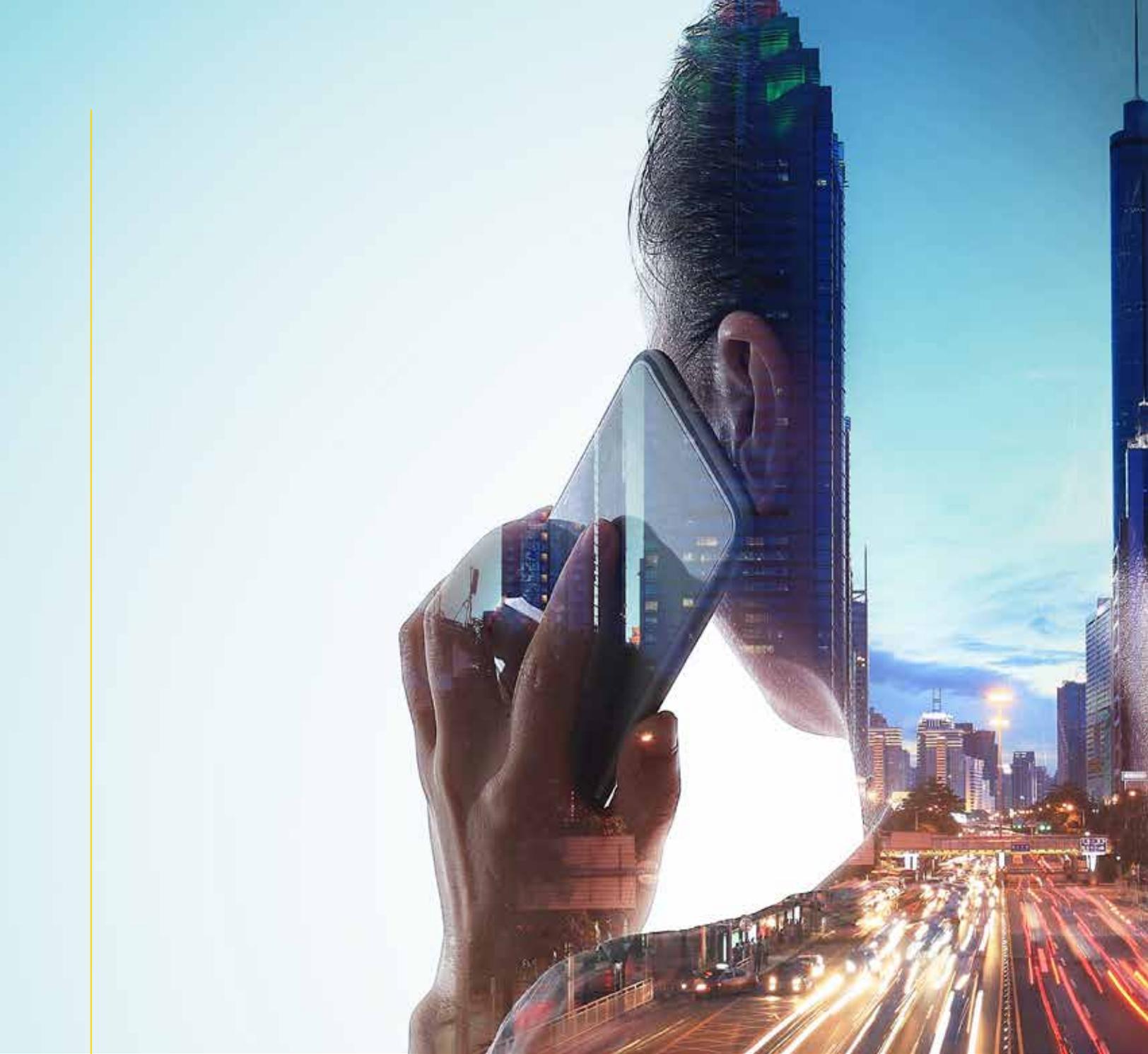




The digital bank: tech innovations driving change at US banks



The digital bank: tech innovations driving change at US banks



Table of contents

01

Executive summary

Page 1

02

Technological innovations driving change

Page 5

03

Digital-era banks

Page 9

04

Value and benefits of innovation

Page 15

05

Regulatory considerations

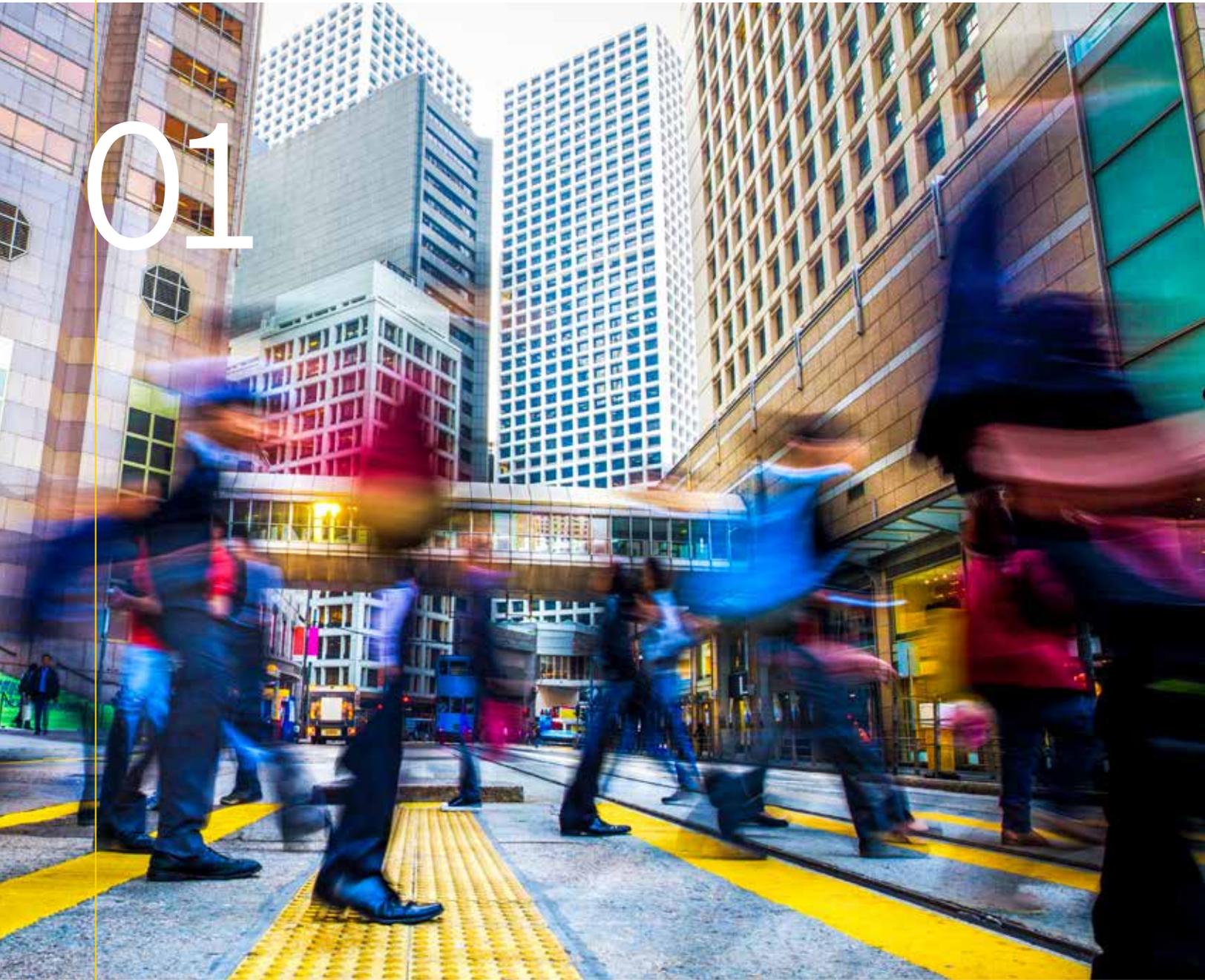
Page 25

06

The path forward

Page 29

01



Executive summary

This paper describes how recent technological innovations are transforming banks by creating new products and services, increasing access for consumers, strengthening bank controls and driving down costs. At the same time, technological innovations are also disrupting existing business models by intensifying competition, squeezing margins and changing the nature of customer interactions. By collectively embracing these opportunities, banks, regulators and policymakers can create a safer and more effective banking system that can meet the needs of customers and stakeholders in a digital era.

