A network diagram background consisting of interconnected nodes and lines, with some nodes highlighted in blue. The diagram is spread across the page, with a larger, more detailed version in the top left and smaller, more sparse versions in the bottom left and right.

BLOCKCHAIN TECHNOLOGY

FROM HYPE TO REALITY

February 2017

Infosys® |  Finacle

Let's Talk Payments
LTP

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Foreword



Last year, the Infosys Finacle – Efga Innovation in retail banking report stated that, 61% of the banks perceived blockchain will have a significant impact on emerging banking business models in the next three-four years. Within a short span of time, our new study reveals that banks are not only endorsing this technology as revolutionary, but they are actively investing in it – *50% of banks are already investing in Blockchain or will invest in 2017*. This study, covering more than 100 senior financial services professionals from over 75 organizations across the world, also highlights that the average investment in *blockchain projects in 2017 is expected to be about \$1 million*.

While the report reiterates the near unanimous agreement about blockchain's transformational potential, several questions remain: How soon can the industry create collaborative networks with this technology? Can the technology meet the scalability requirements? How can we tackle the lack of governance models with? How do we integrate multiple networks with existing infrastructure?

With several open questions, it is understandable that banks aren't deciding in a hurry – with 50% stating that they will invest when the technology is more mature. As a technology partner to banks across 94 countries, clients often ask us how to effectively use this technology to discover its benefits that are contextual to their business. Our consistent advice to them is that they shouldn't wait for all answers to

emerge. Banks must experiment with the technology in a controlled environment to discover the value it can bring in their context and basis that commit towards production deployments. The study further reaffirms this belief. Our recent successful [blockchain technology](#) pilot with ICICI Bank Limited, India's largest private sector bank by consolidated assets, and Emirates NBD, the leading banking group in Middle East, using the [EdgeVerve Blockchain Framework](#) was also one such step in this direction.

Blockchain offers immense possibility, and can be implemented in a range of banking operations, from trade finance to international payments and securities trading. It is important for each bank to determine the area where blockchain fits best in their transformation strategy and then initiate efforts to apply the technology in real-world processes.

This study was made possible due to the efforts of all the respondents who took time out for answering this survey. The insights from their responses, give us further headway into the opportunities and challenges associated with blockchain and its future in the industry. We hope you will find it useful while crafting your organization's blockchain adoption strategy.

Sanat Rao
Chief Business Officer and Global Head,
Infosys Finacle



2 Executive summary

Ever since the first Bitcoin transaction was carried out in **January 2009**, the digital currency has been a topic of intense debate. While banks and regulators have been wary of bitcoin and other virtual currencies, their underlying technology, namely a distributed ledger technology, has been attracting the attention of banks and startups and technology companies. The disruptive potential of blockchain is widely claimed to be equal to that of the Internet.

The debate has now moved onto the topic of adoption and on how to implement a solution using blockchain. The technology has created a new set of opportunities for banks to partner with startups exploring niche business areas. Banks are eager to grab these opportunities, and are open to testing and cementing partnerships provided these firms have common goals and vision. The recent DTCC announcement of \$11 trillion investment to process derivatives with blockchain, has instilled further faith in the potential of this technology.

Top banks across U.S., Europe, Australia, Asia and Middle East are exploring blockchain applications by either partnering with startups /technology partners, or by creating innovation labs to test their proofs-of-concept. Santander, for example, claims to have identified 20 to 25 use cases, with a focus on international payments and smart contracts. Barclays is reportedly focusing on 45 internal use case

experiments. Infact, the recent pilot implementation success by India's largest private sector bank by consolidated assets, ICICI Bank, and the leading banking group in Middle East, Emirates NBD on two use cases, just pushes the envelope forward.

With so much happening around blockchain, **Let's Talk Payments (LTP) and Infosys Finacle** partnered to explore the next phase in the adoption of this technology through a survey among key decision makers in financial institutions.

Thus survey aims to understand the following, w.r.t blockchain and the financial services industry:

- **Investments, focus areas, and use cases**
- **Adoption strategies**
- **Opportunities and challenges in implementation**

The survey respondents included more than 100 business and technology leaders from over 75 financial institutions ranging from small regional banks to multinational banks.

Our findings are summarized in this report.

3 Highlights of the report – Key findings

- 50% of banks surveyed have already invested in blockchain technology or will do so in 2017
- Average investment in blockchain projects in 2017 is expected to be about \$1 million
- 33% of respondents expect to see commercial blockchain adoption by 2018, while a majority of 50% expect to see it by 2020
- Majority of banks surveyed, about 69%, are experimenting with permissioned blockchains, while 21% plan to use hybrid variants
- Cross-border payments, digital identity management, clearing and settlement, letter of credit process and syndication of loans are the top 5 use cases chosen by the respondents as the most likely for commercial adoption
- About 50% of the banks surveyed are either working with a FinTech start-up or technology company to augment their blockchain capabilities, while another 30% have opted for the consortium model
- 'Readiness of ecosystem' and 'Lack of governance models among stakeholders' collectively emerge as the top 2 challenges
- 'Improved transparency among counterparties' and 'reduction in settlement and transaction time' are the top 2 benefits
- 74% of banks surveyed, stated, that executives driving blockchain initiatives in their organizations are either Chief Technology Officers, Chief Innovation Officers or Line of Business Heads

