loss.

### Key trends and challenges

- **Zero-day**: Exploits leaked by the Shadow Brokers group were weaponized into WannaCry ransomware, leading to massive disruption. Banking institutions are realizing that building resilient architectures to unknown threat vectors can result in a competitive edge.
- **ATMs, SWIFT and UPI**: These are lucrative targets for attackers, resulting in regulatory guidelines defining secure controls for these critical systems.
- **Customer and employee awareness**: The human factor is vital to securing organizations, and many of them are actively educating their customers and employees on the various cyber risks.
- **Cyber resiliency**: Financial organizations are transforming their existing systems to be agile in their response and immune to unknown threat vectors.

### Emerging areas of risk in the digital world

The cyber threat landscape continues to evolve and presents new challenges to organizations every day. In response, organizations have learned over decades to defend themselves and respond better, moving from basic measures and ad hoc responses to sophisticated, robust and formal processes. While the regulatory landscape in India has evolved, organizations have been compelled to transform their cybersecurity measures on account of recent events such as the demonetization drive coupled with the corresponding push to adopt digital technology, heightened focus on e-governance and digital governance, breach of sensitive data and the outburst of cybercrime. Similarly, organizations are realizing that threats originating from the digital world require dedicated resources and efforts.

Cyber-attack breaches in the financial and insurance sector were often associated with banking Trojans stealing and reusing customer passwords, along with ATM skimming operations. Distributed denial of service (DDOS), web application attacks and payment card skimming represent 88% of all security incidents in the financial services industry.

- **ATM malware attacks**: ATM machines were targeted to fraudulently dispense cash.
- **Phishing and vishing**: Fraudulent gangs were caught defrauding bank users by impersonating as bank employees over emails and phone calls.
- **Ransomware**: Indian banks in May 2017 had to shut down their ATMs in order to counter threat from ransomware ‘WannaCry’, a ransomware that had disrupted IT networks in over 150 countries. Additionally, the banks were mandated by the RBI to follow instructions of government organization - Indian Computer Emergency Response Team (CERT-In) on WannaCry.

With technological innovations in the banking and FinTech industry, the world of opportunities is endangered by immature implementations, design flaws and lack of awareness among end users, leading to exploitation by malicious attackers.

### Case study

*A nationalized bank in India came under a cyber-attack when hackers sent malicious emails to its employees. A malware was released when a bank employee opened the email attachment, allowing hackers to steal the bank’s access codes for SWIFT, a system that lenders use for international transactions. The codes were then used to send transfer instructions for about US$170 million to another bank in New York. However, with the support of government agencies, the entire US$170 million was traced.*
Cyber resilience

Given the increase in the complexity and persistence of cyber-attacks, the risk landscape is transforming. Most organizations struggle to keep pace with the breakneck speed at which technologies and threats evolve, giving rise to hazardous gaps between risk and response. This leaves organizations wide open – not only to competitive disadvantage and potential collapse but also to market, regulatory and stakeholder pressure to improve security governance.

In the face of such high stakes, successful business leaders will be those who transform their cybersecurity strategy by giving it due consideration and aligning it with core business objectives. A deeper understanding of known and unknown threats, business-critical information and how to cascade digital security effectively throughout the enterprise will be instrumental in improving and protecting business performance.

Elevating responsibility for shaping information security to the board level is imperative. Business leaders are best placed to mitigate cyber threats, downrange breaches and ensure prosperity in today’s borderless, data-driven business environment when cybersecurity runs throughout the risk management strategy of the entire organization, rather than intermittently alongside.

Defending against advanced attacks

If organizations are ambitious enough to seek to close the door on common types of cyber-attacks, they must also be realistic enough to accept that advanced attackers will get in. In such a case, it is crucial to be able to identify intrusions as quickly as possible – and to have processes that are known to provide the organization with an effective means to deal with the after-breach situation and to kick attackers back out.

A Security Operations Center (SOC) that sits at the heart of the organization’s cyber threat detection capability, providing a centralized, structured and coordinating hub for all cybersecurity activities is increasingly moving beyond passive cybersecurity practices into active defense – a deliberately planned and continuously executed campaign that aims to identify and remove hidden attackers and defeat likely threat scenarios targeting the organization’s most critical assets. Active defense represents a crucial step forward as organizations seek to counter advanced attackers, and can be thought of as a strategy encompassing at least four stages:

- **Prioritizing the crown jewels**
  In any organization, certain assets, including people, are particularly valuable and must be identified and then protected especially well; these assets may be related to critical business functions or particularly sensitive data repositories.

- **Defining normal**
  Since active defense depends on tools such as anomaly analysis, it is important for organizations to understand how their networks normally operate. Cybersecurity analytics tools use machine learning to define the “normal” and AI to recognize potential malicious activity more quickly and accurately.

- **Advanced threat intelligence**
  By working closely with threat intelligence providers and developing in-house analyst capability, it is possible for organizations to build a much clearer picture of the threat landscape – including the identities of C-level executives.