New technologies and the pace of innovation are reshaping bank business and operating models, and influencing the shape and dynamics of the broader financial services ecosystem. Early adopters of new technologies stand to gain a significant advantage in relation to competitors. Other banks may choose to pursue a more gradual approach for strategic purposes – delaying adoption of new technologies until they have been proven by competitors.

Banks have adopted new technologies to varying degrees. Most banks use elements of cloud computing, a key technology that reduces the costs of rolling out and scaling the online and mobile banking capabilities that digital-era consumers expect. Many institutions are also gradually implementing elements of big data and analytics as well as robotic process automation to strengthen controls and reduce costs. Other technologies, such as distributed ledger technology and the Internet of Things, are only in the early stages of commercialization by banks. Collectively, these technologies provide opportunities to:

- ▶ **Better serve customers and increase access**
- ▶ **Provide enhanced insights both from a risk management and customer service perspective**
- ▶ **Increase agility and speed to market**
- ▶ **Strengthen operations and controls**
- ▶ **Transform institutional cost structures**

Because banks are critical financial intermediaries, responsible adoption of technological innovations (i.e., innovation undertaken with appropriate oversight and controls) can also enhance the stability of the financial system and further economic growth.

Banks have a long and successful track record of safely implementing technological innovations. Nevertheless, as regulated entities, their ability to move forward on new technological innovations at the market's pace can be directly affected by the level and nature of regulatory requirements and supervisory expectations. Historically, regulators have allowed banks to develop and deploy new technologies when undertaken with proper oversight and controls. Regulators have also adapted regulatory requirements and supervisory expectations as needed to enable banks to practically operationalize and capitalize on innovations.

Section 01

Executive summary

The current regulatory framework outlines a broad range of requirements and expectations that apply to banking activities more generally, including technological innovation. It is also important to recognize the significant, ongoing progress made by the banking sector following the financial crisis – banks are now safer and sounder, the financial system is more stable and consumers are better protected. Moreover, policymakers and regulators continue to actively monitor developments within the banking sector so that emerging, potential risks are appropriately addressed.

To maintain the progress achieved to date, policymakers and regulators need to confirm that key players within the broader financial services ecosystem operate in a safe and sound fashion and comply with consumer protection, AML/KYC and other applicable requirements – particularly if they engage in bank-like activities (e.g., payments, lending). Additionally, as new technologies continue to emerge and mature, further clarifications to the existing regulatory framework may be warranted to enable implementation of more nascent innovations in a timely, safe and efficient manner.

Further, policymakers, regulators and industry should expand their outreach and enhance coordination with one another both domestically and internationally, not only to keep abreast of technological developments, but also to provide industry with a clear and consistent message concerning requirements and expectations. This will provide industry with the additional clarity and confidence needed to move forward on investments in emerging – and potentially much more transformative and beneficial – technologies that are consistent with regulatory objectives.

New technologies and the pace of innovation are reshaping bank business and operating models, and influencing the shape and dynamics of the broader financial services ecosystem.



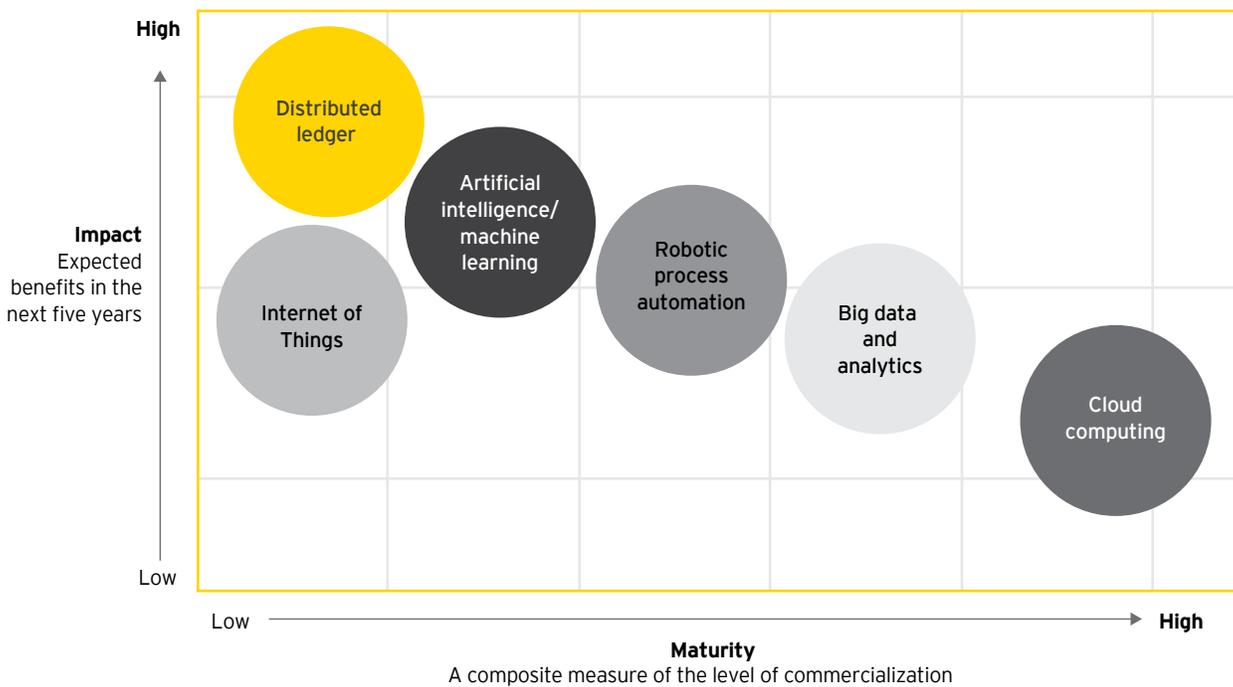
02



Technological innovations driving change

Banks are undergoing a fundamental transformation resulting from a range of technological innovations. Six technologies are currently most prominent in financial innovation: cloud computing, big data and analytics, artificial intelligence (AI)/machine learning (ML), robotic process automation (RPA), distributed ledger technology (DLT) and the Internet of Things. These technologies are at different stages of maturity, and some have the potential to significantly change the industry in the coming years.

Figure 1: Diagram of the comparative maturity and impact of each technology



Section 02

Technological innovations driving change

Cloud computing. Cloud computing is an internet-based model for delivering information technology (IT) services. It enables IT resources to be centrally pooled, rapidly provisioned and quickly redeployed. Banks are leveraging cloud computing to overcome the scaling limitations of legacy infrastructure and to gain access to advanced technologies developed by other service providers in a cost-effective manner. Within the industry, early adoption of cloud technology has focused on infrastructure and vendor-based software services. However, use of cloud technologies to improve front-office business processes and core functions has taken hold more slowly to minimize data security, privacy and operational risks.

Big data and analytics. At its core, big data refers to technologies that enable the sourcing, aggregation and analysis of large amounts of data – whether structured (e.g., FICO scores), multi-structured (e.g., sensor data¹) or unstructured (e.g., text, email, video). Analytics refers to the discovery, interpretation and communication of meaningful patterns within data. These technologies are underpinned by a series of integrated disciplines, including applied statistics and mathematics, operations research and computer programming. Some elements of big data and analytics are well known and broadly adopted within financial services, such as the use of machine learning in algorithmic trading and natural language processing in customer service call centers. However, newer and more advanced uses of analytics to predict trends and prescribe actions in areas such as risk management are in the early stages of adoption.