4 Investments, Focus Areas and Use Cases

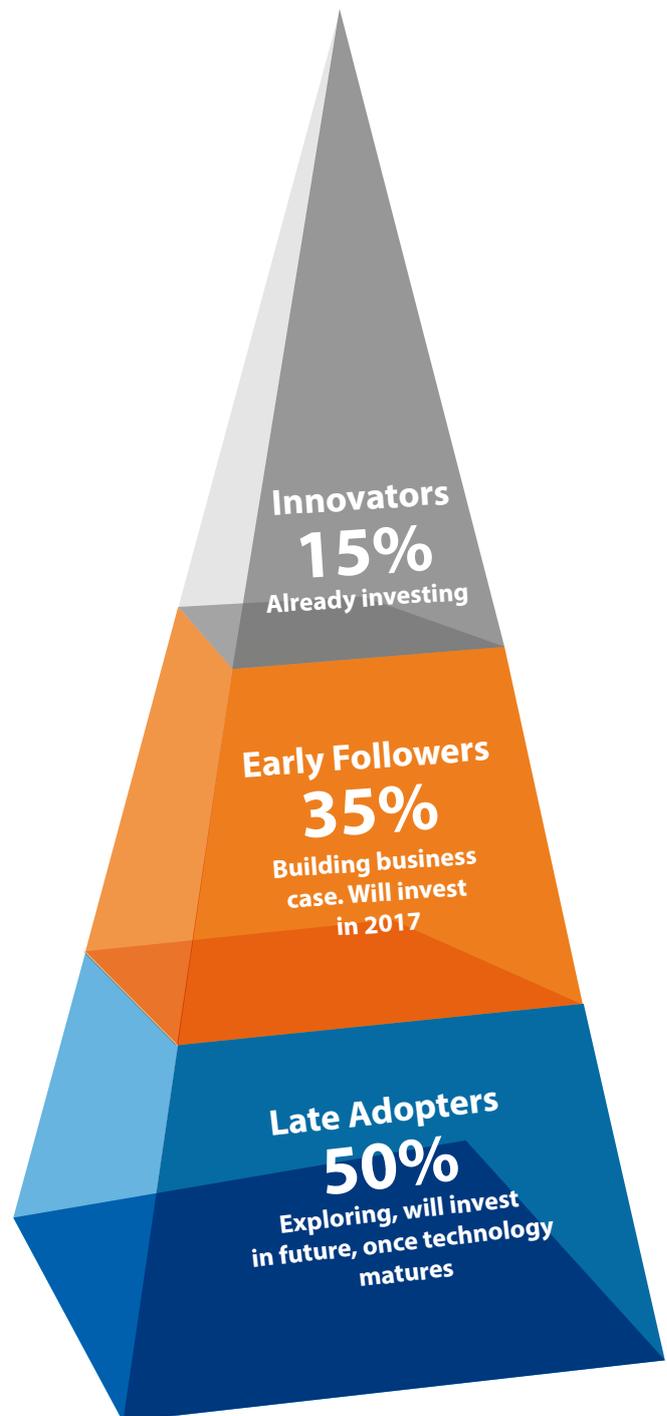
Innovators, Early Followers and Late Adopters

About 50% of the respondent banks indicated that they are waiting for the technology to reach a more mature stage. These banks are planning to explore limited use cases in the short term before making wider investments.

35% of the respondents fall under the category of 'Early Followers'. These are financial institutions that have identified business cases for blockchain that are suitable for their organization strategy and are looking to invest in the near future. Planned investments from these banks are in the range of 1 million USD to 10 million USD.

The true 'Innovators' have already started blockchain initiatives in full scale with either dedicated teams to support these efforts or through partnerships with technology startups or companies. About 15% of the banks surveyed fall in this category.

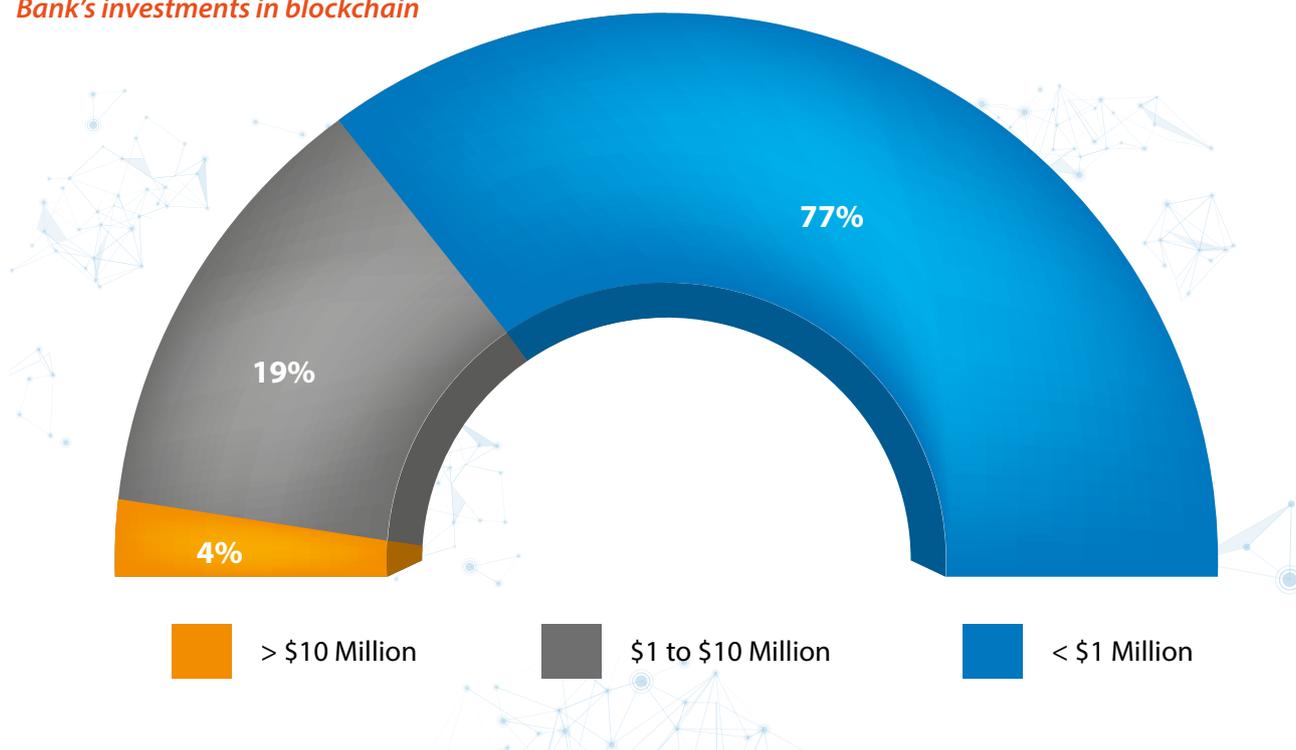
They have already invested funds of over 10 million USD, to support the initiatives and are experimenting with use cases beyond the traditional ones like cross-border remittances and clearing and settlement. Seizing early mover advantage, these banks have taken the first step towards forming and defining what could well be one of the first blockchain ecosystems in their industry.



Investments in blockchain are expected to rise in 2017

A majority of the respondents (77%) indicated that their investments are in the order of 1 million USD. 4% of the respondents have invested more than 10 million USD. However, this proportion is set to increase - the respondents who indicated that their investments are in the 1 to 10 million USD range (19% of respondents) plan to increase investments in blockchain-based technology enablers.