- **Active defense missions**
  These are exercises planned and executed in order to proactively defeat specific threat scenarios and uncover hidden intruders in the network. It requires tailored training and testing – spear phishing tests, for example, that identify how vulnerable employees are to email scams, penetration tests that pinpoint network vulnerabilities, and even full-blown red team testing.
Future outlook

The banking sector is expected to move in tandem with the changing times and technologies. The key stakeholders – the Government and regulators and banks – are required to be prepared for the future with robust regulatory frameworks and internal processes in place to safeguard themselves from potential threats. Another aspect is the use of disruptive technologies such as AI, blockchain and big data, which are going to change the cybersecurity landscape in India.

Big data in cybersecurity

There is a sea of customer data available and accessible to banks that is continuously generated and needs to be safeguarded. Big data analytics allows easy monitoring and quick response to threats. The benefits of big data and analytics in cybersecurity are as follows:

- New analytics based cybersecurity tools are able to collect, store and analyze huge volumes of security data in real time. Such tools operate in near real time and are better that security information and event management (SIEM) tools in giving alerts.
- Predictive analytics can track both online and mobile data and highlight deviations.
- Advanced analytics help in fraud detection by way of analyzing behavior and transaction trends.

Hence, big data is being utilized by banks for identification and access management and for the study of usage patterns, allowing them to serve better and also to predict any financial crime by looking for any changes in pattern. A data-driven organization is also able to audit its operations and study any cyber incident in greater detail.

Uptake of blockchain reducing cybersecurity concerns

Blockchain is expected to transform banking operations and also help fight cyber-attacks. Blockchain helps tackle cyber-attacks in the following ways:

- **Information security**: Blockchain offers a key benefit of immutability, making it difficult to alter data. First, the public key infrastructure (PKI) relies on centralized, trusted third-party certificate authorities (CA) to issue and store key pairs. Second, a keyless signature infrastructure (KSI) distributes the information. Alteration in a single node would require an attacker to compromise over 50% of the network and the data would be permanently insecure to be rebuilt. Also, each block is tied to the previous block by a cryptographic hash, which makes it very easy to identify the data that has been manipulated.
- **Protect against DDoS attacks**: DDoS attacks shut down entire networks for days at a time. Blockchain technology could bring a transparent and distributed domain name system (DNS) where domain records will be managed by their owners and thus will never yield under an excess of requests or manipulated by a third party.
Reduction in human interaction: The human factor is the greatest threat in cybersecurity, and blockchain addresses this basic flaw. The use of a distributed ledger reduces the risk of loopholes in the chain and provides end-to-end security. Banks in India have already begun using blockchain for transactions. Major private banks with a strong customer base have started using blockchain for vendor financing and international trade finance. RBI has also successfully tested blockchain technology for trade application.

AI adoption for cybersecurity

A major hurdle in controlling cyber-attacks is the rapid growth in the volume of data generated, which is extremely difficult to manually check and process every day. Using traditional methods can take weeks or months to detect intrusions, during which time attackers can exploit vulnerabilities to compromise systems and extract data. The key benefits of using AI in cybersecurity are as follows:

- Less human analysis is required to identify and counter a large number of attacks, leading to less cyber blindness and fatigue.
- As AI learns from each situation, it provides security analysts greater awareness about identifying and classifying varied pattern mutations.

Case study

An Australian multinational bank is developing AI to help with cybersecurity, fraud detection and regulatory compliance. As banks have large data sets, it becomes difficult to identify any noise. Machine learning capability will provide insights in to the top five frauds which can be taken up by the banks for further investigation.

Getting prepared for the future

Banks that understand the threat landscape and have strong defenses in place will stand a greater chance of repelling attacks and identifying those attackers that do get through; those with the ability to fight back will limit the damage attackers can do by acting quickly.

Over the past few months, the Government of India has taken numerous initiatives to support the cyber security framework, such as the launch of the Cyber Swachhta Kendra (CSK) – a botnet cleaning and malware analysis center – and the set-up of the National Cyber Coordination Centre (NCCC) – to monitor and handle cyber-attacks. These initiatives are directed toward creating a secure cybersecurity ecosystem.

In order to ensure cyber security in the banking sector of India, the Government and banks are required to take strategic steps. The Government would need to implement best practices from across the globe and enhance awareness, while banks would need to focus on setting up next-generation security centers, a crisis response mechanism, cyber threat intelligence and more secure solutions to offer to customers.
04 Digital innovation and payments: “Digital pays”
A key area that is witnessing rapid adoption of new technologies and digitization is payments. Growth in digital payments marks a significant shift for the entire payments infrastructure in India, in line with the global trend. An array of digital payment methods and indigenous innovations is today available to the customers and merchants in the country. This has led to significant interest among the investor community as well; over the last 12 months, some of the notable global corporations and private equity investors have been racking up investments in payments businesses in India.

