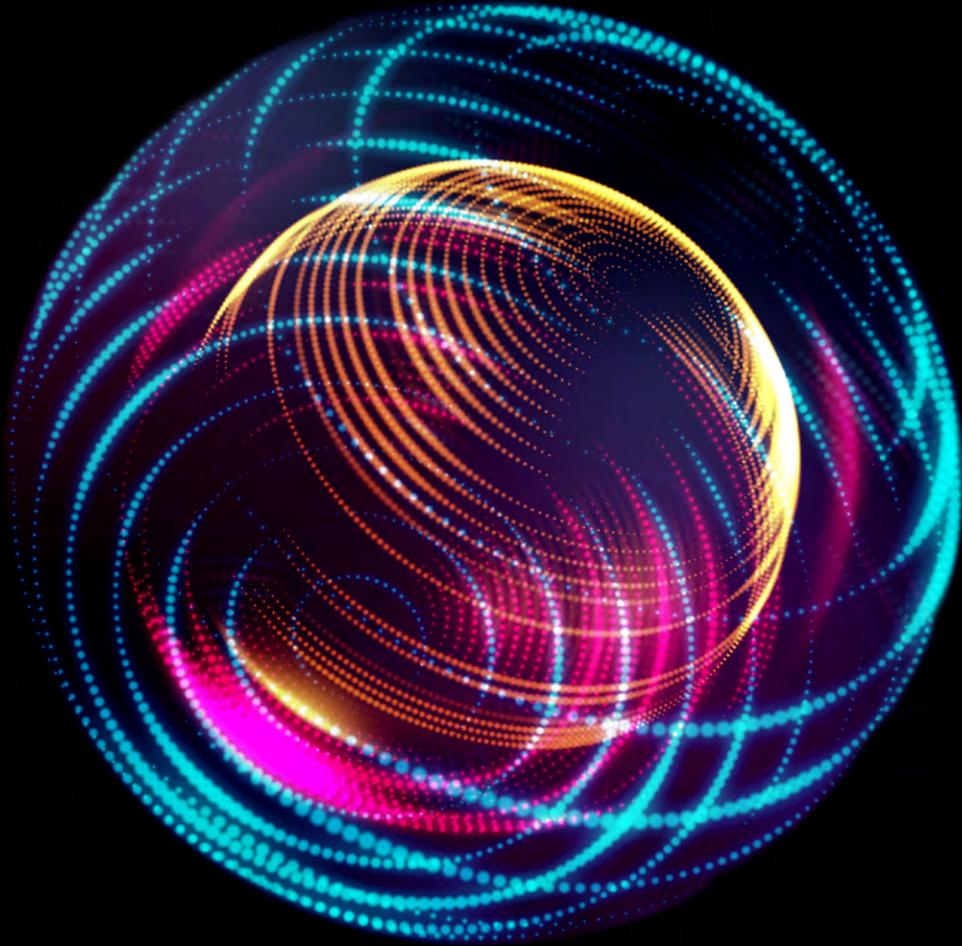


Deloitte.



Evolving Technology Trends
Is your bank ready for tomorrow?



**MAKING AN
IMPACT THAT
MATTERS**
since 1845



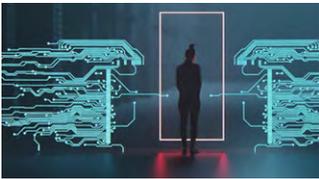
As we look back over 10 years of reports on technology trends in the banking industry, the core mission hasn't changed. How do we shine a light on the emerging technologies that are shaping the future of our clients' business? We want to help clients focus on the 'so what' and the 'now what' of how they serve their customers and constituents, how work gets done within their organizations, and how products and offerings evolve. However, the uncertainty from COVID-19 will remain for the foreseeable future. Banks have no choice but to remain hypervigilant and rewrite their business continuity playbooks as circumstances change. While it is reassuring to see some aggressive fiscal and monetary policy responses around the world already, clarity on how these actions will stabilize markets and accelerate the path to normalcy is slowly emerging, and in some cases yet to emerge. Therefore, banks need to actively consider the immediate needs of their customers and simultaneously the multiple near, short and medium-term operational, financial, and regulatory risk and compliance implications. Banks that have embraced today's technologies may be better placed to weather this crisis and facilitate a quick return to recovery. This unprecedented crisis can be the catalyst for banks to strengthen their digital business models and infrastructure to support business and accelerate their adoption of technologies of the future to define the "new normal" in the industry.

Contents



Introduction

04



The frontier of today

05



The bridge to tomorrow

10



Hovering over the skyline

16



Complexities ahead

19



Taking shape

22

Introduction



Banks around the world have been racing to catch up with the ever-evolving technological trends shaping the way they operate and serve their clients.

Prior to COVID-19, the Middle East financial services industry was evolving at a measured pace, driven by changing customer expectations, heightened competition from incumbents and new entrants, evolving regulations, and advancements in technology. In a matter of weeks, COVID-19 upended those conventions.

In this document, we explore key technologies at the frontier of today, such as cloud and AI, to those that form the bridge to tomorrow, such as FinTech

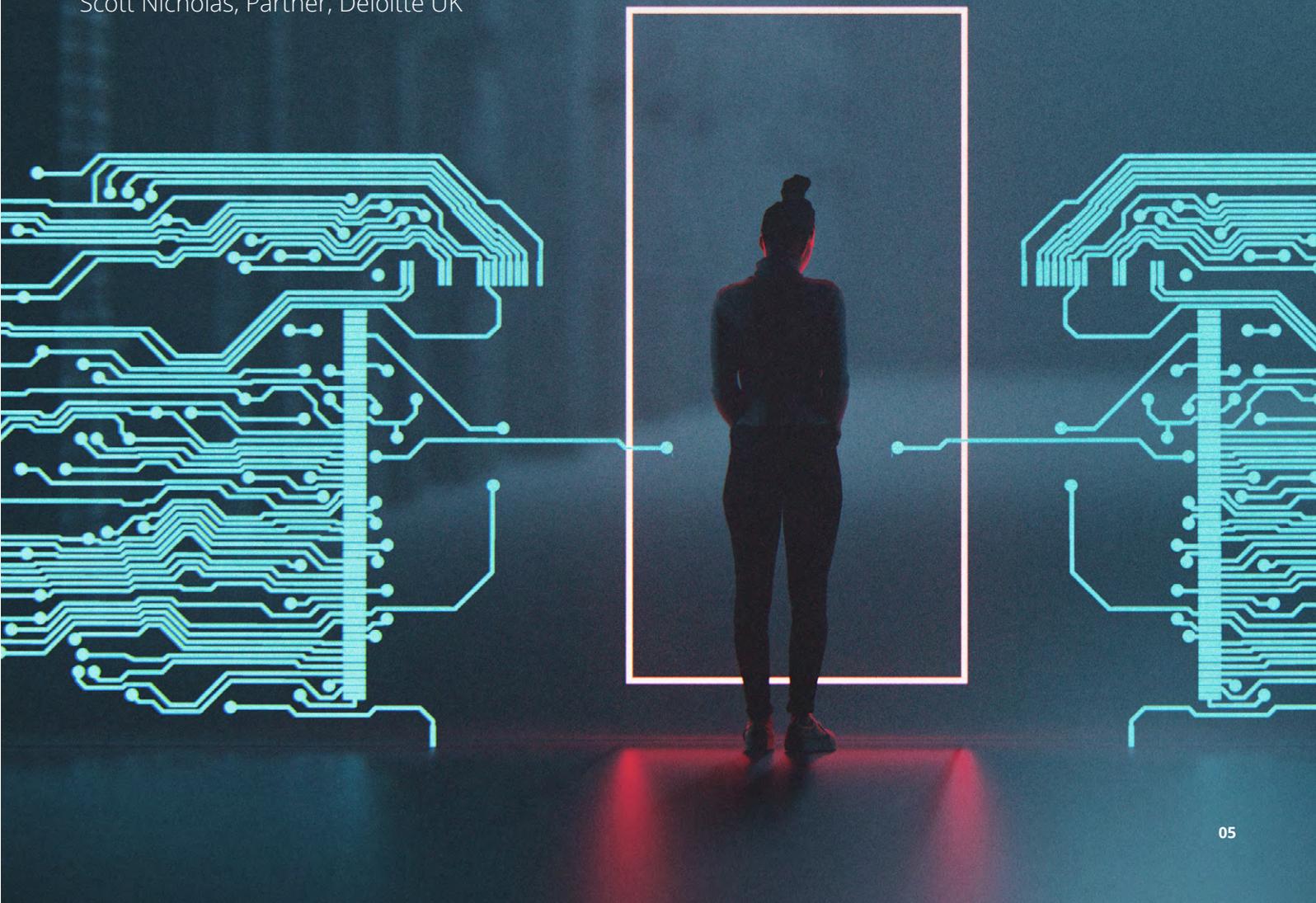
and Blockchain, and those which seem to be hovering over the horizon, such as quantum computing. Now more than ever, the accelerated adoption of these technologies can enable the industry to recover and thrive from the impact of COVID-19.