Artificial intelligence/machine learning. Artificial intelligence (AI)/ machine learning (ML) allows computers to learn from data with the goal of predicting and/or making decisions beyond human scale. Artificial intelligence is a form of advanced analytics that seeks to emulate human traits like learning, understanding complex content, developing proprietary conclusions and engaging in natural dialogue. AI can replicate human cognitive performance (e.g., cognitive computing) or augment and extend human productivity in the execution of non-routine tasks. The technology is currently being deployed in a targeted manner throughout the financial services industry, primarily in risk and compliance areas such as trade surveillance.

Machine learning is a type of artificial intelligence that automates analytical model building, enabling computers to learn without explicit programming when exposed to new data. Machine learning consists of two distinct techniques, supervised and unsupervised. Supervised machine learning can predict future events based on a known target result and historical data, such as trader surveillance. Unsupervised learning identifies patterns from data without hints of a target result, such as fraud detection.

Robotic process automation. RPA refers to the automation of routine processes to capture and interpret existing means for processing a transaction, manipulating data, triggering responses or communicating with other digital systems. This discipline has progressed from the enhancement of manual, repetitive tasks to the automation of intelligent processes and augmentation of human resources, allowing for faster, more accurate and continuous processing.

Section 02

Technological innovations driving change

Distributed ledger technology.

Often referred to as “blockchain” technology, DLT is a shared database, distributed across a network (of individuals, organizations or devices) that maintains 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 recorded on the ledger cannot be changed. Distributed ledger technology was initially showcased through bitcoin, by enabling online, peer-to-peer exchange of virtual currency. The development of smart contracts (i.e., business logic embedded in a distributed ledger) has introduced a new dimension of functionality. Banks are currently evaluating distributed ledger and smart contract technology for a variety of use cases, including master data management, asset/securities issuance and servicing, collateral management and trade/contract validation.

Internet of Things. The Internet of Things (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. This allows the behavior and other properties of people and things to be measured and tracked. IoT has been widely adopted by industries with both physical products (e.g., phones, cars, electric utilities) and services (e.g., health care monitoring, home security services). However, within banks, IoT is still in its early stages, with adopters focusing on how to (i) use it to augment financial services associated with other industries (e.g., mobile banking and payments) and (ii) apply it to digital product and service development.



03



Digital-era banks

Historically, the banking industry has evolved both alongside and as the result of broader political, economic, legal/regulatory, social and technological forces. While the recent financial crisis and resulting regulatory reforms continue to play an important role in reshaping the structure and operating models of banks and markets more broadly, technology-driven innovation will lead to much broader, deeper and more rapid transformations in future years.

Technology-driven innovation is compelling change within the banking industry both internally (i.e., bank-specific) and externally (i.e., industry-specific). To respond to changing customer expectations and new technological innovations, banks began with a focus on digital experience capabilities, including web, mobile and social. As digital capabilities mature, new technologies emerge and customer expectations continue to evolve, banks are extending their transformation efforts from digitizing narrowly targeted functions to the broader digitization of the enterprise. These changes are resulting in expanded financial inclusion, improved internal operations and transformations to the banking value chain.

A Increase financial inclusion

According to the Federal Deposit Insurance Corporation (FDIC), roughly 92 million people in the US are either under- or unbanked,² meaning they have limited or no access to basic financial products and services, in part due to their proximity to physical branch locations. Technological innovations and partnerships with nonbank entities are helping banks to remove or mitigate these barriers³ by reducing the overall reliance on brick-and-mortar access channels. For example, regional and community banks are collaborating with new entrants to provide services via mobile-only channels.

B Improve internal operations

As noted, banks initially focused on adopting individual technologies to drive change within narrow and specifically targeted functions (e.g., implementing RPA to automate documentation processes to improve the speed and accuracy of regulatory reporting). However, as technologies continue to evolve and become increasingly interoperable, banks are integrating multiple innovations to precipitate enterprise-wide transformation or digitization as depicted in the following graph. This includes overhauling some of the banking industry's most challenging and resource-intensive processes. For example, RPA and analytics are being used to streamline anti-money laundering/know your customer (AML/KYC) functions and to integrate them more effectively within the broader risk management framework.

Section 03

Digital-era banks

C Transform the bank value chain

Externally, nonbank entities and other technology providers continue to enter the banking ecosystem. The growing prominence of such entities is transforming the bank value chain and hastening the digitization of the enterprise. Banks are now “internalizing,” or integrating nonbank entities within their business and operating models, to access new customers and markets, while also “externalizing” nontraditional business functions to third-party service providers or utilities to generate cost savings and increase focus on core services.

New technologies are allowing banks to reexamine their business and operating models and determine which functions and capabilities should be retained internally vs. obtained externally. Banks are able to benefit from technological advances made by nonbanks in several key areas (e.g., customer reporting, risk analytics as a service, blockchain) by entering into strategic partnerships with these entities. For example, certain banks are collaborating with nonbank entities to leverage their lending platforms to process small business loan applications more rapidly and efficiently.⁴

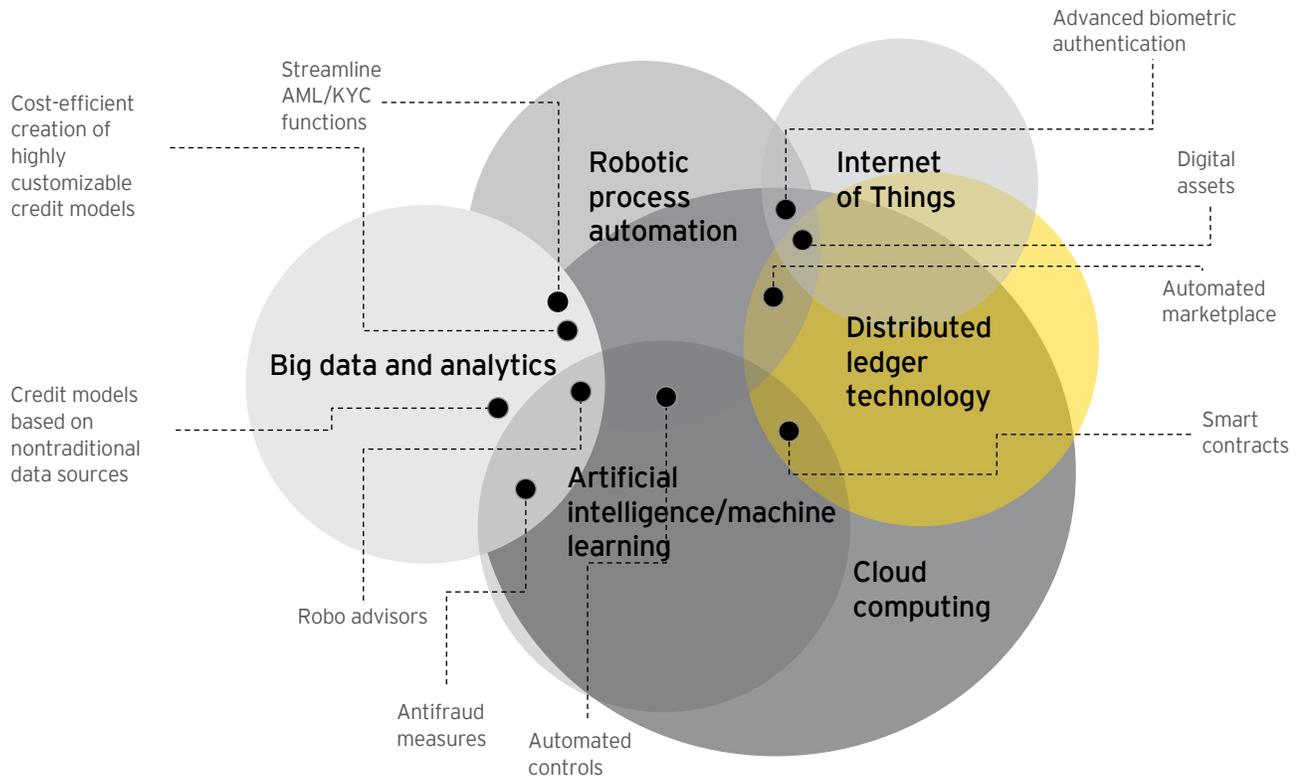
Technological innovations are also enabling banks to virtualize more of their banking operations and shift non-critical functions (e.g., managed treasury and cash services, white label call centers) to business partners – allowing firms to increase their focus on core services and improve efficiency, while maintaining robust oversight and controls.