Digital payments becoming a way of life

The Indian payments landscape has evolved rapidly over the past few years, driven by an increase in the number of digitally initiated consumers, rising personal consumption expenditure, increase in use-cases supporting digital payments, urbanization and improvement in technology and mobile data usage. While in the past banks played a central role in providing payments services, the landscape today has evolved with active participation coming in from non-banks players as well. Increasing smartphone penetration, reduction in the prices of telecom data use, growth in digital commerce and institutional support have been the key drivers for digitization of payments in India.

Growth in the adoption of digital payments has also been supported by improvement in the supporting infrastructure. A combination of access to 4G data, mobile phones (cost reduced to near zero with telecommunication companies offering subsidized 4G-enabled phones), Aadhaar and Unified Payments Interface (UPI) has catapulted India into a payments growth trajectory. From market players’ perspective, banks, non-banks, government and institutional bodies have been the driving and enabling digital payments adoption through several favorable policies and business measures, all directed toward a common objective.

Indigenous innovation around payments has seen a lot of traction, specifically UPI. As a result, not only Indian banks and payments companies, but also global platforms are developing transactions use-cases on UPI. There is a potential for a significant network effect through this, where people transact and bring others into the digital payments net; more use-cases get defined, which make such transactions contextual and more categories erstwhile predominantly cash-driven begin transitioning to electronic payments.

There are four core pillars that support the improving payments infrastructure in India:

- Shift to digital payments across new categories
- Supportive institutional environment
- Continued growth of traditional card and wire transfer payments
- Significant adoption of indigenous payment methods

### Shift to digital payments across new categories

Various transaction types earlier considered to be default in cash are moving to digital payments, for example, over-the-counter railway tickets, toll and transit (ETC Fastag), traffic fines and municipal payments

A network effect from this further helps accelerate the usage and adoption of digital payments

### Supportive institutional environment

The Government has set an aspirational target to achieve 25 billion digital transactions in FY18

Reduction in pricing for payments will make it more affordable (debit card transactions)

Initiatives from NPCI focus on driving new-age payments systems (QR, UPI, Aadhaar Payments)

NHAI’s drive aims to increase usage of ETC through RFID Fastags

### Continued growth of traditional card and wire transfer payments

Credit and debit card transactions (both by value and volume) have increased substantially over the past few years

Wire transfers (NEFT, RTGS, IMPS) have also been on the growth trajectory

Banks have taken several steps toward making transactions seamless, with improvements in channels and user experience for both retail and corporate customers

### Significant adoption of indigenous payment methods

New payment methods such as BharatQR, OR-wallet payments, UPI P2P and P2M payments have scaled up significantly

UPI has seen phenomenal growth over the past one year

Several banks and non-bank players have developed solutions and use-cases around UPI, leading to large-scale adoption

Source: EY Analysis
While these core pillars have helped in the sustenance and development of the payments landscape, demonetization has been a major catalyst coupled with improvement in mobile data accessibility at cheaper tariffs.

For instance, the electronic payment system that involves using Fastags is already rapidly replacing cash at toll plazas. The Government mandate for the inclusion of Fastags in new vehicles has led to an increase in the number of Fastags from 60,000 in December 2016 to more than a million in February 2018. The Government’s smart city mission with a budget allocation of INR2.04 trillion for creating 100 smart cities is also expected to bolster the digital infrastructure in the country and thus create new revenue streams for the payment industry. For instance, an Indian mobile wallet company is partnering with the Bhopal smart city initiative for payments. The tie-up between Bhopal Municipal Corporation and the wallet company will enable residents of Bhopal to pay taxes and bills for utility services such as electricity and water, digitally.

In addition, over the past two years, the point-of-sale (POS) terminal presence has improved substantially, outside the metro and tier I and II cities as well.

Reduced debit card pricing for merchant payments, increase in use of cards for non-cash withdrawal transactions and improving adequacy of POS terminals are healthy signs for sustaining the cashless momentum.

Similarly, UPI has been equally impressive in its adoption, use-cases and transaction numbers. Many new use-cases have come up on UPI such as cab payments, bill payments, P2M and pull-based payments, creating significant traction among customers. Several non-bank players have also promoted UPI significantly to drive adoption.
Demonetization: A catalyst for digital payments growth

Many users transacted at merchant outlets using a debit card in the demonetization phase. The growth has been sustained after the few months and continues to be positive even 12 months since demonetization. For others new payment methods such as UPI, the growth continues to be impressive even on a month-on-month basis.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>10M pre Jan’16 - Oct’16</th>
<th>5M post Nov’16 to Mar’17</th>
<th>Steady state Apr’17-Dec’17</th>
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<tbody>
<tr>
<td>Net new credit cards added per month (’000)</td>
<td>459</td>
<td>500</td>
<td>631</td>
</tr>
<tr>
<td>Avg. monthly spend on credit cards at industry level (INR Bn)</td>
<td>240</td>
<td>305</td>
<td>368</td>
</tr>
<tr>
<td>Avg. monthly transactions on credit cards at industry level (Mn)</td>
<td>77</td>
<td>106</td>
<td>113</td>
</tr>
<tr>
<td>ATS per transaction for credit cards at industry level (INR)</td>
<td>3100</td>
<td>2900</td>
<td>3200</td>
</tr>
<tr>
<td>Avg. monthly spends per credit card at industry level (INR)</td>
<td>9400</td>
<td>10600</td>
<td>11300</td>
</tr>
<tr>
<td>Avg. frequency of use per credit card per month</td>
<td>3.0</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Net new debit cards added per month (Mn)</td>
<td>10.5</td>
<td>4.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Avg. monthly spend on debit cards at industry level (INR Tn)</td>
<td>2.40</td>
<td>1.98</td>
<td>2.69</td>
</tr>
</tbody>
</table>