We present an overview of these technologies, their current adoption in the Middle East, along with the benefits they have to offer to the banking industry. We also briefly explore the approach which regulators should have in place and that leaders need to foster for a successful transformation. Finally, we introduce what Deloitte has to offer its clients in the banking industry.

The frontier of today

“Financial services institutions have been underpinned by technology for over 30 years, but the expectations of today’s consumer massively exceed the capabilities and services upon which they operate. This is either the biggest opportunity or threat the industry has seen in 20 years. But this time it is real.”

Scott Nicholas, Partner, Deloitte UK



Cloud computing: The future is here

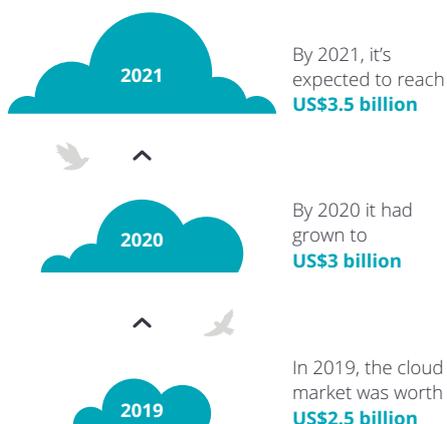
The financial services industry is moving towards digitization at a rapid pace and adopting the latest technologies such as cloud to meet rising customer expectations to remain competitive in today's challenging business environment. By leveraging cloud-based services, banks are able to decrease data storage costs through saving on capital expenditure (CAPEX) and operating expenditure (OPEX), while ensuring customer data is protected.

Customer information, such as credit card details and transactions history, is highly confidential and thus, the need to protect such data has increased the pace of cloud adoption. Cloud-based services allow banks to securely store and manage data, avoiding any customer data loss.

Cloud is an essential tool of today's service-delivery model, and enables banks to penetrate new business opportunities and access new delivery channels. There are three types of cloud services:

- **Infrastructure as a Service (IaaS)**
A third party hosts elements of infrastructure, such as hardware, software, servers, and storage.
- **Software as a Service (SaaS)**
Using the cloud software such as an internet browser or application is able to become a usable tool.
- **Platform as a Service (PaaS)**
The branch of cloud computing that allows users to develop, run, and manage applications, without having to get caught up in code, storage, infrastructure and so on.

Cloud Computing in the Middle East



Benefits of Cloud in the banking sector

The following are some key benefits that cloud has to offer the banking industry:

- **On-demand scaling and agility**
Cloud-based services are agile and able to provide additional technology resources whenever required, adhering to organizational computing needs and dealing with sudden spikes in demand. This level of agility can give banks a real cost advantage over competitors who operate their own data centers.

- **Security and availability**
Cloud vendors provide the banking sector with restraints on data manipulation in a cloud ecosystem. These security and audit restrictions, combined with organizational authentication programs, offer the facility to audit and reduce penetrative attacks,

which would otherwise require significant investments to execute in an on-premise environment.

Leverage industry-specific solutions

Using IaaS or PaaS to build applications grants flexibility in terms of design and functionality, and assists banks to cope with the regulatory burden by ensuring regulatory compliance, auditability, transparency, and security.

Shift in IT spending

Cloud provides a shift from capital expenditure to operating expenditure. Switching from asset ownership to service consumption leads to flexible pricing, (you only pay for what you use), and requires no upfront infrastructure investment, enabling organizations to pursue other investments for growth or innovation. With the purchase of infrastructure, there is always the risk of aging and obsolescence; this can be avoided by consuming resources as a cloud service.

Stimulates innovation

Cloud services free banks to redirect IT roles away from operations and towards developing capabilities in such areas as the Internet of things (IoT), machine learning and artificial intelligence (AI). This cannot happen without at-scale computing and storage.

AI and cognitive technologies: The true game changer

While still considered science fiction a few years ago, artificial intelligence (AI) is now becoming a part of our business environment and is reinventing the entire ecosystem of the banking sector. By increasing the level of automation and using dynamic systems, AI supports decision-making, enhances the customer experience, and improves operational efficiency.

AI also provides a strategic oversight for getting value out of data, which is now needed more than ever due to the data influx from a wide range of sources.

With over 163 zettabytes of data expected to exist globally by 2051, this challenge will only get more complex.

Fortunately, with the improvements made in AI, banks can overcome the challenge of data influx through the innovative processes, tools, and systems offered and which they can leverage to obtain insights and value from their data.

For example, AI can identify irregularities in how a customer taps and swipes on their smartphone by comparing historical data, thus enabling superior customer identification.

Deloitte predicts that among companies that adopt AI technology, 70% will obtain AI capabilities through cloud-based enterprise software, and 65% will create AI applications using cloud-based development services.

Benefits of AI in the banking sector

The following are some key benefits artificial intelligence has to offer the banking industry:

Fraud detection

Fraud detection has been the hotspot for the application of AI in banking. AI's increased potential for real-time sensing and improved ability to spot anomalies make it highly valuable in this regard. Automated fraud detection systems use machine learning to identify behavior patterns that could indicate fraudulent payment activity.

Customer recommendation

AI can enable banks to provide quality advice to customers by removing "human error". AI-powered personalized finance management tools hold great potential in the market.

AI-driven virtual assistant

A virtual assistant can anticipate and answer thousands of customer questions and also help customers perform banking transactions in real-time.

Productivity gains

Almost the top 20% of back-office work accounts for 85% of the cost. Labor-intensive work like compliance reporting, new customer on-boarding communications, and documentation can become highly accurate and efficient with the adoption of AI tools and technologies.

AI in the Middle East

In line with the global trends, Deloitte envisions a growing appetite for AI investment across the Middle East. In fact, some sources estimate that spending on cognitive and artificial intelligence systems in the region will reach over US\$100 million in 2021.