Last, new technologies are also enabling the centralization of certain operational functions into industry-wide utilities, improving broader market efficiency and resiliency. This includes potential utilities for KYC validation, reference data management and other non-differentiated services.

Section 03

Digital-era banks

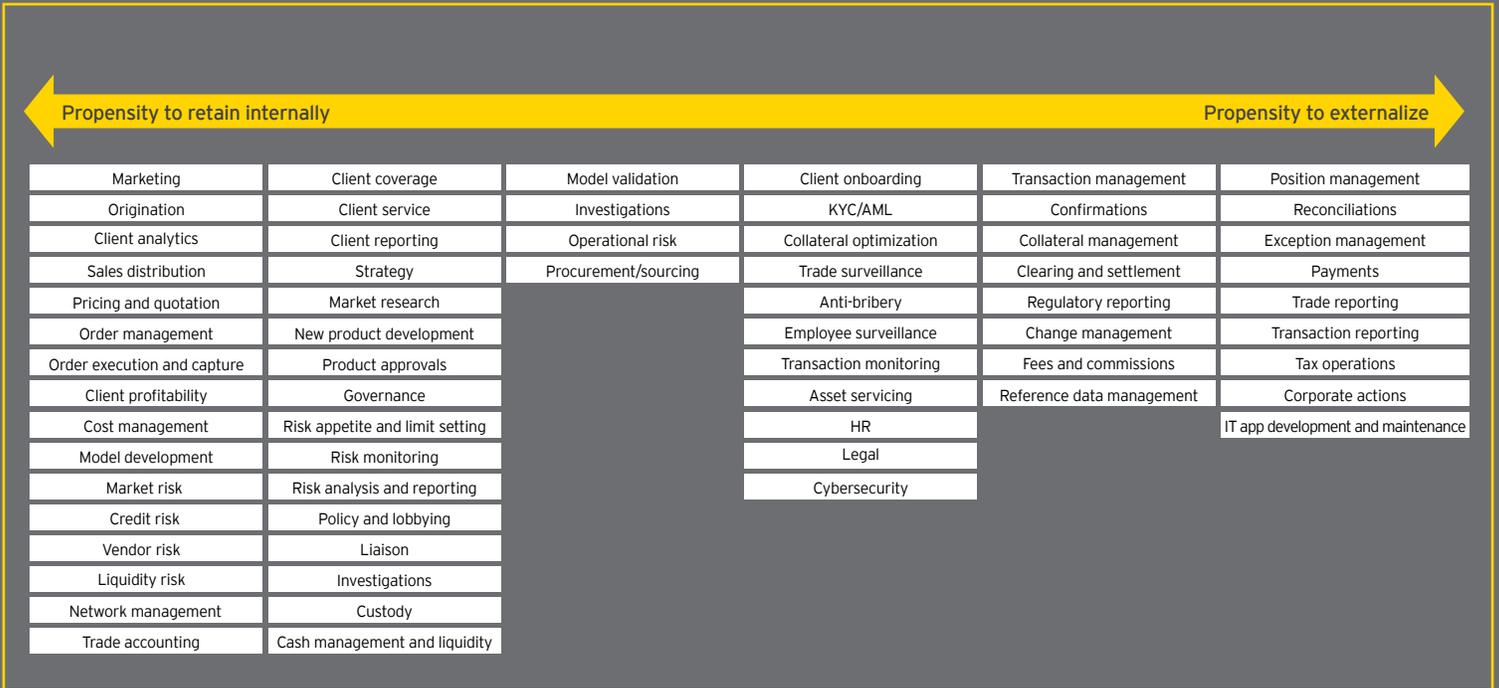
Figure 2: Example use cases resulting from combining multiple emerging technologies



Section 03

Digital-era banks

Figure 3: The externalization spectrum



As digital capabilities mature, new technologies emerge and customer expectations continue to evolve, banks are extending their transformation efforts from digitizing narrowly targeted functions to the broader digitization of the enterprise.

04



Value and benefits of innovation

Digital bank business models combine frictionless user experiences, deep analytics, scalable cloud-based platforms and agile transformation methodologies to achieve customer centricity, efficiency, resiliency and stability. Individual technologies offer distinct benefits to banks and customers. Nevertheless, it is the convergence (i.e., interoperability and integration) of these technologies that drives enterprise-wide and industry-wide transformation. Leveraging these technologies enables banks to deliver/access value in five key areas:

- ▶ **Better serve customers and increase access**
- ▶ **Provide enhanced insights both from a risk management and customer service perspective**
- ▶ **Increase agility and speed to market**
- ▶ **Strengthen operations and controls**
- ▶ **Transform institutional cost structures**

A Better serve customers and increase access

Customer expectations of what “great” service looks like are often shaped by their “single best user experiences.”⁵ The optionality, transparency and affordability of products and services offered by prominent digital-era companies have set a new baseline for banking customers’ expectations of convenience, simplicity and customer engagement. New technologies are enabling banks to minimize or even remove operational frictions associated with client interactions. Banks are expanding access to products and services through customer-preferred channels and significantly reducing/eliminating the intervention required to complete core banking services.

i. Enable access to core banking services through digital channels

New technologies and the digitization of core banking functions are helping to reduce reliance on brick-and-mortar bank access channels. By technologically enabling processes such as check deposit through phone, peer-to-peer funds transfer and electronic payment capabilities, banks are able to offer access to their products and services regardless of an individual’s proximity to a bank branch.

Overcome geographic limitations

Mobile phone-based banking and other money transfer and financing services are expanding access to financial services.

More self-service

Digital transformations (i.e., reengineered and automated business processes) are enhancing customer experience (i.e., customers can receive tailored services, access preferred channels, transact securely).

Section 04

Value and benefits of innovation

ii. Expand access to additional financial products and services, and create innovative new products

New entrants to the banking ecosystem are demonstrating how customer access to banking products and services can be expanded through the use of emerging technologies. Examples of these new product innovations are seen in wealth and asset management, peer-to-peer lending and payments. The proliferation of mobile based access and advances in technologies such as big data and analytics, RPA and AI, is also enabling banks to create new products to satisfy unmet customer needs. In particular, expanded data sources (e.g. customer-specific data sets) and new credit models leveraging advances in analytics are expanding access to credit.

Expand access to credit

Small-to-medium enterprises (SMEs) are also benefiting from increased access to credit as the result of improved credit scoring models that leverage new data sets (e.g., accounts payable, accounts receivable, utility bills etc.) and analytics, which enable refined segmentation (i.e., identification of key attributes). IoT is also enabling banks to reduce credit risk through real-time access to data on SME operations and financials.

Broaden participation in capital markets

Robo advisors educate investors and make investing more accessible and affordable. Digital crowdsourcing marketplaces enable people to buy partial shares and identify multiple loan guarantors.

Value and benefits of innovation

B Provide enhanced insights both from a risk management and customer service perspective

Over the past decade, the exponential growth in publicly available consumer and market data has fueled the development of new technologies, including big data and analytics, natural language processing and machine learning. These technologies are enabling banks to analyze and develop insights about their customers and market trends through the collection and integration of customer and IoT interaction information (e.g., social media chatter and other data sources that customers have “opted in” to provide). The benefits of these innovations include: (i) increased transparency for customers (e.g., product terms and pricing) and (ii) improved institutional risk management.

Crowdsourced intelligence

Big data is creating better-informed customers by aggregating information about financial services providers (e.g., banks), products (e.g., credit cards, bank accounts) and services (e.g., best customer service).