Source: RBI

While on fundamentals digital payments continue to demonstrate growth, there are several adjacent opportunities that emerge with it. An important one is payments providing an ability to assess the flows for customers and business and do a credit assessment.
Banks have also played a pivotal role in driving digital payments

While the digital payments revolution in India has benefited from enabling technologies, greater government push and proliferation of mobile data, the role of banks cannot be neglected. In the past two years, banks have accelerated their investments in developing payments infrastructure, especially with the steady stream of new entrants increasingly competing directly for customer wallet share. Some of the notable measures include:

### Number of ATMs v/s POS

<table>
<thead>
<tr>
<th></th>
<th>Oct-16</th>
<th>Nov-16</th>
<th>Dec-16</th>
<th>Jan-17</th>
<th>Feb-17</th>
<th>Mar-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>POS machines ('000)</td>
<td>1,512</td>
<td>1,591</td>
<td>1,768</td>
<td>2,016</td>
<td>2,225</td>
<td>2,529</td>
</tr>
<tr>
<td>ATMs ('000)</td>
<td>205</td>
<td>205</td>
<td>206</td>
<td>207</td>
<td>207</td>
<td>208</td>
</tr>
</tbody>
</table>

Source: RBI Database of Indian Economy

### Proximity payments options

- **Tap and go payment mechanisms** have been deployed in India across a number of use cases (toll payments, public transport etc.). In May 2017, an American multinational financial services corporation in collaboration with a private Indian bank launched a proof-of-concept (POC) for contactless toll payments at the Manesar toll plaza of the National Highway Authority of India (NHAI). Other modes of proximity payments are also gaining popularity as a result of a number of changes in the market. Near-field communication (NFC) payments are steadily becoming a common feature, even in budget smartphones, and leading global providers.

### Proximity Payments

Proximity payments can be broadly classified in the following categories:

- **Near Field Communication (NFC) payments**: enable offline merchants to accept payments via contactless cards and mobile payment modes such as Samsung Pay using NFC enabled PoS terminals. Most new terminals are NFC enabled and this is expected to increase NFC transaction volumes.

- **Toll & transit payments**: through smartcards, RFID tokens and mobile applications. A recent government mandate for inclusion of FASTag in new vehicles is expected to provide a boost.

- **Magnetic Secure Transmission**: smartphones emit magnetic signals mimicking a card magnetic strip allowing for cardless payments even at non-NFC PoS terminals.

- **Other key emerging modes for proximity payments**: BharatQR codes, UPI, and Aadhaar enabled payments.

Source: “The battle for the Indian consumer,” EY, October 2017
Launch of Aadhaar Enabled Payment System (AEPS) targeting rural sector: AEPS, which is a payment service offered by the National Payments Corporation of India (NPCI) to banks, is being implemented through special agents in rural areas. Through these micro-ATMs, rural people who have their Aadhaar numbers linked with bank accounts are able to make balance inquiry and deposit and withdraw cash at their doorsteps.

In March 2017, an Indian private bank launched Aadhaar Pay, which is a merchant version of AEPS. Aadhaar Pay, an app that runs on the Android operating system, enables merchants to take cashless payments from customers. The customers in turn are required to give their Aadhaar number, name of the bank (from where the money is to be deducted) and fingerprint for authentication. The Government has also asked banks to enroll around 35 merchants per branch so that they can take cashless payments from customers. Several banks have also adopted or integrated Aadhaar Pay with their own payment system.
Payments is the starting point: Emergence of FinTechs and the scope of alternative lending in India
The financial landscape of India has been transformed by the emergence of FinTech firms. A recent research conducted by EY (EY FinTech Adoption Index 2017) shows that India is ranked second globally in the adoption of FinTech services (at 52%), second only to China (at 69%)14. FinTech adoption in India is astonishingly high – more than half of our sample of Indian consumers claimed to have used more than two FinTech products in the past six months.

Payment services are the most popular among the Indian consumers, who have embraced tech innovations such as mobile wallets and UPI platforms for their day-to-day payment transactions.