Bank's investments in blockchain

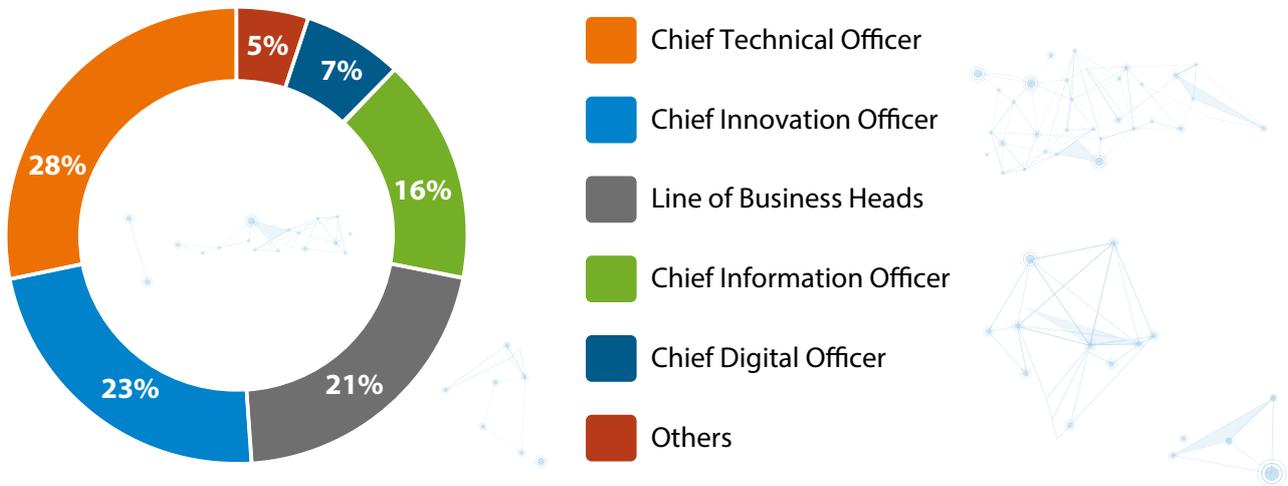


Technology, innovation and business heads drive blockchain investments

Banks' blockchain investments are currently being driven from several directions. While a majority of the stakeholders are CTOs or Innovation Officers, Line of Business Heads are also increasingly becoming key decision makers in their firm's blockchain journey. CTOs are driving the blockchain-based initiatives in 28% of the banks surveyed, while in 23%, innovation officers lead the way. Because of the variety of ways in which blockchain can be applied, it has caught the eye of business heads and accordingly, in 21% of the respondent banks, the initiatives are being managed by

Heads of Lines of Business. A small fraction of the respondents (16%) indicated that the initiatives are managed by the offices of Chief Information Officers, mainly because they are involved in other business systems as well.

Who drives blockchain investments in banks and financial institutions?



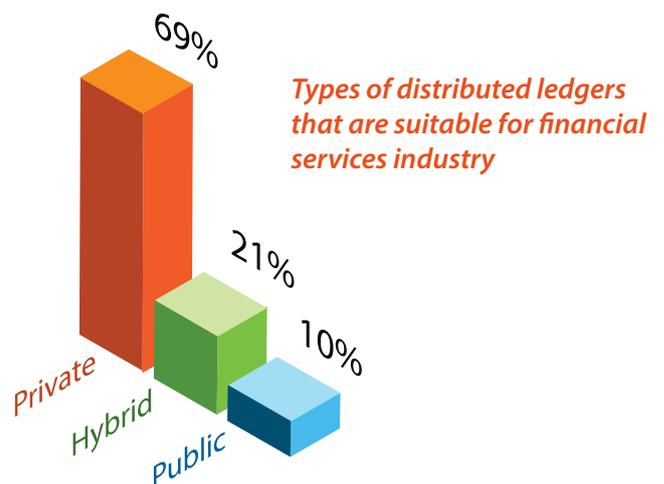
Private Permissioned Block-chain is the popular choice, with a whopping 69% of banks in their favour

The security of customer and transactional data is paramount for Financial Institutions. Public blockchains, come with security concerns and therefore a majority of banks are adopting private permissioned blockchains to address security concerns. Private blockchains also offer greater flexibility, dependability and adaptability compared to public blockchain infrastructure.

- 69% of banks surveyed indicated that they are experimenting with private blockchains. Apart from data security concerns, banks are also faced with ambiguity on regulatory approval for public blockchains as these do not provide blacklist checks Know Your Customer /Anti Money Laundering checks, leading to operational risks
- About 21% of banks indicated that they have adopted or are planning to adopt hybrid blockchains

Information Snippet

- **Public blockchain is a completely decentralized blockchain where anyone can join the consensus process.**
- **Hybrid blockchain is a consortium blockchain where the consensus process is controlled by a preselected set of nodes.**
- **In a private blockchain, access permissions are more tightly controlled, with rights to modify or read restricted only to a few users.**