Informed customer

Advanced analytics and RPA are enabling banks to provide customers with tailored product assessments, which allows customers to identify products that meet their needs.

i. Increased product terms and pricing transparency

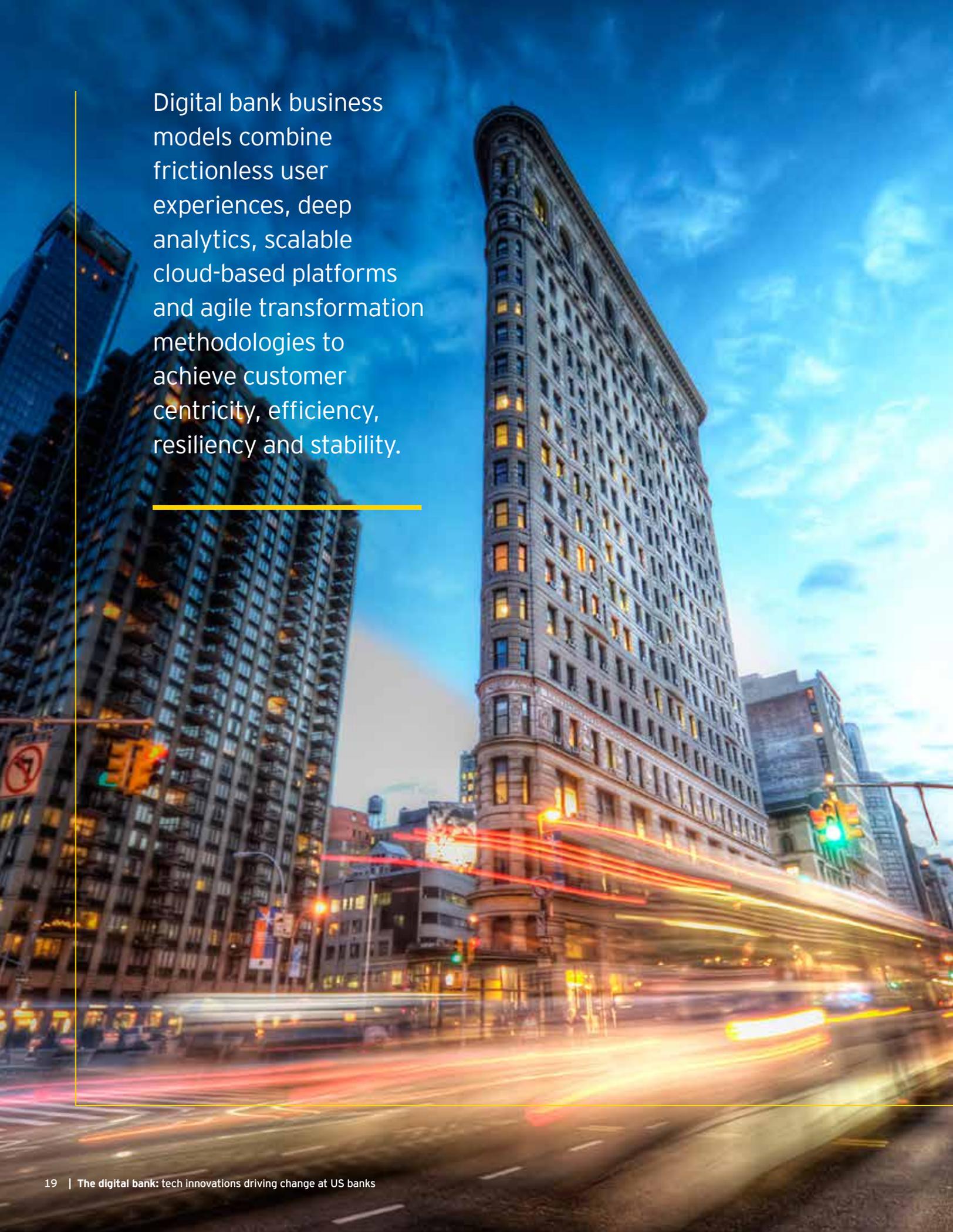
Digital business transformations targeted at enhancing customer experiences (e.g., online banking) are also increasing the transparency of financial products and services (e.g., pricing). Additionally, web-based companies (e.g., digital blogs, information aggregators) are also leveraging bank websites and other sources of financial product comparison data (e.g., bankrate.com) to increase market transparency.⁶ The resulting insights are improving the consumer decision-making process, and increasing broader market efficiency.

Technology-enhanced decision-making

Banks are currently exploring nontraditional data sets (satellite imagery for crop estimates, thermal imaging for measuring oil and fuel reserves, traditional news, social media, etc.) as well as IoT and other new, technology-derived data sources to improve risk assessments (e.g., market and credit risk) and enhance risk management more broadly.

ii. Improve risk management

Machine learning and advanced analytics are enhancing risk monitoring, controls and risk mitigation across the banking industry. Banks are able to leverage expanded internal and market data and advanced analytics to better understand key customer and financial transaction related risk factors. Additionally, incorporating RPA enables banks to inspect transactions on a real time basis and identify those that require further validation and review. As a result of these technological innovations, banks are now able to detect fraud closer to real time and to do so a cost-efficient manner with minimal disruption to the client.⁷



Digital bank business models combine frictionless user experiences, deep analytics, scalable cloud-based platforms and agile transformation methodologies to achieve customer centricity, efficiency, resiliency and stability.

Section 04

Value and benefits of innovation

C Increase agility and speed to market

Ongoing adoption of digital-era technologies has accelerated the pace of change within the banking industry and beyond. New entrants to the banking ecosystem are rapidly developing and demonstrating the feasibility of digitally enabled end-to-end business models. Technological innovations are expediting the transformation of bank technologies and enterprise architecture, enabling banks to (i) configure technology and operations for business agility and (ii) establish digitally enabled business models that are more responsive to changing customer, market and regulatory dynamics.

i. Technology and operations configured for business agility

Nonbank entities; start-ups; and large, established technology companies have demonstrated that digital infrastructure and platforms have the potential to meet stringent, technical resiliency and stability requirements (e.g., systems are able to continuously update while full-time availability is maintained). Leading technology companies have even commercialized their digital platforms to become public service providers. Adopting and/or integrating digital platforms within existing infrastructure enables banks to accelerate resource provisioning, achieve scalability and preserve development agility for business and IT resources to drive the business forward in a controlled and resilient manner.

ii. Digital business models that are more responsive to changing customer, market and regulatory dynamics

The shift toward digital platforms allows banks to interact more closely with customers, and quickly design and deliver relevant services. Digitizing end-to-end business processes further enables banks to achieve scale and become more efficient, resilient and transparent. As a result, banks are better able to quickly respond to changing customer needs, market dynamics and regulatory expectations. New products and services can be quickly launched, offerings rapidly scaled, existing features and capabilities enhanced, controls embedded and processes measured.⁸

Customers can collaborate with banks to rapidly obtain relevant products and services.

Web chat	Crowdsource attributes	Rapid product approval	Easy/fast sign-up
Secure social community platforms built on public cloud infrastructure promote and enhance business-to-customer dialogue and communication via blogs, discussion boards and voting/polling.		RPA analytics enable banks to evaluate transaction data and community activity for information on customer needs, which can then be leveraged to create relevant financial products and services for customers.	

Digitally enabled business models can be configured for rapid growth, customer adoption and interoperability.

Digital banking providers	New entrants
Digitally enabled providers can scale their offerings as customers and transaction volumes grow. For example, robotics and analytics minimize manual processes, allowing firms to efficiently process documentation related to customer onboarding and servicing, loan applications, etc.	

Section 04

Value and benefits of innovation

D Strengthen operations and controls

Digital business transformations designed to enhance the customer experience require the re-engineering, streamlining and automation of business processes. These transformational efforts, and the underlying technologies used to re-engineer said processes, can also be leveraged to strengthen institutional operations and controls.