However, when it comes to borrowing, a large part of the Indian population continues to rely on primitive borrowing methods such as borrowing from family and friends, chit funds and moneylenders. Unavailable or incomplete credit scores (which are obtained through ineffective means such as credit cards or loan repayment history) deny bank loans to this population segment (consisting mainly of SMEs, students, consumers seeking to consolidate debt and new-to-bank consumers), which accounts for approximately 90% of the market15.

India is ready for a lending revolution, as a low financial literacy rate (estimated at 24%)16 and limited coverage by existing financiers have given rise to the need for simple, transparent and low-cost lending products.

Alternative lending business refers to digital platforms that provide low-cost loans, which are simple to obtain for the large unaddressed market segment in India. These modern alternative lending companies determine the credit worthiness of applicants by using advanced data analytics and innovative data sources. Moreover, the growing volume of digital payments allows these alternative lenders to access many more digital data points for credit risk assessments. As they use digital solutions, the speed of loan disbursement also increases manifold as compared to the traditional methods. The borrowers also have the option to repay the loan through multiple flexible repayment options.

After witnessing a boom in the payment segment, there is large potential for alternative lending in India, which is one of the fastest-growing segments.
FinTech lending marketplace

1. Direct lending
   These are platforms that have a lending license. NBFCs have recently started competing with traditional banks in this segment.

2. Peer-to-peer lending
   Peer-to-peer lenders link individuals willing to lend money with people seeking finance, using online platforms to create connections that would never exist otherwise. Such marketplaces use alternate credit scoring models for risk assessment and underwriting.

3. Market/Comparison places
   Digital marketplaces connect lenders to borrowers. Usually the lenders are banks or financial institutes.

4. Invoice trading
   Invoice trading assists MSMEs that often struggle with working capital and cash flows due to delayed payments. Recently emerged FinTech companies are providing platforms to such MSMEs to sell their invoice or other receivables at a discount for working capital.

5. Crowd Funding
   Crowd funding entails raising finance from a large group of investors. The investors can interact with the investors on the crowd funding platform. This form isn't popular in India.

6. Credit scoring
   Many alternative lending companies have taken up the role to generate credit scores for the millions of consumers who do not have credit scores in India. They do this by using advanced data analytics and innovative data sources.

P2P lending marketplace: Case study

P2P lending in India is growing (India already has ~30 P2P lenders\(^1\)). P2P lending platforms provide an online marketplace for lenders and borrowers in return for a fixed origination fee. P2P platforms use proprietary algorithms and scoring mechanisms to assess the risk of each borrower and provide a recommended “risk-adjusted return” to the lender. The data points used originate from social media accounts and device history and are used to gauge reliability, spending power and likelihood of default of the borrower in place of traditional credit assessment models for which data might not be available. Their differentiators are greater speed and scalability and reduced costs (through efficiencies).

There are two kinds of P2P models: Direct dispersal model and partner-assisted dispersal model. Both are regulated by the RBI.

Direct disbursal model: In this model, the P2P platform directly connects the lenders to the borrowers. Currently in India, this model is focused on the educated urban middle class consumer – who understands the marketplace and can do online transactions.

Basis RBI guidelines, P2P platforms have to maintain nodal/escrow accounts for better monitoring and control. This allows both borrowers and lenders to deposit funds in an escrow account held by the P2P platform, and both disbursements and repayments are routed through these escrow accounts.

Partner-assisted disbursal model: In this model P2P platforms tie-up with a field partner (local NGO or micro financer) to manage customer acquisition, disbursement and collections, for a fee. The P2P platform is primarily responsible for on-boarding lenders and offering matching services. This model is focused on unsecured loans (micro-finance) to low-income households ranging from US$100 to US$500.

Source: EY Analysis
Credit scoring marketplace: An example

There is a growing demand for alternative credit scoring methods. Traditional methods used mainly by the banking sector determine the credit worthiness of an individual by their history of loan repayments and credit cards. This method denies an estimated 90% of individuals from access to credit.

The new credit scoring models, however, use data points obtained from social sites, device data, digital footprints, social media accounts and bank account statements. Proprietary algorithms are then used to assess the customer's ability and willingness to pay. The underwriting decision is then taken by a rule-based decision engine.

The “pay later” anti-wallet

A Mumbai based FinTech firm provides customers with credit at no additional cost and a consolidated bill for all their transactions on a fortnightly basis. Customers can use the wallet without needing to top it up or perform multiple card transactions at each point of purchase. The wallet has now partnered with multiple online platforms.

Road ahead for digital lending

According to a World Bank report published in late 2012, over 50 million SMEs in India generate a debt demand of US$520 billion, out of which US$198 billion is not met by banks, NBFCs and FIs. In the consumer lending space, it is estimated that retail loans accounted for US$310 billion in 2014 and the segment is expected to witness a CAGR of 18% to reach US$830 billion by 2020. Going forward, digital or alternative lending offers significant opportunities as it is primarily an untapped market.

Around 50% of the non-banked population is targeted by the Government and progressing toward the goal of financial inclusion, and 160 million accounts have been opened under PMJDY with INR500 billion being targeted to be transferred directly under the Direct Benefit Transfer (DBT) scheme.