From an industry's perspective, the adoption of AI is highly uneven. Industries with long histories of investment in the development of digital tools are leading the way.

The banking industry fits this pattern of adoption. The industry's access to more and better-structured data, compared to other industries in the region, as well as a willingness to enhance productivity, will allow banks to take the lead in AI adoption.

Big Data analytics: The dawn of technologies

Big data commonly refers to large and complex datasets that create significant challenges for traditional data management and analysis tools in practical timeframes.

The quantity of data we create every day is enormous. There are more than three quintillion bytes of data generated each day and this is only growing with the introduction of the Internet of things (IoT). Over the last two years alone, 90% of the data in the world was generated.

As a massive amount of structured and unstructured information is continuously generated, FinTech and startups are entering the marketplace with innovative ways to make use of this data.

Banks, like nearly all businesses, are under pressure to exploit so-called 'big data' in order to identify new opportunities, improve their service differentiation, enhance their performance, and reduce the risk of operations, which in turn leads to higher profits, increases the efficiency of their activities, and allows for smarter business moves to be made.

The banking sector is practically overwhelmed with a range of data, relating to customers, pricing, credit bureaus, macro-economic data, and now unstructured data, to name a few. Banks can and are achieving many advantages from this wealth of data.

The market size of the global big data analytics market was USD11 billion in 2018 and is expected to reach a market size of USD68 billion in 2025.

Benefits of Big Data in the banking sector

Big data is not just a low-cost data storage platform anymore as it brings new use case possibilities, and other key benefits for banks. The following are some key benefits big data has to offer to the banking industry:

Risk management optimization

Monitoring customer spending patterns and identifying unusual behaviour is one way in which banks can leverage big data to prevent fraud. Big data, when plugged into business intelligence tools with automated analysis features, can trigger red flags on customer profiles that are higher risk than others.

Real time stock market insights

Instead of simply analyzing stock prices, big data takes into account political and social trends that may affect the stock market. Monitoring trends in real-time allows analysts to compile and evaluate the appropriate data and make smart decisions.

Increased customer retention

With in-depth customer profiles, it's easier to build stronger customer relationships, by developing products, services, and other offerings tailored to their specific needs. Banks can use big data to sort through feedback and respond promptly to customer questions and concerns.

Innovation

Big data covers a broad spectrum of use cases and is a key enabler of many technologies of today and the future, especially in advanced analytics, AI, machine learning, and robotic process automation (RPA).

Big Data in the Middle East

As for big data in the Middle East, GCC countries have started reaping the benefits of its enabling technologies through various initiatives, such as launching the TASMU program in Qatar, which aims to position the country as a leader in the area of smart city technology and ICT. Bahrain is implementing its open data strategy that aims at encouraging and enabling the use of public data, while the Kingdom of Saudi Arabia has initiated a new ambitious big data strategy. The United Arab Emirates' smart data strategy is built on key national policies supporting the development of smart and open data. With all of these initiatives, GCC countries are at the forefront of making the most out of big data-enabling technologies.

Robotic Process Automation (RPA): We're only humans after all

Over decades, robots of different forms have freed humans from dull and dangerous jobs, allowing them not to waste time on routine tasks but rather focus on their unique talents and capabilities to develop creative ideas and solutions.

However, this has given rise to many questions regarding the prospects of careers in the future and the ability of organizations to embrace such a transformation.

Organizations that fail to develop an ecosystem of both humans and virtual resources are at a risk of missing efficiency and engagement opportunities.

Thus, the workforce of the future will be comprised of crowdsourcing, freelancers, and the full spectrum of automation, beginning with RPA, a way to automate repetitive and often rule-based processes.

RPA in the Middle East

Increasing volatility and uncertainty of the macro environment have increased the complexity of doing business in the Middle East.

The banking industry is mandating the use of intelligent automation to drive efficiency, eliminate repetition, and improve customer satisfaction by providing fast and efficient services. The technology behind this automation is called robotic process automation (RPA).

The most essential driver enabling the RPA market to gain traction is its success in increasing operational excellence in the Middle East region.

Benefits of RPA in the banking sector

RPA is transforming how banks operate. The following are some key benefits of RPA in the banking industry:

Cost reduction

The cost of robot software represents one-ninth of a full-time employee in an onshore location. Potential cost-saving opportunities such as those associated with employing and housing a person are therefore eliminated when hiring a robot.

Accuracy

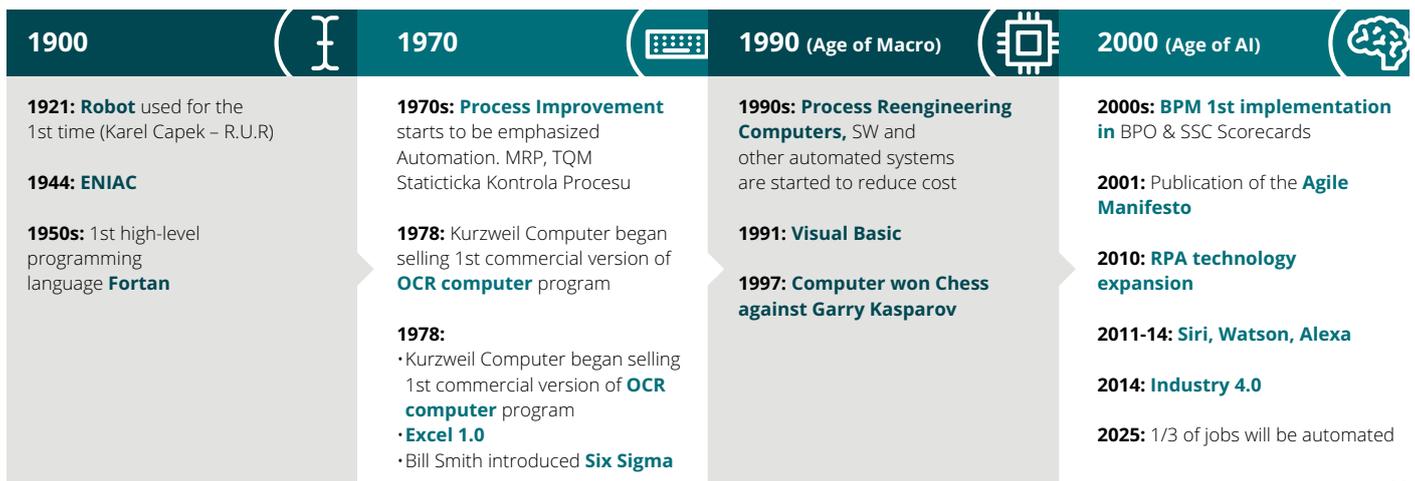
By nature, robots are programmed to follow rules, thus providing higher productivity and less error rates compared to their human counterparts. When hiring robots, quality of data goes up typically to 99.5% accuracy. In rare cases of RPA errors, slips are systematic.

Operational efficiency

Robots are faster than humans at performing tasks, and thus standard tasks such as customer onboarding processes, account opening, and loan processing to a certain extent can be automated using RPA.

Compliance

RPA can enhance several aspects of compliance such as monitoring and testing. RPA's capability to pull and aggregate data from multiple sources could also enhance the efficiency of regulatory, non-financial, and risk reporting as it can help eliminate or reduce the time-consuming processes of collecting and compiling large amounts of information.



The bridge to tomorrow

“We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don't let yourself be lulled into inaction.”