For example, RPA-enabled digitization of manual processes can reduce the cost to execute and increase the quality and consistency of process execution. When combined with analytics, RPA also enables improved monitoring. Ultimately, integrating RPA and analytics across enterprise-wide processes allows banks to achieve stronger and more efficient operations and can help achieve more robust control frameworks.

Mitigate or prevent instances of identity theft, fraud and cyber attacks

Device security

Smart network devices can identify and report attacks to security companies and manufacturers, allowing associated devices and networks to be protected from infiltration.

Biometric authentication

Identity and access management coupled with IoT enable bank managers and security officers to receive automated alerts about suspicious customer activity to protect against identity theft and fraud.

Voice recognition

Voice recognition and analytics enable real-time automated identification of suspected fraudsters, preventing repeat offenders from receiving services over the phone.

Data analytics

Analytics monitor patterns of normal activity (consumer spending, intercompany data packet transmissions, etc.) and both detect and alert users to discrepancies – reducing fraud and improving risk management.

Improve operational efficiency and transparency

Digital surveillance platforms embedded with natural language processing offer cost-efficient and effective solutions for monitoring various communication mediums (email, voice, text, etc.) that were previously difficult to examine. Such technology could be used to detect and prevent potential market manipulation by traders.

RPA can augment the sourcing, transformation and loading of AML/KYC data for monitoring and reporting purposes, improving both operational efficiency and compliance with regulatory requirements.

Enhance institutional and market efficiency and resiliency

Banks and financial market utilities are currently evaluating the use of DLT to potentially increase efficiencies, better manage risk, and/or standardize intercompany processes. In addition to the trading of financial instruments, other areas of development include the creation of KYC utilities to streamline/consolidate the customer verification process for the banking industry as a whole, and supply chain management – particularly in relation to trade finance. These developments could further reduce costs, improve compliance and risk management, and enhance the ability of banks to serve customers. Additionally, DLT's potential to provide secure, tamper-proof digital records, offers the prospect of enhanced operational resiliency for both banks and broader financial markets as cybersecurity concerns continue to grow.

Value and benefits of innovation

E Transform institutional cost structures

Cost and margin discipline continue to be key factors in a bank's strategic decision-making, particularly given the slow economic growth environment. Banks can achieve these objectives by leveraging technological innovations to eliminate costly and inefficient legacy technologies and optimize business processes. Specifically, new technologies can (i) improve bank cost efficiency, (ii) reduce compliance costs and (iii) eliminate out-of-date processes.

i. Improve bank cost efficiency

Digital-era technology companies such as Amazon, Google and Microsoft have leveraged their scale and expertise to build low-cost infrastructure platforms with advanced capabilities. The commercialization of such platforms and capabilities has formed the technical foundation upon which many nonbank entities have entered the financial services ecosystem.

Digital technologies are helping banks to move toward more modern, sophisticated, scalable and cost-effective platforms. RPA and analytics are being used to drive significant and sustainable productivity enhancements through automation.⁹ Today, banks are evaluating and adopting more advanced forms of cloud computing and RPA to eliminate stranded costs, autonomously provide IT services and drive down broader operating costs.

Reduce IT costs of production through simplification, modernization and automation

- Technology drives down margin costs by allowing banks to simplify their technological footprint, reducing stranded cost and increasing productivity.
- Modern sensor technologies and analytics (e.g., network monitoring solutions) enable banks to better process measurement and predictability to drive continuous cost improvement.
- Automated services such as on-demand cloud computing reduce IT support costs by improving the efficiency of IT provisioning, reducing time to deploy functionality and supporting enterprise-wide consistency.

Reduce operational costs through upgraded technology and technology-augmented capabilities

- Machines are now able to facilitate business processes (e.g., automated payments) and address customer and employee questions (e.g., customer service). These advancements, which result from a contextualized understanding of language, efficient query matching and knowledge-based search, are reducing the cost to serve.

Section 04

Value and benefits of innovation

ii. Reduce the cost of compliance

RPA technologies are enabling the automation of manually intensive and repetitive compliance processes, resulting in quality improvements, 24/7 productivity and increased cost efficiencies. Early adoption of RPA-focused operational processes includes data movement (i.e., improving the ability to effectively source, transform and load data for all forms of uses from reporting to analytics). Advancements in analytics and AI are extending the automation benefits of RPA to intelligent tasks and augmenting human effort.

Reduce cost of compliance and regulatory reporting

- Cloud-based utilities streamline access to large volumes of data and advanced pattern recognition capabilities (i.e., analytics) to rapidly identify inappropriate dealings (i.e., lead to the discovery of money laundering) and speed up KYC processes.
- The logic of regulations and policies can be interpreted by machines to enable: proactive compliance oversight; risk management analysis, tracking and reporting; identification of violations; and remediation of workflow management processes.

iii. Eliminate processes that are no longer fit for purpose in a digital era

Forces such as evolving regulations, rising customer expectations, globalization and changes in market infrastructure have driven decades of industry-wide M&A and transformation of bank business/operating models. Steps taken to accommodate these changes (e.g., expanding the role of financial market utilities) have been costly and at times hindered the adoption of industry leading practices (e.g., straight-through processing). Technological innovations have allowed banks¹⁰ and new entrants¹¹ to augment or replace existing products, services and capabilities at a sustainably lower cost base and operating structure.

Section 04

Value and benefits of innovation

Establish simpler, sustainably lower-cost and operationally optimized business models

Challenger banks reduce the cost to serve by maintaining a purely mobile presence and limiting offerings to specific or narrowly focused banking and lending services.

Neobanks (i.e., financial intermediaries that leverage traditional bank infrastructures) offer fully automated platforms that provide enhanced client experiences – attracting and retaining customers at lower cost and with limited start-up capital expenditures.

Mobile channel capabilities reduce operating costs by decreasing the need for physical branch locations.

Digital financial products, such as smart contracts (i.e., executable program code that runs on a decentralized verifiable network or blockchain), allow frictionless value transfers, resulting in lower transaction costs and the disintermediation of cross-entity processes.



05



Regulatory considerations

Banks have a long and successful track record of safely implementing technological innovations. Nevertheless, as regulated entities, their ability to move forward on new technologies at the market's pace can be directly affected by the level and nature of regulatory requirements and supervisory expectations.

Historically, regulators have provided banks with the flexibility to develop and deploy new technologies as long as proper controls and oversight were in place. Regulators have also adapted regulation and supervisory expectations to changing technologies and practices as banking has evolved. The current regulatory framework outlines a broad range of requirements and expectations that apply to banking activities more generally, including activities that have been – or will be – transformed by technological innovation. In fact, when adopting technological innovations, banks face many of the same risks associated with traditional banking products and services (e.g., cybersecurity, compliance, vendor/ third-party management, data security, privacy and fraud risks). These similar risk profiles, the established regulatory framework, and banks' robust controls and governance regimes enable many technological innovations to be safely and effectively implemented.

A Historical background

Maintaining an appropriate balance in regulating and supervising banks as they innovate is not a new challenge. Indeed, the history of banking in the United States has in many ways been a history of marked rapid product and technological innovation. In some cases, innovations have required regulators to adopt or amend regulations. For example, the development of paper checks in the nineteenth century, the invention and widespread use of credit and payment cards, and the creation of the ATM (which raised the question, for example, of whether an ATM constituted a branch) prompted regulatory responses.¹² However, in the great majority of cases – including those that are easy to overlook – innovation proceeded without the need for regulatory or even supervisory review. Key examples of impactful, organic incorporation of technological innovations into banking include, among others, the advent of call centers and the shift from paper to electronic/digital books and records.

Banks determined the precise design and use of each technological innovation based on customer needs, opportunities to enhance customer value, compliance with regulatory requirements and supervisory expectations, their business models, risk tolerances and other market factors. Supervisors expected banks to remain in compliance with applicable laws and engage in safe and sound practices throughout the innovation process. Banks relied on their first (business), second (risk management) and third (internal audit) lines of defense to maintain compliance. As long as they continued to meet these requirements and expectations, supervisors did not impose barriers on the ability of banks to determine how, when and at what pace to adopt technological innovations. The banking industry's long and successful track record of safely implementing technological innovations speaks to the effectiveness of this regulatory engagement model.