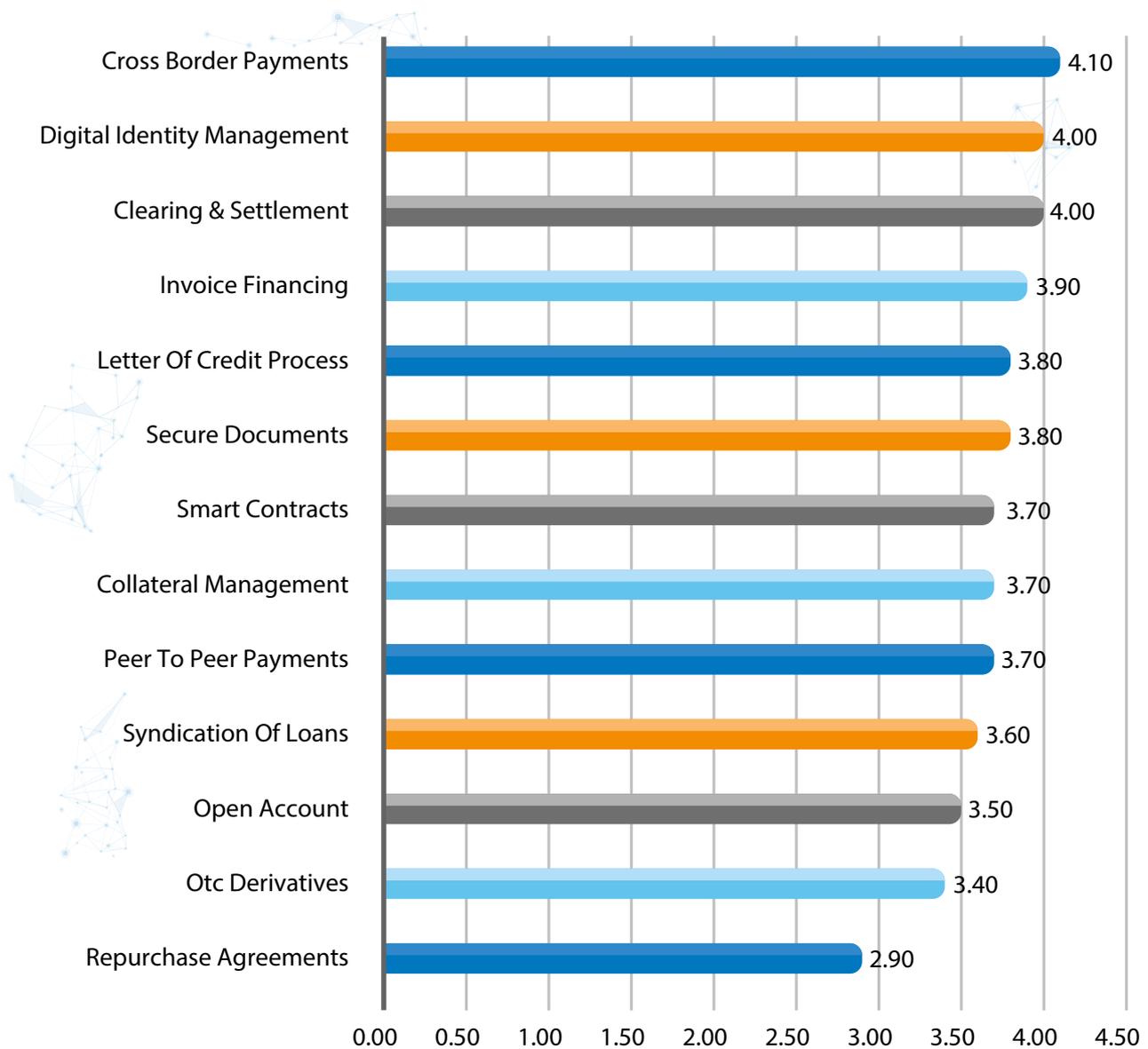


Cross-border payments, digital identity, clearing and settlement - the most preferred use cases for blockchain application

Banks have explored a variety of blockchain use cases in financial services – both traditional and non-traditional. The most preferred use-cases are the ones which help lower costs and complexity in business processes and increase operational efficiency, as this survey reaffirms.

Cross-border payments, digital identity and clearing and settlement, closely followed by Line of Business use cases like invoice management and Letter of Credit are the top 5 use cases chosen by the banks.

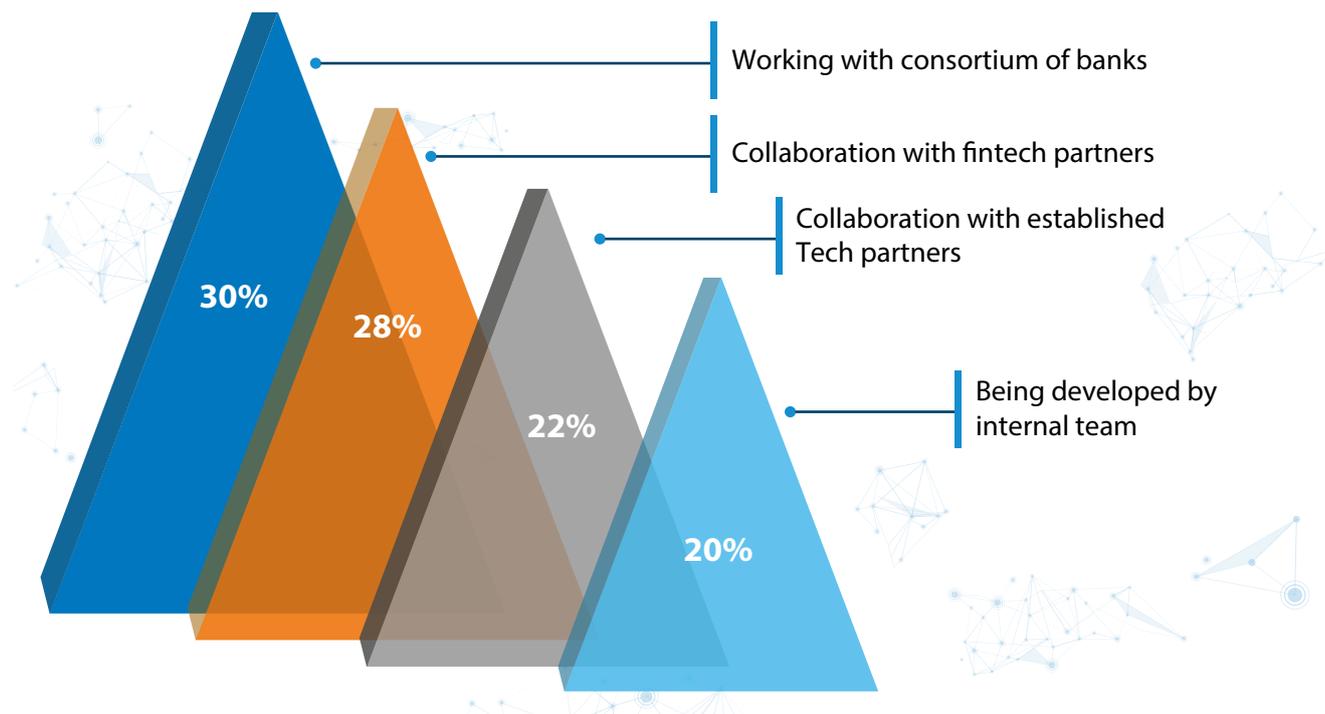
Priority use cases testing and application for a financial institution