Bill Gates



FinTech: The enemy who will become a friend

In just a few short years, FinTech companies have defined the direction, shape, and pace of change across almost every banking subsector. Customers now expect seamless digital onboarding, rapid loan approvals, and free person-to-person payments, all innovations that FinTech made popular. And while they may not dominate the industry today, in two years FinTech will succeed as both standalone businesses and vital links in the banking value chain. In other words, while FinTech have yet to disrupt the competitive landscape, they've laid the foundation for future disruption. FinTech represents a great opportunity for smart incumbents. They provide a chance to see which new offerings show promise. The dominant presence of FinTech will result in several outcomes that have the potential to shift the competitive landscape of the banking sector.

FinTech in the Middle East

According to the Deloitte Middle East FinTech Study published in June 2020, the FinTech ecosystem in the Middle East is characterized by a certain degree of contradiction and dichotomy.

Although the FinTech ecosystem is evolving rapidly when it comes to deploying innovative solutions and customer behavior, especially in KSA, is encouraging banks to adopt such solutions, banks are still reluctant to integrate FinTechs into their strategy as they prefer to follow a "wait and see" approach.

In order to realize the full potential of FinTech, governments and regulators need to focus on eight key priorities:

1. Foster public funding in innovative FinTech solutions.
2. Define a transparent monetization and value creation path for FinTech.

3. Establish regulatory harmonization within each of the Middle East countries' FinTech ecosystems.
4. Build harmonized regulation across Middle East countries.
5. Define a vision and higher purpose, and establish an innovation hub that unites all key players of the ecosystem.
6. Drive strategic alignment across different governmental agencies and departments that run FinTech initiatives.
7. Attract and develop local talent by offering the right incentives and career path.
8. Recruit recognized global leaders in the chosen domain and incentivize them to share knowledge.

Benefits of Fintech in the banking sector

The dominant presence of FinTech will result in several outcomes that have the potential to shift the competitive landscape of the banking sector.

Cost commoditization

Operating cost will become less of a competitive advantage. Firms are exploring new technologies and working with other organizations, competitors, and new entrants alike to accelerate the

commoditization of their cost bases, so they can preserve margins and focus on more promising strategies.

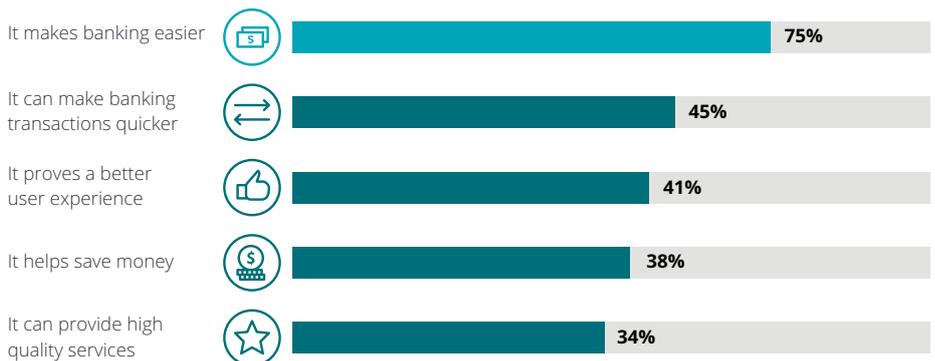
Experience ownership

Traditionally, many financial institutions distribute the products they create. But with platforms and alternative channels on the rise, prudent incumbents are planning for conditions where distribution is beyond their control. Recognizing that the balance of power swings to those who own the customer experience, dedicated producers of financial offerings are weighing strategies that call for extreme scale or focus.

Data monetization

Facing a future where data is increasingly important, banks are looking to expand their customer datasets. One way is to make the digital experience more engaging to customers, collecting more data in the process. Another is to team up with other companies, offering customers additional value in exchange for their data. In short, institutions are applying a combination of strategies to help them catch up with startups and differentiate themselves from other providers.

What are the reasons for using FinTech solutions?



Source: Deloitte survey March 2020

Open Banking: The power of APIs

The new forces to which banks are exposed are pushing traditional banks toward a paradigm shift to redefine their role in their ecosystem. Customer relationships tend to move towards the best offering, especially when the cost of switching banks diminishes. As a result, banks can no longer rely on closed-shop offerings but should rather embrace the opportunities of opening up. This way, the open banking movement is no longer a threat, but rather it allows access to new profit pools and enables future growth.

Many established banks, as well as new players in the market, have already considered joining the “open revolution”. Fields of application range from a “minimum approach” that allows third-party access through APIs solely to share select data up to a “maximum implementation”, enabling the integration of various functionalities in the form of a Banking-as-a-Service platform.

Open Banking strategic options

Banks have four broad strategic options: full-service provider; utility; supplier; and marketplace interface. These four options are not mutually exclusive. Two of these – utility and supplier - involve losing control of the customer interface as products and distribution become unbundled. However, organizations pursuing more than one option are likely to need to sharpen their own proposition for each option they pursue to remain competitive.

Benefits of Open Banking in the banking sector

Open banking is poised to transform the industry and introduce a number of exciting opportunities both for incumbents and new entrants; some of these opportunities are:

Service offering enhancement

By opening up their APIs, banks can connect other APIs in the market in order to enlarge their service offerings by introducing FinTech solutions in a plug-

and-play manner. By embracing the open banking API economy, banks are able to further improve and transform current offerings, increasing their attractiveness to existing and prospective customers alike.

Customer engagement improvement

Open banking APIs improve the attraction rate of a bank and enable them to cope with the changing demands of existing customers and lure prospective customers. These APIs can also serve as a unique way to improve customer engagement and provide for customer needs in an agile, secure, and future-proof method.

Profitability increase

Increased access to individual transactional data will allow lenders to better understand customers' risk profiles at a more granular level. Lenders will be able to augment credit scores with empirical cash flow data to better understand individual customers who do not currently hold relationships with them. Furthermore, lenders will be able to price risks for each individual transaction to reflect its context, from purchase type to total borrowed amount.

Open Banking in the Middle East

According to the Deloitte Middle East FinTech Study, the introduction of open-banking frameworks provides opportunities for FinTech to scale and open the market for a new set of opportunities.

As for regulators, they are at different stages of introducing their open banking regulatory frameworks. The average usage of account aggregation solutions among banking customers in the Middle East is 33%. This is set to increase in the upcoming years if open-banking regulations become more widely adopted in the region.



IoT: The Internet of Things

The banking sector started utilizing IoT relatively late compared to sectors such as energy and automotive. However, IoT has been gaining importance in both banking and financial institutions lately, especially in retail banks, which are showing large investments in IoT to be used in their internal infrastructure and consumer-facing capabilities. The use of smart devices by customers allows banks to access related data and provide a complete view of customer finances in real-time. This will allow banks to anticipate the needs of customers through the data consolidated and offer solutions and advice that can help clients make sound and smart financial decisions, allowing the bank to enhance customer loyalty and attract more business.

IoT in the Middle East

The GCC market has several inherent characteristics that could drive uptake of consumer IoT devices. The most significant driver is a very young and highly tech-savvy population. In the GCC, more than 70% of the population owns a smartphone, with the United Arab Emirates (UAE) and the Kingdom of Saudi Arabia (KSA) currently

having the highest smartphone adoption rate in the world at 97%. Furthermore, governments have launched ambitious plans to build the necessary enablers to develop IoT and smart cities. Besides Dubai being one of the leading smart cities in the world, other GCC countries have developed similar ambitions: Saudi Arabia is building smart cities across the country and Qatar launched the Connect 2020 ICT Policy that aims to develop smart infrastructure initiatives in view of the World Cup 2022.