Section 05

Regulatory considerations

B The regulatory regime applicable to technological innovations

Within the US, there are generally no formal legal or regulatory approval requirements that specifically apply to the technological innovation activities of banks, as long as these activities fall within the scope of the bank's charter. In particular, unless the activity involves the acquisition or merger of another bank,¹³ there is generally no requirement that a bank obtain approval from its regulators before engaging in technological innovation activities.

Instead, technological innovation activities are subject to regulatory requirements and expectations that apply to bank operations more generally, including the prohibition of unsafe and unsound practices and the need to comply with consumer protection requirements. In addition, depending on the precise nature of the innovative activity, other general aspects of the bank regulatory framework may also apply, such as those pertaining to data security and privacy, AML/KYC and cybersecurity. In instances where the incorporation of technological innovations involves the performance of services for the bank by a third party, the general requirements and expectations applicable to vendor relationships would also apply.

Accordingly, under the existing legal and regulatory framework, a bank's technological innovation activities are generally subject to ongoing review and examination – meaning that banks frequently discuss relevant innovation efforts with supervisors in the course of the regular examination process – but typically not to any form of prior review or approval. Under this structure, banks and their lines of defense are responsible for the ex-ante risk management and alignment of any innovation activity with the firm's risk appetite/tolerance, risk culture and all regulatory requirements.

Section 05

Regulatory considerations

C Key considerations

Policymakers and regulators continue to actively monitor developments within the banking sector, including those that are technology-related, so that emerging, potential risks are appropriately addressed. Importantly, banks are pursuing a measured approach toward the rollout of emerging technologies in order to effectively identify and appropriately manage any new or different risks and to comply with associated regulatory requirements and supervisory expectations. Banks are also coordinating on an industry-wide basis to develop effective protocols and controls not only to protect their respective institutions but also address any potential systemic implications.

However, gaps and/or inconsistencies within the regulatory framework, domestically or internationally or both, can raise uncertainties for banks during the innovation process. To address these concerns, policymakers, regulators and the industry should expand their outreach to one another – both on a domestic and international basis – as this would enable policymakers and regulators to keep abreast of rapidly evolving technologies and enable implementation of more nascent innovations in a timely, safe and efficient manner. Moreover, policymakers and regulators should also coordinate on a domestic and international basis to provide industry with a clear and consistent message concerning regulatory requirements and supervisory expectations for technological innovations. This is particularly important considering the global footprint of many banks, market infrastructure and technology providers, as well as the prevalence of overlapping regulatory authorities concerning these entities within individual jurisdictions.

To date, banks have safely implemented many beneficial technologies without adverse repercussions to institutions or the broader financial system. Nevertheless, implementing technological innovations, particularly emerging technologies, will always have some element of risk, given the heuristic nature of innovation and new activities and services. Going forward, appropriate levels of capital, liquidity and operational resilience, together with effective management of technological innovations and robust internal controls, should help limit any potential negative outcomes resulting from the exploration of new technologies. Supervisory review of these protections will provide banks with the opportunity to safely explore new technologies without requiring specific licensing requirements for them.



06



The path forward

Technological innovations have the potential to continue to significantly transform the financial services industry and benefit society. They can replace individual banks' legacy systems, enhance processes, improve efficiencies and strengthen controls. They can also provide opportunities for the creation of new products and services that benefit customers. Ultimately, technological innovations hold great promise for the identification of new customers and the provision of financial services to the unbanked or underbanked community in a safe and sound manner.

Because of their unique role as intermediaries in the financial system, it is essential that banks maintain their ability to pursue technological innovations in a measured and controlled manner. This does not mean that regulatory compliance and risk control expectations should be relaxed, but rather that banks should have the capability to pursue innovations as long as they are sufficiently well capitalized and well managed.

Moving forward, policymakers and regulators should stand ready to make further refinements and clarifications to the regulatory and supervisory framework as may be necessary to enable implementation of more nascent innovations to proceed. Any new or additional requirements related to technological innovations should be commensurate with the scale of risks presented, as an overly proscriptive or prescriptive approach could limit adoption of technological innovations by banks, along with the benefits that technological innovation within the regulated banking sector provide. Moreover, such an approach could push technologically innovative activities to the non- or underregulated sectors – an outcome that could undermine other broader policy objectives (i.e., consumer protection, systemic risk reduction).

More broadly, to maintain the progress achieved to date within the banking sector since the financial crisis, policymakers and regulators need to confirm that new players within the broader financial services ecosystem operate in a safe and sound fashion, and in compliance with laws, rules and regulations – particularly if they engage in bank-like activities (e.g., payments, lending).

Policymakers, regulators and the industry should also advance measures to increase their coordination and expand outreach both domestically (e.g., U.S. Treasury-sponsored work stream on innovation and the recent White House FinTech Summit¹⁴) and internationally (e.g., various Financial Stability Board work streams¹⁵). This type of outreach between the official sector and industry enables policymakers, regulators and the industry to address innovation-related concerns in a holistic manner. It also provides the industry with a clearer picture of policymaker and regulatory perspectives on innovation, encouraging additional investment in innovation-related activities.

Ultimately, active engagement and collaboration between industry, regulators and policymakers help to promote safe and sound innovation that benefits the financial services industry and society as a whole.

For more information contact a member of our team:

EY

Peter Davis
Partner
Ernst & Young LLP
+1 212 773 7042
peter.davis@ey.com

Roger Park
+1 212 773 5379
Principal
Ernst & Young LLP
roger.park@ey.com

Nikhil Lele
+1 212 773 1996
Principal
Ernst & Young LLP
nikhil.lele@ey.com

Matt Hatch
Partner
Ernst & Young LLP
+1 415 894 8219
matthew.hatch@ey.com

Marc Saldenberg
+1 212 773 9361
Principal
Ernst & Young LLP
marc.saldenberg@ey.com

Tom Campanile
+1 212 773 8461
Partner
Ernst & Young LLP
thomas.campanile@ey.com

Scott Waterhouse
+1 212 773 9974
Executive Director
Ernst & Young LLP
scott.waterhouse@ey.com

Sandra Cvitan
+1 212 773 7674
Senior Manager
Ernst & Young LLP
sandra.cvitan@ey.com

Fayaz Jaffer
+1 212 773 8958
Senior Manager
Ernst & Young LLP
fayaz.jaffer@ey.com