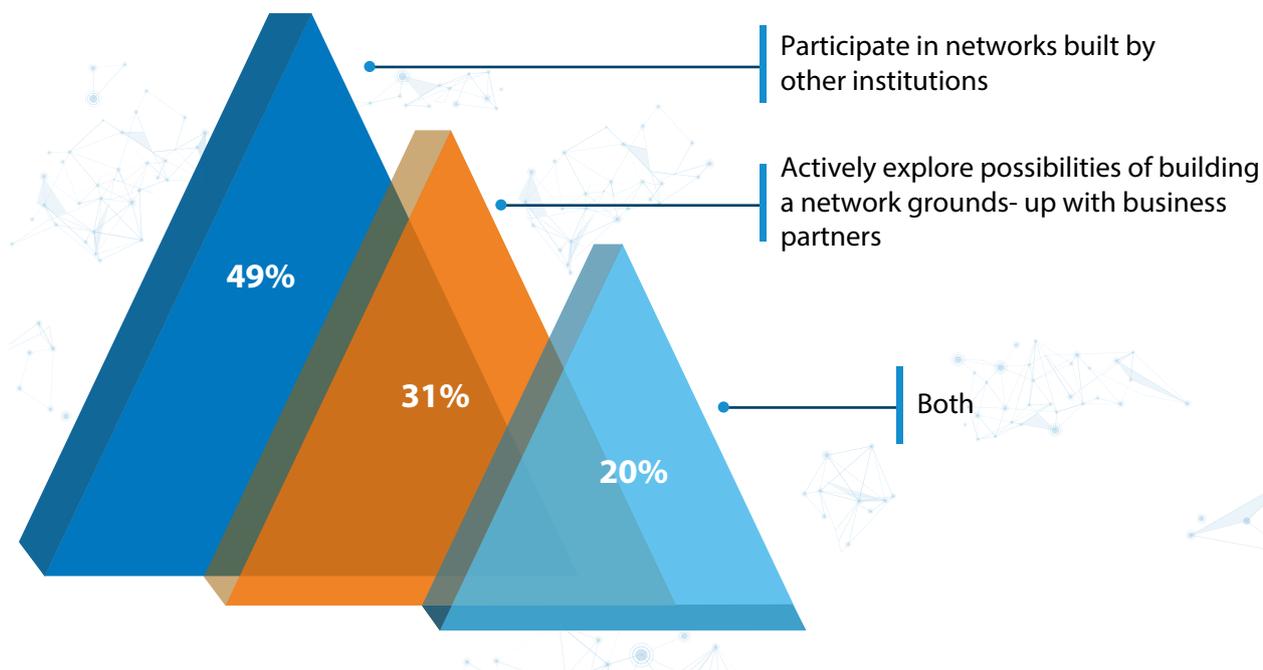
Partnerships key to blockchain use case implementations

A distributed technology platform such as blockchain can achieve its true potential only when supported by a network of businesses and partnerships. It comes as no surprise therefore, that a majority of banking respondents (80%) indicated that they are partnering with technology firms, FinTechs, peers and central organizations for developing blockchain applications. For building a network around blockchain, the preferred route for majority of the respondents (49%) is collaboration with already existing networks.

Developing business applications using blockchain



Building network with other participants



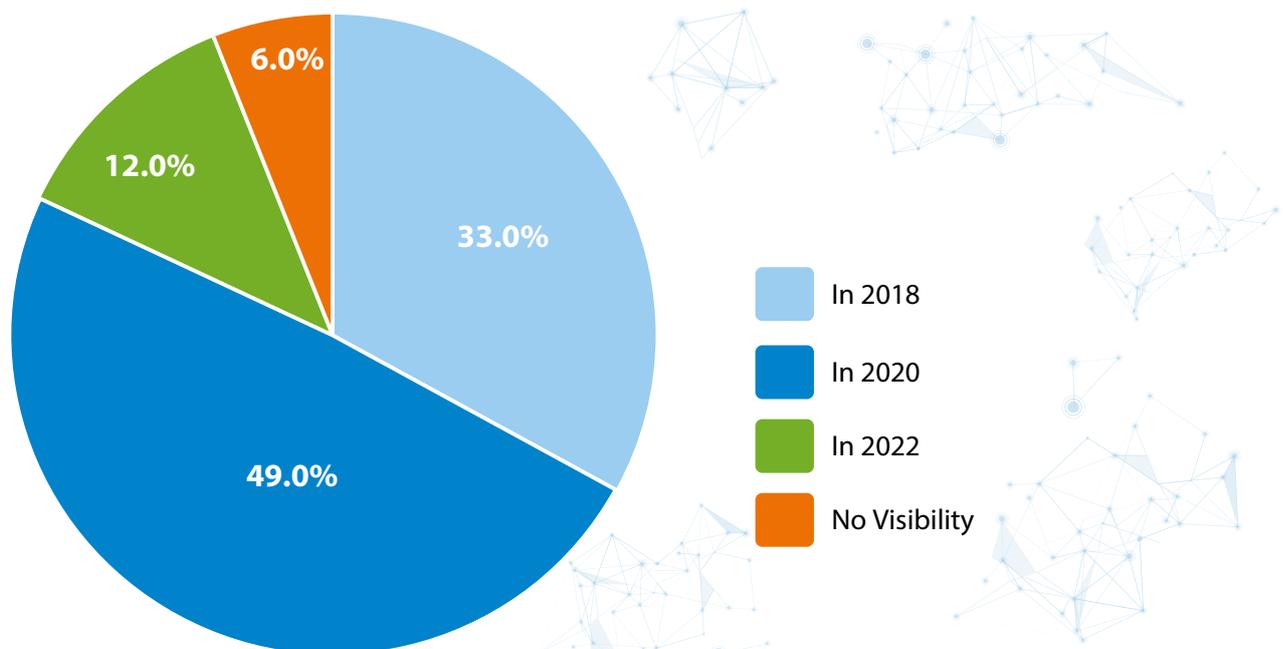
5 Adoption strategies

Commercial adoption not too far: 80% of banks expect large commercial adoption by 2020

According to the survey results, 80% of the respondent banks expect the financial services industry to adopt Blockchain-based applications commercially by 2020. And the top business areas where banks expect this technology will be applied for a commercial offering are cross-border remittances, digital identification, invoicing and trade finance.

The banking industry has picked up blockchain as one of the core technology areas of the future and 33% of the bankers in the survey said they will see a commercial offering by the end of 2018, while 49% indicated that they expected to see it by 2020.