Benefits of IoT in the banking sector

The use of IoT devices will allow banks to collect massive stockpiles of customer data, ranging from their demographic details to their income and spending patterns, to their preferences. The access to this amount of data has the potential to drive fundamental change in the industry:

Profits Increase

IoT will help to increase operational efficiency, prevent fraud, reduce non-performing assets (NPAs), improve employee and customer efficiency, and

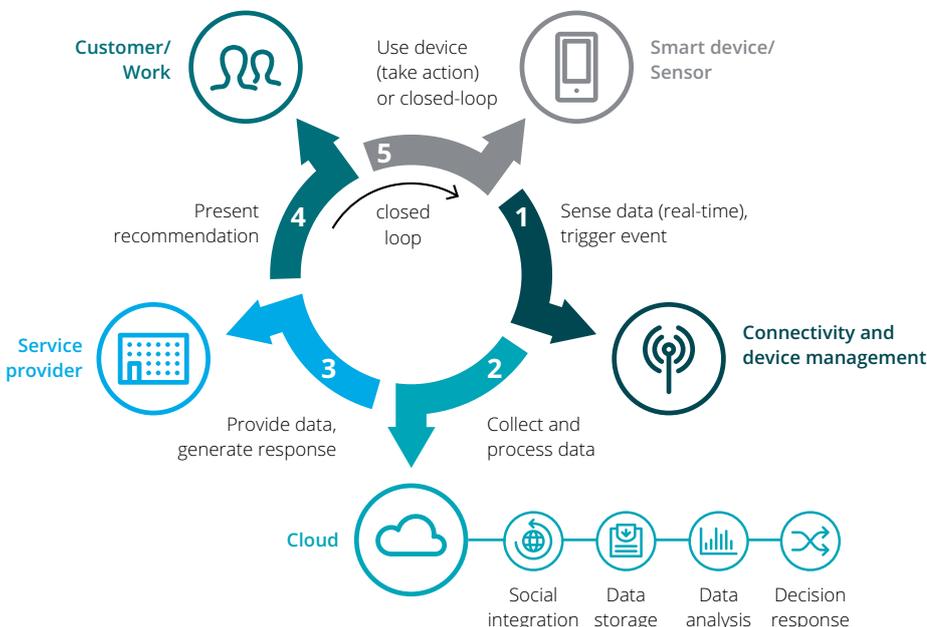
facilitate easier verification, loan tracking, and customer retention, allowing banks to reduce cost and increase profitability. IoT will also increase the profit generated by banks through a lower risk rate, higher interest margin, agriculture lending, customer acquisition, and new products.

Role transformation

The industry is shifting to become more dynamic, toward every data byte having to be analyzed to predict its implications. Wearables and biometric devices, cars, homes, offices, and even the built environment will initiate transactions directly with banks in real-time, to expand the bank's role and include management services, helping the customer in his budgeting process.

Product customization

The increase in information sources creates a situation where banks can enhance the level of personalization they offer, thanks to progress made in the field of analytics. From simple analytics cases to real-time analytics, or exploring machine learning solutions, there are many ways to improve understanding of data and these can be a real asset for developing innovative services. Therefore, banks can offer customized products to clients, make dynamic changes to products, and bundle products to satisfy customer needs and maximize profits.

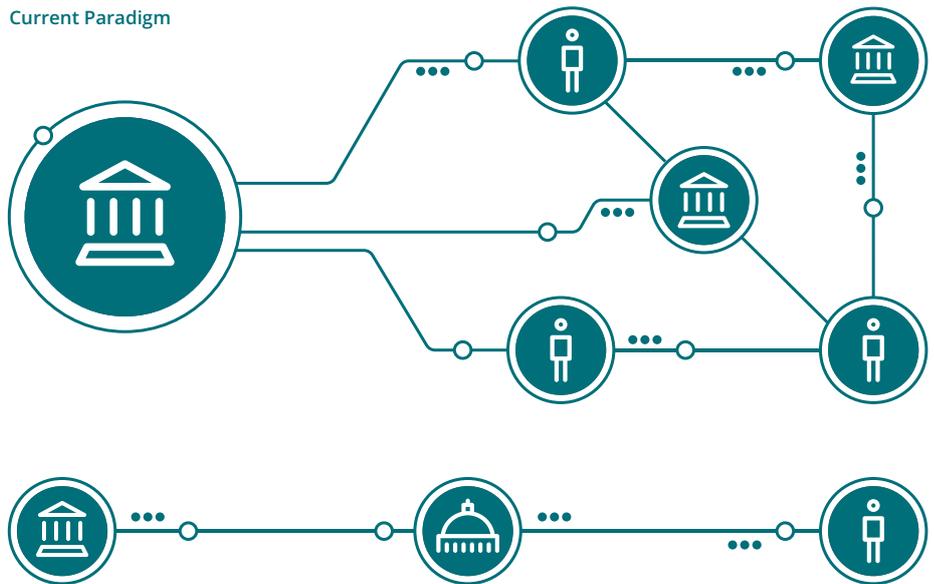


By making yourself ready and actively participating in the development of IoT, you can stand out from your competitors and provide your clients with innovative services!

Blockchain and Distributed Ledger Technology (DLT)

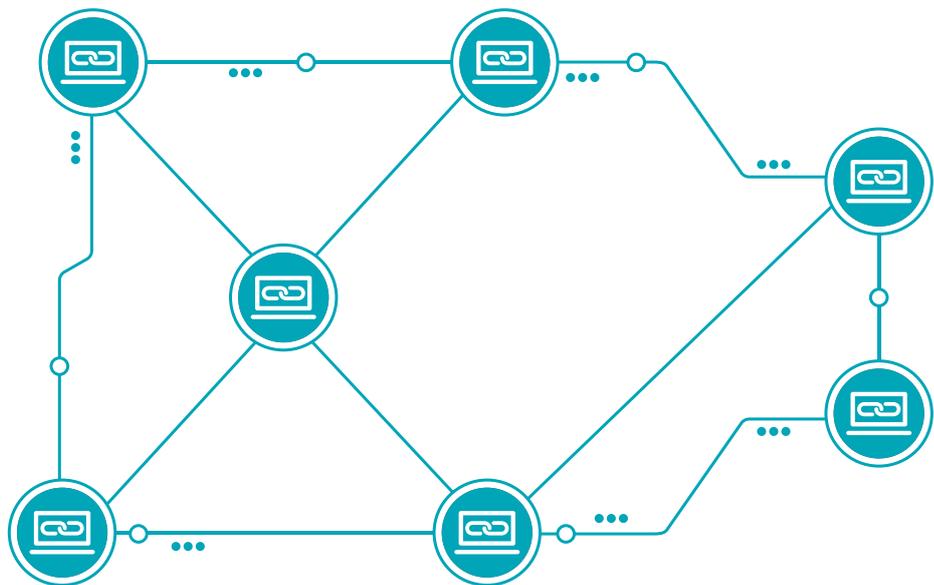
Blockchain technology and its associated distributed ledgers were devised as a simple yet smart solution to keep track of the Bitcoin cryptocurrency in circulation. The solution leveraged a 'distributed ledger' architecture under which all users who participated as 'nodes' in the network had a copy of the entire ledger. This implied that all participants had full visibility of all the transactions at all points in time. Any updates to the contents of the ledger could happen by consent of participants and any such addition would be in the form of an encrypted new 'block' in an existing 'chain' of all prior blocks. While Bitcoin as a cryptocurrency has come under the scrutiny of multiple regulators, stakeholders shortly realized the potential of the underlying blockchain technology enabled by a system of distributed ledgers. In essence, blockchain architecture could enable a disintermediated and extremely tamper-proof ledger through which interested parties could directly exchange information or even value between each other in near real-time with no requirement for a trusted third party.