Several multinationals have already entered the Indian marketplace in partnership with NBFCs. Together, they have initiated a Seller Lending Program to provide working capital loans to small and medium businesses on an online retail platform. The program offers secured and unsecured loans ranging from INR0.5 million to INR20 million.

Indian banks not far behind

To deal with the outburst of so many new competitors in the lending sector, Indian banks have begun to go digital too. Customers now have high expectations from their banks for a faster, more transparent and quicker loan dispersal. This has led the banks to automate each step of their lending process. A large private bank rolled out Nano Credit – pre-approved, instant and unsecured loans for their customers. Its key features are as follows:

- First-of-its-kind loan product in the country for the urban low-income segment
- Offers unsecured loans of up to INR15,000 per individual by way of a term loan or overdraft
- Quick disbursal within 1–2 hours, easy access to loan amount through a pre-paid card, and withdrawal through any ATM/merchant payment through POS machines
The bank does this through the following steps:

How can banks and FinTech co-exist and complement?

The emergence of FinTechs has had huge implications for incumbent banks. Banks that had become accustomed to the traditional ways of operations have an option of either going alone by upgrading their digital infrastructure and incubating innovative culture internally or growing inorganically through acquisition or collaboration with FinTech companies.

In India, the trend of banks collaborating with FinTech companies is fast catching up especially in areas such as payments, AI and machine learning. The RBI also has backed the growing partnership between banks and FinTech as it believes that it will yield smarter returns for both the parties.

Partnership imperatives and opportunities for banks and FinTech

Source: “The battle for the Indian consumer,” EY, October 2017

Source: EY Analysis
Banks can provide FinTech companies access to a wider customer base, distribution network and data for testing new concepts/ algorithms. Apart from leveraging banks’ brand, FinTech companies can also receive guidance and mentorship from banks in handling regulations and risks. On the other hand, FinTechs provide banks with an option of testing newer technologies in a very short span of time. FinTech companies can also provide access to talent pool and a younger digital savvy customer base.

Engagement model between banks and FinTech

Banks and FinTech companies can engage with each other primarily through the following possible five modes:

**Investment**
- Banks invest their own capital in FinTech start-ups as:
  - Dedicated in-house venture capital or strategic investment arms
  - Independent venture capital funds
  - Investments on their own balance sheet business

**Collaboration**
- Banks enter into various types of arrangements with FinTech companies:
  - Utilizing products or platforms developed by FinTechs (e.g., teaming up with a robo-advice FinTech to offer investment management service)
  - Joint ventures or co-created services (e.g., partnering with FinTech to launch digital marketplace)
  - Collaborating as a network to develop and test new technologies and solutions
  - Referral arrangements between FinTech companies and the bank

**In-house product development**
- Banks are accelerating their in-house development of FinTech products and services. Steps include:
  - Developing a FinTech framework that rewards innovation
  - Selecting an innovative operating model that connects new ideas to business needs while balancing innovation with risk

**M&A**
- Acquiring a FinTech company can increase a bank’s digital footprint and short-cut the development of new technology

**Joint FinTech program**
- Collaborative role with other banks alongside program participants (e.g., VCs, government agencies and program managers)

Source: EY Analysis
### Pros and cons of models of engagement with FinTech firms

<table>
<thead>
<tr>
<th>Engagement</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment</td>
<td>- Early access to innovative solutions</td>
<td>- Right valuation can be challenging</td>
</tr>
<tr>
<td></td>
<td>- Resolves the problem of lack of in-house talent and innovative culture</td>
<td>- Misuse and mishandling of data by third parties</td>
</tr>
<tr>
<td></td>
<td>- Reduces the time-to-market</td>
<td>- Not an exclusive relationship</td>
</tr>
<tr>
<td>Collaboration</td>
<td>- Reconnects with customers without significant time and resource investment</td>
<td>- Potential culture clashes</td>
</tr>
<tr>
<td></td>
<td>- Benefits emerging technology projects such as blockchain</td>
<td>- Challenge of finding a compatible partner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Data security and privacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Not always an exclusive relationship</td>
</tr>
<tr>
<td>In-house product development</td>
<td>- Better control on technology, talent and resources</td>
<td>- Increased time to market</td>
</tr>
<tr>
<td></td>
<td>- Exclusivity</td>
<td>- Challenging given banks’ traditional structures and legacy systems</td>
</tr>
<tr>
<td></td>
<td>- Easily scalable</td>
<td>- Expensive to develop, maintain technology and hire specialists</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>- Rapid route into new markets</td>
<td>- Valuation can be difficult</td>
</tr>
<tr>
<td></td>
<td>- Fast delivery/go-to market</td>
<td>- Difficult to integrate due to cultural differences, which could lead to internal tensions</td>
</tr>
<tr>
<td></td>
<td>- Exclusivity</td>
<td>- Retention of talent</td>
</tr>
<tr>
<td></td>
<td>- New customers at low cost-opportunity to cross sell</td>
<td>- Integrating new solutions into existing systems could accelerate costs</td>
</tr>
<tr>
<td></td>
<td>- Market/product differentiation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Access to talent and innovative culture</td>
<td></td>
</tr>
<tr>
<td>Joint FinTech program</td>
<td>- Flexibility to tailor staff’s level of involvement according to resource capability</td>
<td>- Limited branding opportunities (as these are shared with others)</td>
</tr>
<tr>
<td></td>
<td>- Cost shared with other parties</td>
<td>- Potentially low financial ROI if small minority stakes are shared with others</td>
</tr>
<tr>
<td></td>
<td>- Mentorship, program sponsorship opportunities that provide enhanced FinTech network</td>
<td>- May be viewed as tokenistic</td>
</tr>
</tbody>
</table>