Timelines for commercial adoption

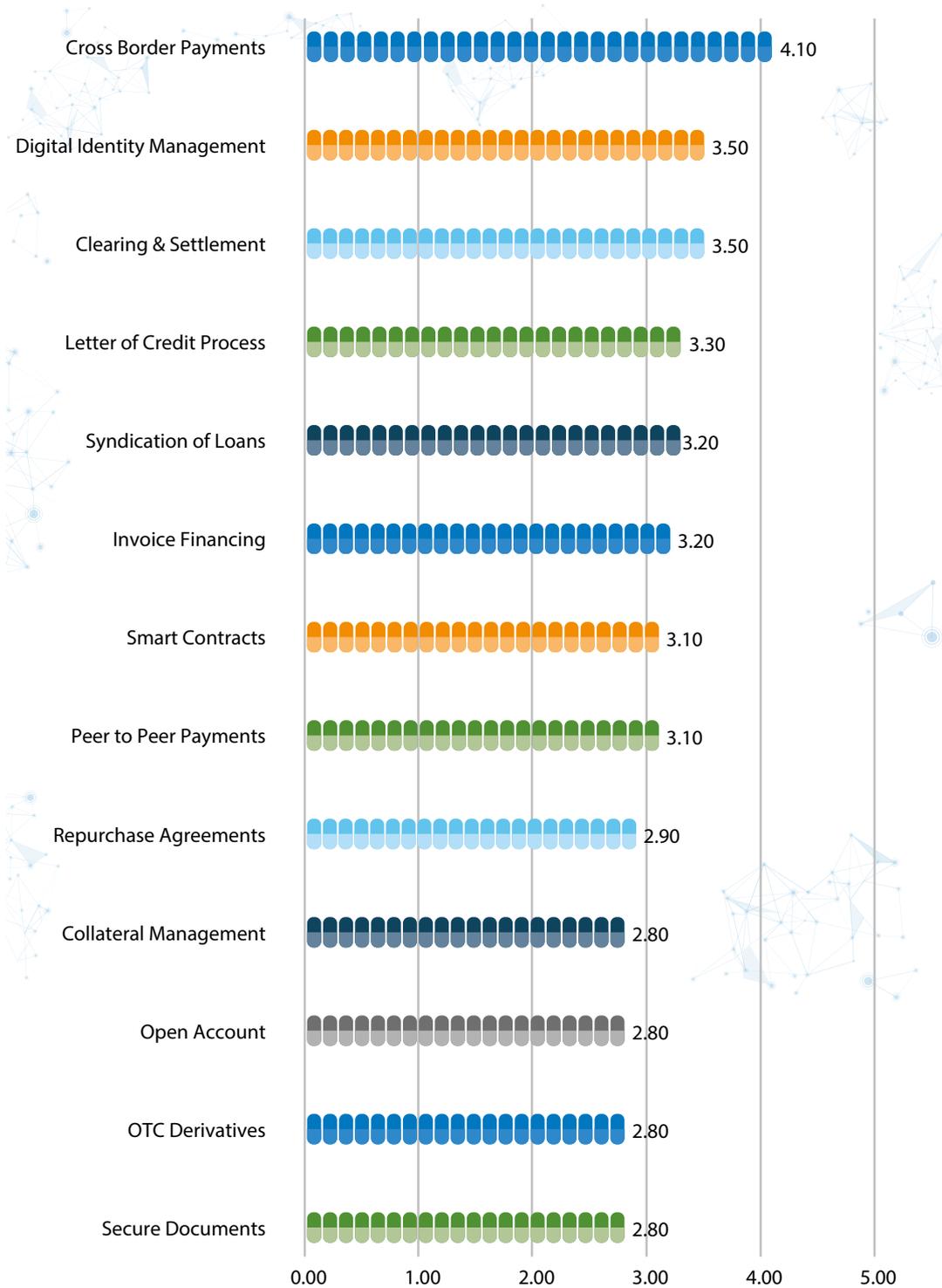


Use cases – which are the ones headed for production first?

Over the last 5 years, organizations have steadily experimented with various blockchain use cases. Interestingly enough, many of these areas have not reached the production stage. As adoption increases, some areas have emerged as front-runners in the race to production. According to the survey respondents, cross-border payments is the clear winner in this race with the respondents indicating that they expect commercial solutions to emerge in this area in 2017 itself.

Apart from this, almost 7 use cases have gained equal mindshare among banking firms namely – **Trade Finance (LC and Open A/C), Syndication of Loans, Clearing and Settlement, digital identity management, invoice financing and smart contracts**. Respondents expect commercial solutions in all 7 of these areas.

Priority areas for blockchain technology application, commercially



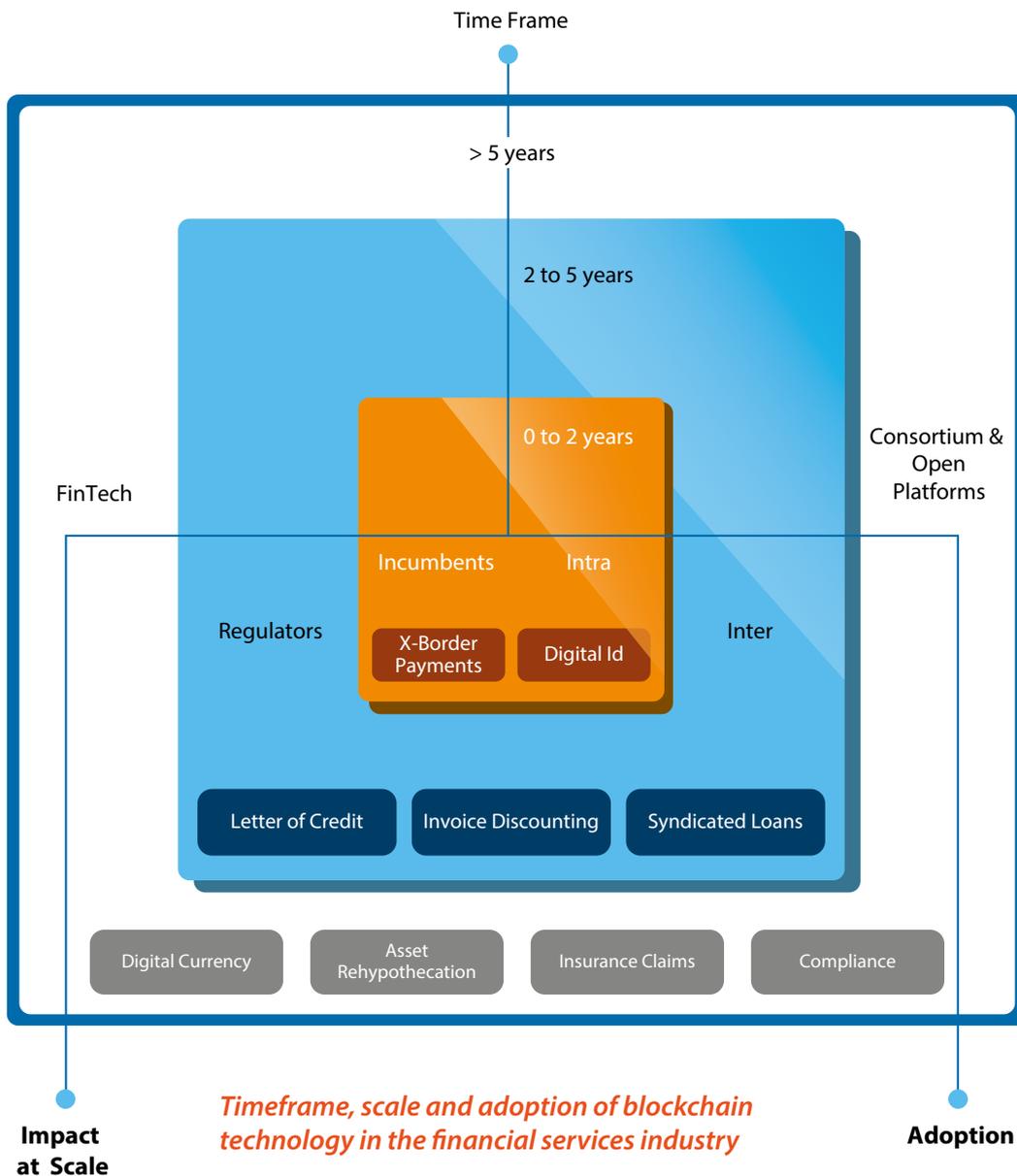
Based on the responses from the surveyed banks, we believe, that the banking industry should see blockchain projects going into production in 2017 itself – albeit in a small way and for simple use-cases. However, the impact at scale, would be felt only when there is adoption across the ecosystem which is still 2–5 years away by 2020. Early adoption would confer benefits in terms of blockchain capabilities and readiness from a process and technology perspective.