Current Paradigm



- **Central authorities** transfer actual value between two parties
- **Multiple Intermediaries** required to facilitate of assets and create trust

Blockchain Paradigm



- **Distributed nodes** that maintain a shared source of information
- **Trust enabled by cryptographic algorithm**

Various global banks and players have taken a test-and-scale approach to blockchain and some of the initial success observed by them, though in a controlled environment, has led to more players joining the movement. Banks are developing and testing out use cases across several areas such as cross-border remittances, trading and securities operations, customer loyalty management, and financial inclusion. In fact, Santander estimates that by 2022 blockchain-based distributed ledger systems can help banks save \$15-20 billion annually.

Blockchain in the Middle East

In the Middle East, the United Arab Emirates has developed a visionary strategy for blockchain with the intent of having 50% of government transactions on blockchain by 2021 and the UAE Central Bank and the Saudi Arabian Monetary Authority have announced plans to use blockchain technology to issue a digital currency accepted in cross-border transactions between the two countries.

Banks are developing and testing out use cases across several areas such as cross-border remittances, trading and securities operations, customer loyalty management, and financial inclusion.

Benefits of Blockchain in the banking sector

Authentication

Smart contracts allow business validations and automated reconciliation for straight through processing

Trust

Smart contracts allow codification of business rules, validations and reconciliation, thereby reducing manual processing

Manual processing

Blockchain maintains automated audit trail of transactions, thereby reducing manual processing for data validations and reconciliations

Time sensitivity

Blockchain enables the near real-time settlement of recorded transactions, reducing risk and providing an enhanced customer experience

Intermediary

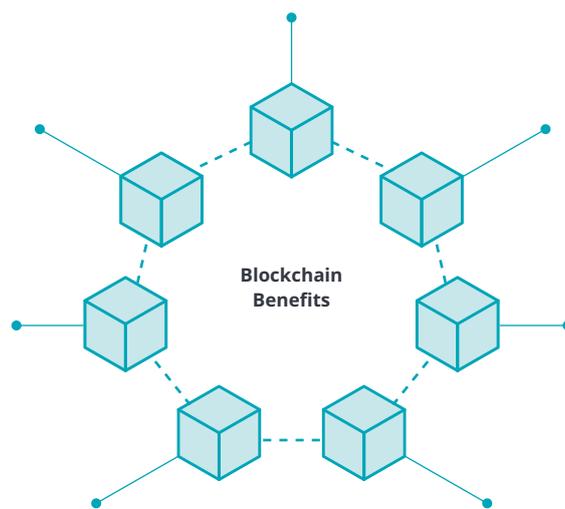
Blockchain's distributed ledger technology facilitates disintermediation, thereby reducing costs and lowering latency

Transparency

The hash/pointers of the records written on the Blockchain are immutable and irreversible, not allowing modifications and eliminating risk of fraud

Golden source

Blockchain's distributed ledger and consensus mechanism allows data consistency across multiple participants



Hovering over the skyline

"Some spooky action at a distance."

Albert Einstein

Quantum Computing: The mystical phenomena

A quantum computer is a new type of computer that harnesses the power of quantum mechanics to solve problems that were previously believed to be intractable on regular computers. While today's computers store and process information using bits, represented as either 0s or 1s, a quantum computer uses quantum bits, known as qubits, which can exist as 0, 1, or as a combination of 0 and 1 at the same time. This ability to simultaneously exist in multiple states is known as superposition, and is one of the fundamental principles of quantum mechanics.

When combined with another property called entanglement, superposition enables quantum computers to carry out parallel calculations, and thus makes it possible to solve problems exponentially faster.

The 2020s will likely be a time of progress in quantum computing, but the 2030s are the most likely decade for a larger market to develop.

It is expected that the second decade of the 21st century will see the first ever proven example of "quantum supremacy": a case where a quantum computer will be able to perform a certain task that no classical computer can solve in a practical amount of time or using a practical amount of resources.

However, the term "supremacy" does not mean that quantum computers will replace classical computers; instead they will be used as side-processors to solve very specific problems.

According to Deloitte Global, quantum computers will not replace classical computers for decades, if ever. The first commercial general-purpose quantum computers will appear in the 2030s at earliest.

Benefits of Quantum Computing in The Banking Sector

The following represent the main benefits of quantum computing in the banking industry:



Portfolio optimization

One of the areas where quantum computing is currently being explored is determining the attractiveness of a portfolio by processing thousands of assets with interconnected dependencies, thus helping in minimizing risk and maximizing gains from dynamic portfolios of instruments.



Financial modeling

Today's markets deal with a basketful of risky and uncertain situations that require faster and more secure processing solutions. Quantum computing will offer a big help in isolating key global risk factors and finding new ways to handle complex financial data by carrying out an incomprehensible number of calculations all at once.



Enhanced security

Quantum computing can be used to create better encryption, resulting in stronger data security and less fraud and compliance violation. Although quantum computing can break the current data encryption techniques, the adoption of quantum computers will open new doors to robust and advanced cryptography techniques that theoretically are unbreakable.



Machine learning optimization

Quantum computing can enhance current cognitive technologies that have seen widespread applications across industries. Because they have the ability to scan a massive amount of data in milliseconds, quantum computers can provide feedback much more efficiently compared to classic computers, which results in shortening the learning curve for AI.



Reduction in size of hardware

Quantum computers will allow for a reduced size of processors. A reduced hardware size could mean the ability to load more technology onto any equipment, which would give information superiority and logistical advantage.

Quantum Computing and related technologies

Quantum computing and Cloud



Cloud will be the preferred mode of accessing quantum computing for most companies as it offers solutions to some scalability challenges. Cloud-based quantum solutions and services are emerging as a potential game-changer in the digital cloud computing industry.

Combining quantum computing with cloud provides an optimal mix of scalability, efficiency, and performance.

Quantum computing and Cybersecurity



One area in which large quantum computers will almost certainly deliver an exponential speed-up is the area of security and cryptography.

Even in a pre-quantum era, there may be an urgent need for quantum-safe encryption.

A technique called Shor's algorithm is known to be able to break many current public key cryptosystems. However, this will likely only happen when commercial quantum computers hit the market.

Quantum computing and Blockchain



Quantum computing could replace other forms of data protection, such as blockchain, within a period of ten years using quantum encryption. This would enable banks to send data which is almost un-hackable over a quantum network. Quantum cryptography uses a system called quantum key distribution to ensure encrypted messages and its keys are sent separately. If these messages and keys are tampered with, or edited in any way, they are automatically destroyed.

Middle East: Into the next-next generation

According to Deloitte predictions, quantum computing is unlikely to present any use case in the Middle East in the near future. While some industries will ride the eventual wave of disruption that it will trigger, the banking industry will embrace the trend in the region ahead of other sectors, driven by the former's global competitiveness and the latter's place as a strategic priority for the region's governments.