Source: EY Analysis

### Technology and financial inclusion

India has a wide network of institutional credit, with scheduled commercial banks (SCBs) providing significant domestic outreach through 144,001 branches\(^{25}\) (as of FY17). However, despite this wide branch network, the financial services ecosystem still lags in terms of coverage and inclusiveness. Over 40% of the population is not connected to banks and an estimated 90% of small businesses are not linked to formal FIs. However, this grim picture is slowly improving on the back of a number of digital initiatives being undertaken by the Government to drive financial inclusion and direct delivery of benefits\(^{26}\). The doubling of allocation for the Digital India program (total outlay: INR30.7 billion) in Budget 2018 is expected to further bolster digital infrastructure in the country and hence increase financial inclusion\(^{27}\).
Technology as an enabler

In India, technology is playing a pivotal role not only in improving access to finance but also in improving the awareness levels. The evolution of the Aadhaar ecosystem and the increasing penetration of mobile phones in rural India and semi-urban cities are increasing financial inclusion in the country. Further, the JAM (Jan Dhan-Aadhaar-Mobile) Trinity policy involving the linking of PMJDY accounts with the Aadhaar ecosystem and mobile networks has enabled the Government to make direct transfers of INR740 billion to the financial accounts of 350 million beneficiaries annually. Also, technologies such as micro-ATMs and tab banking have helped bank agents (also known as Bank Mitra) in bringing banking to the doorsteps of the poor in the remotest parts of the country. These micro-ATMs even support Rupay cards provided to all Jan Dhan account holders and have hence befitted a large section of the underprivileged society.

In addition, the increasing rate of adoption of smartphones on the back of rapidly declining prices has encouraged mobile network operators to bring high-speed data and mobile networks to remote areas, providing real-time connectivity and access to people. As a result, mobile internet is fast picking up in rural India. According to a report from the Internet and Mobile Association of India and IMRB International, 92% of rural users prefer mobile for accessing the internet. The growth of mobile banking in rural areas is expected to continue on the back of growing popularity of UPI-Aadhaar enabled apps, which will further contribute to financial inclusion.

The FinTech companies in India are also playing their part in increasing financial inclusion in areas such as microfinance, digital payments, credit scoring and remittances. The availability of digital identities, in the form of Aadhaar IDs, has simplified procedures such as e-KYC and retrieval of credit information. Peer-to-peer lending and microfinance are now increasingly addressing the funding needs of MSMEs and micro enterprises.

VC-Backed FinTech deals in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding (US$ m)</th>
<th>Deals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>2013</td>
<td>20</td>
<td>38</td>
</tr>
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<td>2014</td>
<td>30</td>
<td>163</td>
</tr>
<tr>
<td>2015</td>
<td>47</td>
<td>1,580</td>
</tr>
<tr>
<td>2016</td>
<td>50</td>
<td>388</td>
</tr>
</tbody>
</table>

Source: “The battle for the Indian consumer,” EY, October 2017

Popular areas by funding (US$m)

<table>
<thead>
<tr>
<th>Area</th>
<th>Funding (US$m)</th>
</tr>
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<tbody>
<tr>
<td>Mobile payments</td>
<td>US$1.3b</td>
</tr>
<tr>
<td>Payments</td>
<td>360</td>
</tr>
<tr>
<td>Lending</td>
<td>345</td>
</tr>
<tr>
<td>Banking Tech</td>
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<tr>
<td>Insurance Tech</td>
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<tr>
<td>Software for IIs</td>
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</tr>
<tr>
<td>Investment Tech</td>
<td>47</td>
</tr>
<tr>
<td>Consumer finance</td>
<td>37</td>
</tr>
<tr>
<td>Enterprise finance</td>
<td>8</td>
</tr>
<tr>
<td>Forex</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Annual Reports, Telecom Regulatory Authority of India

In addition, the increasing rate of adoption of smartphones on the back of rapidly declining prices has encouraged mobile network operators to bring high-speed data and mobile networks to remote areas, providing real-time connectivity and access to people. As a result, mobile internet is fast picking up in rural India. According to a report from the Internet and Mobile Association of India and IMRB International, 92% of rural users prefer mobile for accessing the internet. The growth of mobile banking in rural areas is expected to continue on the back of growing popularity of UPI-Aadhaar enabled apps, which will further contribute to financial inclusion.