If you notice the logical progression of implementation of use cases in the diagram below, it reiterates that adoption of blockchain will begin at the most convenient areas (that will help banks not only experiment to test the technology, but can be done within a budget), slowly progressing towards more transformative areas. This is because banks and Financial Institutions want to create networks with already established partners in the industry who are already aligned with their process, or internally.

Accordingly, we believe, the first use cases that will see the light of the day from now to the next 2 years are intra bank use cases, or use cases which can be tested with incumbent inter-bank relationships. These are most likely to be in areas such as digital identification and cross border payments. Moving on, in the next

2-5 years we will see more of inter-bank use cases, and cases that involve regulators – such as trade finance. Beyond 5 years, we will see the larger adoption of this technology in the financial services and banking ecosystem.

Progressively, by 2020, the adoption of Blockchain-based applications will increase in several business. We will see the larger ecosystem adopting this technology which will include players like the government, corporations from other industries and possibly even end consumers. For example, if we take the case of trade finance, a lot of corporations, shipping companies and governments will start using the ecosystem built on this technology and adopt the new processes.



We also asked banks about the key challenges and opportunities of the implementation and commercial adoption of blockchain technology in this industry.

While 'readiness of ecosystem' and 'integration with existing banking systems' were voted the most pressing challenges, a majority of banks identify with one or more of the challenges on the list equally. Further, with regulatory and compliance policy pressures, financial institutions find it difficult to invest effort and capital in new technologies.

Let us have a deeper understanding of some of these challenges.

6 Opportunities and challenges for Financial Institutions

Top 2 Challenges: 'readiness of ecosystem' and 'integration of blockchain applications in existing ecosystem'

We also asked banks about the key challenges and opportunities of the implementation and commercial adoption in blockchain technology in this industry.

While 'readiness of ecosystem' and 'integration of blockchain applications in existing ecosystem' were polled the most pressing challenges, a majority of banks identify with one or more of the challenges on the list equally.

Following is a detailed description on the polled challenges.

- **Lack of co-operation between banks/FIs** – Blockchain as a technology is network-based and for any such technology to gain competence in a business sense, parties in the industry should co-operate with each other to implement its most-suitable use. Though world over there are a lot of consortiums that are emerging/have emerged, the co-operation has to extend to the next level, where

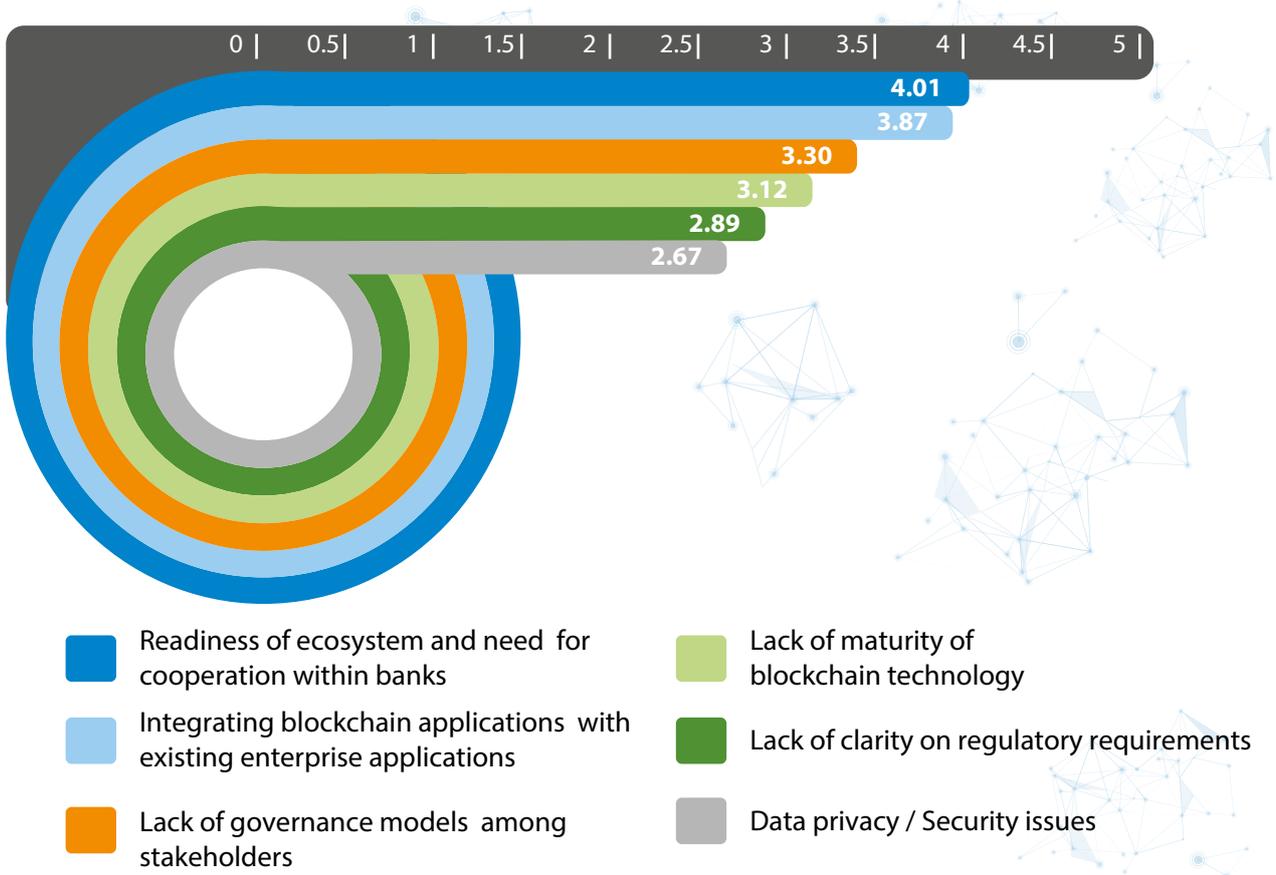
regulators, compliance keepers, banks and FIs – all such institutions collaborate along with technology firms. Without such deep co-creation, a single entity, be it technology firms, banks or regulators, cannot create a meaningful implementation of this technology for business.