The Clearing House

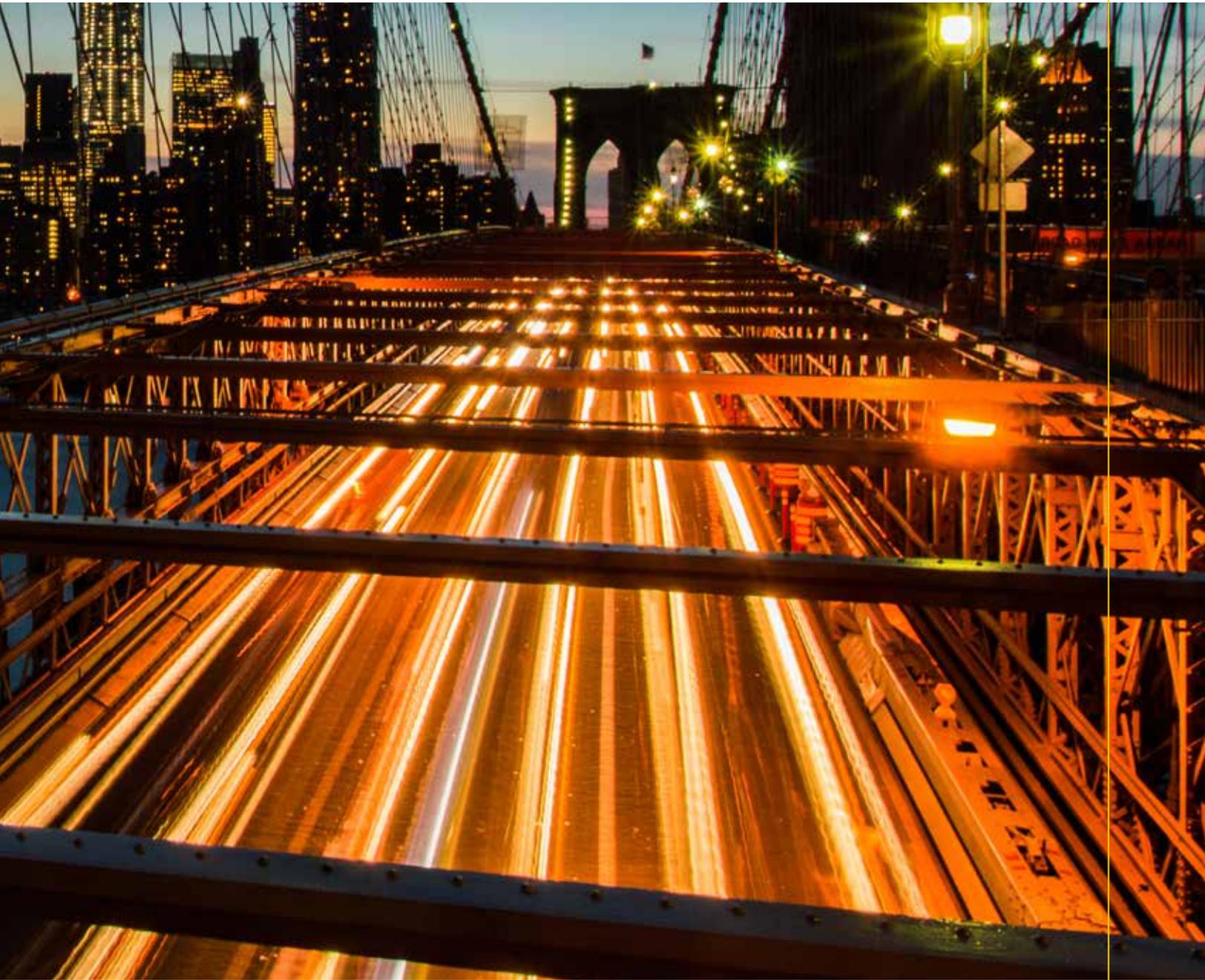
Jill Hershey
Executive Managing Director and
Head of Government Affairs
The Clearing House
+1 202 649 4601
jill.hershey@theclearinghouse.org

John Court
Managing Director and Deputy General
Counsel
The Clearing House
+1 202 649 4628
john.court@theclearinghouse.org

Michael Lee
Senior Vice President, Government Affairs
The Clearing House
+1 202 649 4617
michael.lee@theclearinghouse.org

Sean Oblack
Senior Vice President, Media and Public
Affairs
The Clearing House
+1 202 649 4629
sean.oblack@theclearinghouse.org

Angelena Bradfield
Vice President and Senior Policy
Specialist,
AML/CFT & Prudential Regulation
The Clearing House
+1 202 649 4608
angelena.bradfield@theclearinghouse.org



About EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit ey.com.

Ernst & Young LLP is a client-serving member firm of Ernst & Young Global Limited operating in the US.

EY is a leader in serving the global financial services marketplace

Nearly 51,000 EY financial services professionals around the world provide integrated assurance, tax, transaction and advisory services to our asset management, banking, capital markets and insurance clients. In the Americas, EY is the only public accounting organization with a separate business unit dedicated to the financial services marketplace. Created in 2000, the Americas Financial Services Organization today includes more than 11,000 professionals at member firms in over 50 locations throughout the US, the Caribbean and Latin America.

EY professionals in our financial services practices worldwide align with key global industry groups, including EY's Global Wealth & Asset Management Center, Global Banking & Capital Markets Center, Global Insurance Center and Global Private Equity Center, which act as hubs for sharing industry-focused knowledge on current and emerging trends and regulations in order to help our clients address key issues. Our practitioners span many disciplines and provide a well-rounded understanding of business issues and challenges, as well as integrated services to our clients.

With a global presence and industry-focused advice, EY's financial services professionals provide high-quality assurance, tax, transaction and advisory services, including operations, process improvement, risk and technology, to financial services companies worldwide.

© 2016 Ernst & Young LLP.
All Rights Reserved.

SCORE No. 04049-161US
1611-2107135 BDFSO
ED None

This material has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, or other professional advice. Please refer to your advisors for specific advice.

ey.com

¹ Ben Werther, "Multi-Structured Data: The New Innovation Opportunity," *InformationWeek*, <http://www.informationweek.com/big-data/big-data-analytics/multi-structured-data-the-new-innovation-opportunity/a/d-id/1317838>, accessed 25 August 2016.

² "2013 FDIC National Survey of Unbanked and Underbanked Households," Federal Deposit Insurance Corporation, October 2014.

³ BEE provides traditional banking services through a mobile-only platform in partnership with Community Federal Savings Bank.

⁴ For example, JPMorgan Chase and OnDeck's partnership for small-business loans. See <http://www.wsj.com/articles/inside-j-p-morgans-deal-with-on-deck-capital-1451519092>.

⁵ <https://www.forrester.com/report/Trends+2013+Digital+Wealth+Management/-/E-RES95421>.

⁶ Examples of such web-based companies include NerdWallet, a personal finance website (nerdwallet.com); Policybazaar, an information aggregator (policybazaar.com); and Bankrate, an aggregator of financial information (bankrate.com).

⁷ <http://www.americanbanker.com/news/bank-technology/how-paypal-is-taking-a-chance-on-ai-to-fight-fraud-1091068-1.html>.

⁸ Examples of bank products built upon responsive digital business models include Barclays' Barclaycard Ring, which is fashioned to be responsive to customer feedback, and JPMorgan Chase and OnDeck's partnership, which is designed to leverage OnDeck's technology to offer online loans to existing JPMorgan small-business customers. See <http://www.barclaycardring.com/t5/custom/page/page-id/how-it-works> and <http://www.americanbanker.com/news/marketplace-lending/chase-quietly-launches-its-online-small-business-loan-platform-1080382-1>.

⁹ According to Citigroup's FinTech report, approximately 30% of its retail bank employee positions could potentially be replaced by automation between 2015 and 2025.

¹⁰ Allen N. Berger, "The Economic Effects of Technological Progress: Evidence from the Banking Industry," *Journal of Money, Credit, and Banking*, Volume 35, 2003, available at <https://www.federalreserve.gov/pubs/feds/2002/200250/200250pap.pdf>.

¹¹ One example of a bank acquiring a nontraditional entrant to augment its services is BBVA's purchase of Simple in 2014. See http://dealbook.nytimes.com/2014/02/20/bbva-buys-banking-start-up-simple-for-117-million/?_r=0.

¹² By way of example, the OCC has a long history of issuing guidance and interpretive letters documenting and providing support for the adoption by banks of various electronic and digital innovations, ranging from internet and PC banking, electronic commerce, electronic payments, digital certification, internet access, data processing, the sale and production of software, and electronic safekeeping and storage. See <http://www.occ.treas.gov/topics/bank-operations/bit/opinions-and-letters.html>.

¹³ Prior regulatory approval is generally required for bank acquisition and merger transactions under the Bank Holding Company Act (12 U.S.C. 1841) and the Bank Merger Act (12 U.S.C. 1828(c); 12 U.S.C. 215, 251a). Nonbank acquisition and/or merger transactions typically require formal after-the-fact notice, but in some cases may require prior notice to regulators. Non-controlling minority investments typically do not require prior notice or approval, though they may be subject to various general conditions or other requirements.

¹⁴ See U.S. Department of the Treasury May 2016 blogpost, available at <https://www.treasury.gov/connect/blog/Pages/Opportunities-and-Challenges-in-Online-Marketplace-Lending.aspx>.

¹⁵ See <http://www.fsb.org/2016/03/meeting-of-the-financial-stability-board-in-tokyo-on-30-31-march/>.