The FinTech companies in India are also playing their part in increasing financial inclusion in areas such as microfinance, digital payments, credit scoring and remittances. The availability of digital identities, in the form of Aadhaar IDs, has simplified procedures such as e-KYC and retrieval of credit information. Peer-to-peer lending and microfinance are now increasingly addressing the funding needs of MSMEs and micro enterprises.

VC-Backed FinTech deals in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding (US$ m)</th>
<th>Deals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>2013</td>
<td>20</td>
<td>38</td>
</tr>
<tr>
<td>2014</td>
<td>30</td>
<td>163</td>
</tr>
<tr>
<td>2015</td>
<td>47</td>
<td>1,580</td>
</tr>
<tr>
<td>2016</td>
<td>50</td>
<td>388</td>
</tr>
</tbody>
</table>

Source: “The battle for the Indian consumer,” EY, October 2017

India can also take cues from other countries such as Kenya that have successfully leveraged FinTech in increasing financial inclusion.
Conclusion

The Indian banking sector’s tryst with digitalization has got a new meaning in the post demonetization era. The banks which had got accustomed to traditional ways of banking are now adopting emerging technologies such as RPA, cloud, AI and blockchain to cut down their operating expenses and improve efficiency. AI in particular is not only being deployed by banks in serving routine customer queries but also in offering deep learning based cognitive solutions. One of the major drivers of these technologies in India is the growing popularity of fintech firms. India is ranked second globally in the adoption of FinTech services second only to China.

Fintech firms have been particularly active in the Payments space in India. Factors such as increasing smartphone penetration, reduction in the prices of telecom data use, growth in digital commerce and institutional support have bolstered the payments industry in India. Growth in the adoption of digital payments has also been supported by improvement in the supporting infrastructure driven by success of Aadhaar and Unified Payments Interface (UPI). Apart from the payments space, the alternative market lending space is also expected to attract fintech players as demand for simple, transparent and low-cost lending products goes up.

The steady stream of FinTechs in India is also ensuring ample opportunities for collaboration between banks and Fintech firms. The collaboration between fintech and banks is expected to benefit both the partners due to complementary set of strengths and weaknesses. Fintech firms allows banks to test the newer technologies in a very short span of time. On the other hand, banks can provide FinTech companies access to a wider customer base, distribution network and data for testing new concepts/algorithms.

There is no doubt that recent push towards digitalization is rapidly influencing the traditional banking models. However, it has also exposed the institutions to increasing cybersecurity threats and vulnerabilities. The banks are increasingly looking at emerging technologies such as blockchain and analytics in creating an active defense mechanism against cybercrimes.
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Acknowledgements

For more details please contact

Abizer Diwanji
Partner & Leader - Financial Services, EY
Email: abizer.diwanji@in.ey.com

Rohan Sachdev
Global Insurance Emerging Markets Leader,
Partner & Leader - FS Advisory Services, EY
Email: rohan.sachdev@in.ey.com

Mahesh Makhija
Partner - Financial Services, EY
Email: Mahesh.makhija@in.ey.com

Nilesh Naker
Partner - Financial Services, EY
Email: nilesh.naker@in.ey.com

EY Team:

Digital:
Sachin Sheth
Partner - Financial Service, EY
Email: sachin.seth@in.ey.com

Sushil Zaregaonkar
Senior Manager - Business Advisory Services, EY
Email: Sushil.Zaregaonkar@in.ey.com

Payments:
Fali Hodiwala
Partner - Advisory Services, EY,
Email: Fali.Hodiwala@in.ey.com

Gauravgajanan M Kayal
Senior Manager - Business Advisory Services, EY
Email: Gaurav.Kayal@in.ey.com

Cybersecurity:
Kartik Shinde
Partner - Advisory Services, Cybersecurity, EY
Email: Kartik.Shinde@in.ey.com

Venkatesh Kulkarni
Associate Partner - Advisory Services, EY
Email: venkatesh.kulkarni@in.ey.com

Analytics:
Jasjeet Singh
Partner - Financial Service, EY
Email: jasjeet.singh@in.ey.com

Vaibhav Gupta
Director - Financial Service, EY
Email: Vaibhav13.Gupta@in.ey.com

Knowledge:
Parag Jani
Manager - Financial Service, EY
Email: parag.jani@in.ey.com

Other Contributors:

Brandiing, Marketing and communication: Kirti Shenoi
Editorial: Tanmay Mathur

IBA Team:

Smt. Usha Ananthasubramanian
Chairman, IBA & MD & CEO, Allahabad Bank

Shri M O Rego: Deputy
Chairman, IBA & MD & CEO, Syndicate Bank

Shri Shyam Srinivasan
Deputy Chairman, IBA & MD & CEO, The Federal Bank Ltd.

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