Quantum computing has the potential to disrupt existing industries and to take current "next generation" technologies (AI, big data, etc.) into the "next-next

generation". But even with general-purpose use far off, concrete actions are required now in order to make the Middle East "quantum-ready" and pave the way for its arrival.

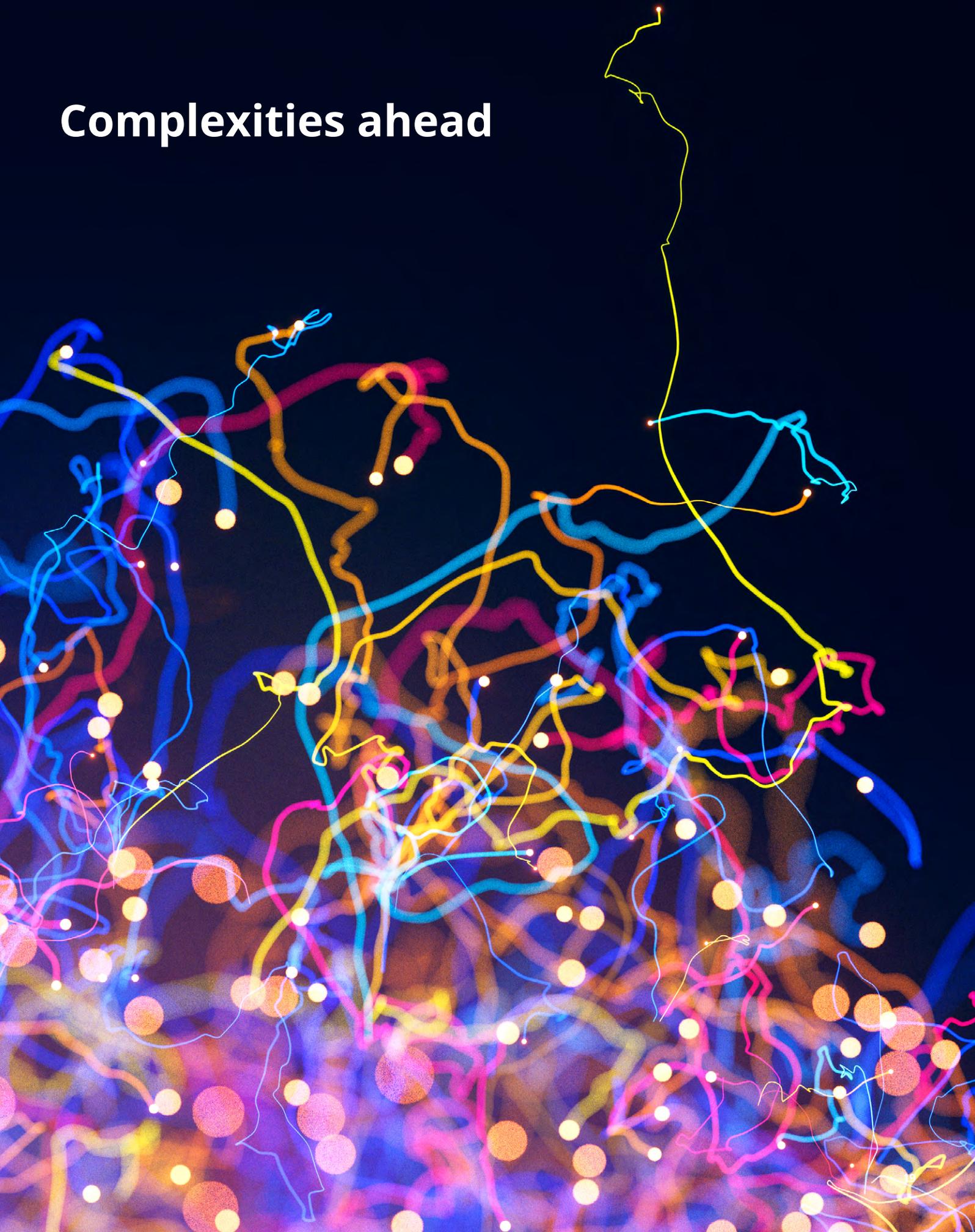
Artificial intelligence, big data analytics, machine learning, cybersecurity and FinTech are all key technology domains that form a crucial part of these initiatives. And yet general-purpose quantum computing has the potential to radically transform all of their implementation cases in the 2030s. This would mean disruption again, just as their previous implementations are concluded!

Classical versus Quantum

Imagine a card with a random number of holes.

The way a classical computer works is similar to checking each row sequentially to identify the number of holes in the card, whereas the way a quantum computer would approach this would be the equivalent of shining a light at the card – the amount of light that shines through helps approximate the number of holes at a much faster speed and accuracy.

Complexities ahead



Regulation: Borderless ends

Innovation helps drive competition, and more competition is good for consumers. Thus, regulators should not stand in the way of innovation, but rather focus on building compliance to protect consumers while allowing competition to flourish. As FinTech become mainstream, the issue of how best to regulate them has become more urgent. On the one hand, FinTech want to experiment and innovate without the pressure of arising regulations. On the other hand, innovators also want a degree of regulatory certainty to ensure that their investments will pay off over the long run and not be shut down or faced with unexpected complications. Regulators should initially understand the impact of FinTech, AI, blockchain, and other big data technologies on data protection, consumer privacy, competition, pricing, financial exclusion ,etc. to be able to form the right ecosystem for FinTech to grow while ensuring consumer protection.

Historically, the mantra of the FinTech industry has been “we are not financial institutions.” FinTech are not constrained by many regulatory requirements that are applicable to banks and other financial institutions.

FinTech pride themselves on creating deep customer connections, navigating market trends agilely, and creating disruption for traditional competitors.

To dig deeper into the regulations affecting FinTech in the Middle East, the region is now witnessing the emergence of regulatory initiatives as a result of these emerging technologies. In 2017, Bahrain adopted a 'Cloud First' policy in the public sector, becoming the first Arab country and one of the first worldwide to mandatorily evaluate cloud-based services.

According to Deloitte, regional governments are expected to reinforce regulatory instruments of AI-enabling technologies in order to accelerate the transition from promising standalone proofs-of-concepts to serial adoption. Public entities should continue to pursue collaborations with global partners to explore the use cases of upcoming technologies such as quantum computing. For example, there is the need to “quantum proof” data to protect personal, corporate and national security, as quantum computers will be able to easily crack almost every classical encryption technology. Thus, regulators in the Middle East should keep track of emerging technologies and carefully weigh their impact on the banking industry.

Talent: Meet the new leads

Digital transformation is not limited to technology and data. To realize long-term success, the human side should also be addressed.

As various technologies become mainstream, the initial advantages may decrease in the long term. This is why it's important for banks to learn how to use technology to develop new customer insights and deliver contextual offerings.

Another equally important aspect to consider will be culture. More often than not, the success or failure of a digital transformation effort may depend on cultural issues rather than technical ones.

To make transformation happen, leaders may need to focus on developing a new mindset for how best to use technology, people, and processes. Only those banks that build a collaborative and innovative culture to drive change can achieve real returns on their technology investments in the long term.

To figure out how this shift might impact talent, and — most importantly — what to do about it, bank leaders will need to understand not just changes to the nature of work (the what and the how) but also the workforce (the who) and the workplace (the where) — all of which are greatly interrelated. Bank leaders should ask the following questions:



Taking shape

As the banking industry needs to recover from the COVID-19 crisis across the region, fostering new technologies and investing in upcoming innovations will allow banks to continue to serve with purpose. Banks should be prepared for this transformation by possessing a solid core infrastructure suitable to adopt these technologies. Similarly, banks should be ready to challenge and overcome the hurdles imposed by regulators. As such, Deloitte provides a vast range of services from strategizing technological transformations to supporting banks in implementing such technologies.

Turn to the next page to discover how Deloitte assists its clients in adopting the aforementioned technological trends.

Together we can shape the future

At Deloitte, we know how to harness the forces that are impacting the Banking industry now and in the future.

Big Data

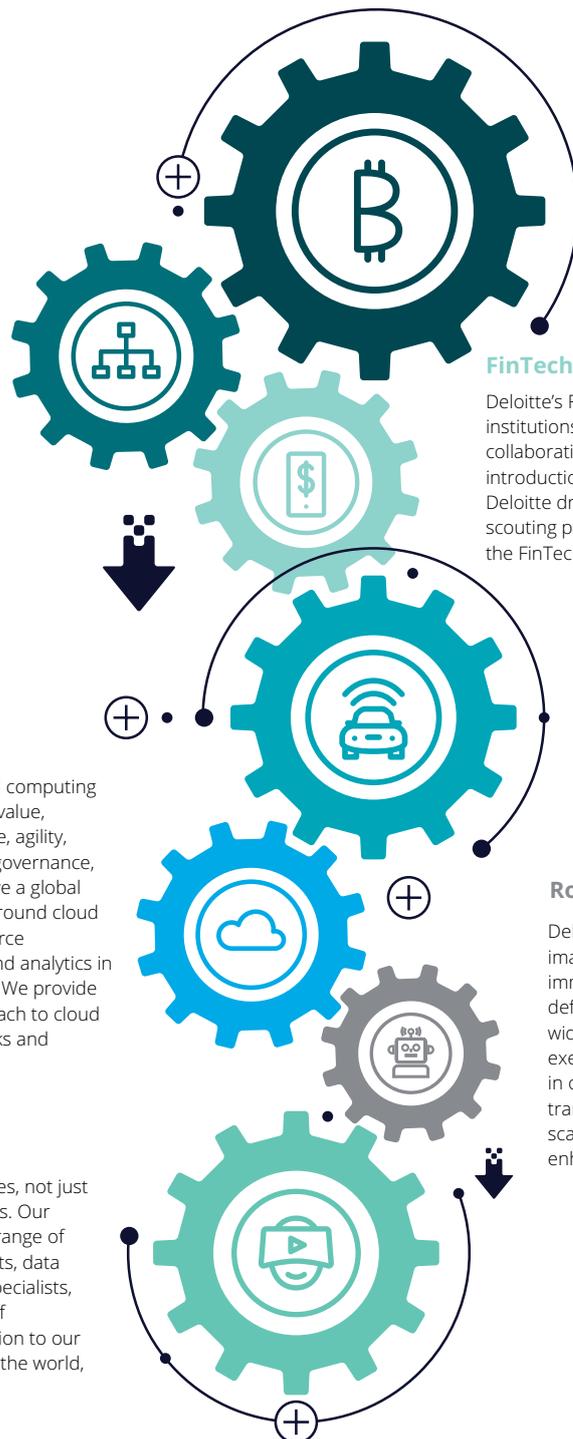
Deloitte Analytics Institute is a unique accelerator to enable your business of tomorrow by leveraging the potential of big data and advanced analytics. Close collaboration with academia, business and technology enables us to provide you with innovative and cutting-edge solutions to generate and increase measurable business benefits. We believe in end-to-end enablement: from the joint identification of analytics opportunities aligned with strategic business goals, to the development of intelligent, cognitive systems and design of big-data architectures, to the implementation of innovative solutions and cutting-edge platforms.

Cloud

Deloitte has unique, cross-functional cloud computing services that unlock measurable business value, enabling innovation, competitive advantage, agility, scalability and flexibility, while addressing governance, risk and compliance requirements. We have a global breadth and industry depth market view around cloud computing as an enabler and disruptive force supporting mobile, social, cyber security and analytics in a framework of the post-digital enterprise. We provide clients with a unique and pragmatic approach to cloud computing that focuses on technology, risks and business transformation.

Artificial Intelligence

Deloitte Analytics deliver powerful outcomes, not just insights, for our clients' toughest challenges. Our analytics practice is built around the wide range of needs our clients bring to us. Data scientists, data architects, business, domain and design specialists, and application engineers bring a wealth of business-specific knowledge and visualization to our clients. We deploy this deep talent all over the world, at scale.



Blockchain

Deloitte helps clients explore every aspect of blockchain and build tailored solutions designed to deliver value. Through architecture, digital design, and development, we serve our clients in their quest for innovative blockchain solutions that are market-ready and address real business issues.

FinTech

Deloitte's FinTech team is uniquely placed to assist institutions to embed FinTech innovation through collaboration, acceleration and integration. Whether it be introductions to the industry or to specific start-ups, Deloitte draws on its global network and powerful start-up scouting programs to introduce institutions to the best of the FinTech ecosystem from across the world.

Internet of Things

The Deloitte Digital IoT practice is a dynamic blend of technologists, strategists, and designers who use technology, data, and science to drive major business innovation. By mixing in creative vision and significant industry expertise, our IoT practice is helping our clients reimagine—and rewire—business-as-usual.

Robotic Process automation

Deloitte provides a portfolio of services and assets to imagine, deliver and run intelligent automation. Through immersive events, we expose and explore opportunities to define the vision, strategy and business case for widespread adoption across the enterprise. We help executives refine the design, tools and methods necessary in order to rapidly scale up automation. As the business transformation takes shape and the benefits are realized at scale Deloitte provides bot management, maintenance and enhancement.

We harness innovative technologies across a set of “integrated offerings”

At Deloitte, we help organizations formulate forward-looking digital strategies that can be translated into actionable results based on practical and real-world experience of helping them to execute their strategies through a set of “integrated offerings”:

- Strategy, Analytics and M&A
- Customer and Marketing
- Business Operations
- Human Capital
- Enterprise Technology and Performance

How to benefit from our offerings



Meet strategic and regulatory demands faster

Our end-to-end capability map makes it easy for you to identify the critical strategic and regulatory requirements needed to operate your functions as well as the steps you'll need to take to mature your overall capabilities over time.



Get to market faster

Capitalize on our diverse, globally recognized brands and capabilities to elevate the human experience in everything we do for our people and every outcome we deliver for our clients.



Lower your delivery costs

Leveraging cloud and open-source technologies will provide you with a lean and efficient operating capability that can reduce your development and ongoing running costs.



Ever evolving growth

Our Business Operations portfolio offering combines functional and technical capabilities to help clients transform, modernize and run their existing technology platforms and helps them take advantage of new technologies.



Impeccable technology and innovation

Our technology platform provides you with a ready to go and fully comprehensive delivery capability offering your business the chance to embrace modern engineering practices while providing flexibility to integrate with your legacy systems where required.



Become a top employer of choice

Our Human Capital portfolio offering helps organizations manage and sustain their performance through their most important asset: their people.

Explore our Deloitte Digital Center – Riyadh, KSA



A space where you are offered the opportunity to experience applications of cutting-edge technology in action. The studio will take you on a journey to enable them imagine and visualize how new technology can create an impact on your business.



A pool of resources organized around key technologies, provided with the right environment, and equipped with all the tools, required to enable them develop solutions in demand from all our clients' engagements.

Let's talk

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