- **Lack of understanding of the technology** – though not as widespread as earlier, FIs are still unaware of the technology and the difference between blockchain and bitcoin. There is also wariness in accepting this technology which is widely misinterpreted as an alternative banks.
- **Delay in decision-making** – the delay in decision making by business heads of FIs and regulators is causing this potential technology to languish at various levels in the POC stage. FIs have to make a business decision to apply this technology to real world processes and business areas. To do this, they have to initiate dialogue with regulators and technology providers
- **Technology limitations** – the technology in itself, is a great simplifier that reduces the overhead of financial processes - from international money transfers, to complex derivative contracts. However, in its current state blockchain has a few limitations such as scalability at lower costs, transaction finality, or manageability. These problems arise as the financial service ecosystem has very few built-in systems for governance, in addition to an inability to meet compliance requirements in the case of public blockchains.

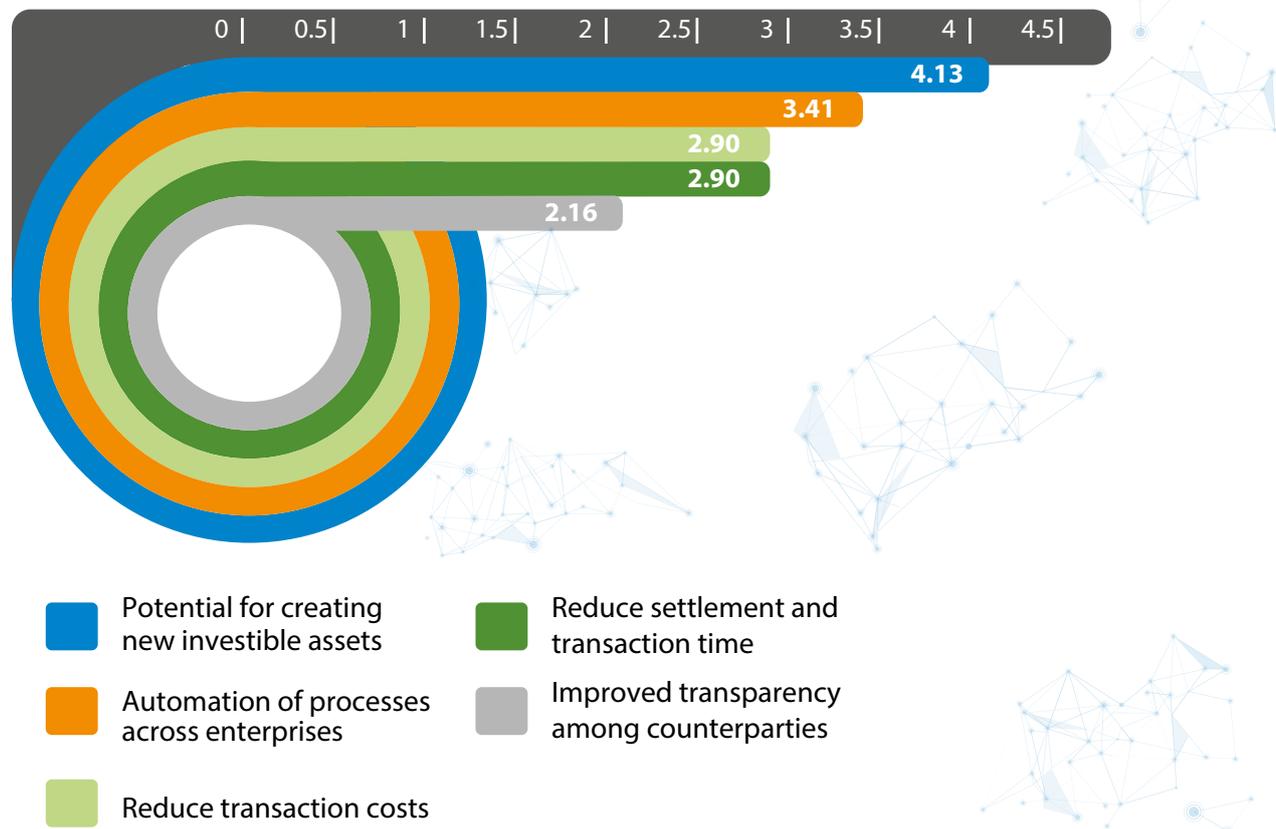
Top 2 opportunities : 'improved transparency among counterparties' and 'reduction in settlement and transaction time'

In spite of these challenges, banks still view blockchain as an opportunity. Most respondents that were polled see speed, transparency and automation as the top benefits of using this technology. Progressive banks around the world tout blockchain as a game changer and therefore these results showcase their optimism and excitement in leveraging this technology for a better business.

Challenges in implementing blockchain technology



Opportunities in using blockchain technology



7 The way forward

Through the survey results we can safely assume that blockchain technology would be a key focus area for banks for the next 2 years. It is no longer a question of whether banks will adopt blockchain, but when and how they will implement it. In our view, there are two approaches that banks are looking at – internal and external implementation. Banks might start with use cases that can be tested internally and build their blockchain capabilities before going ahead and collaborating with their peers. In terms of external implementation, there are already a number of banks that have started their experimentation in collaboration with technology partners and by forming consortiums. Following is our brief assessment on how we see the adoption of blockchain unfolding in the next decade.



Phase 1 – Understand Blockchain's Value for Financial Services Industry

- Banks and financial infrastructure intermediaries formed industry groups to discuss opportunities
- Bank-led closed user groups with peers, technology partners, and FinTech
- Industrywide collaboration projects on the lines of R3 and Linux Hyperledger Foundation



Phase Phase 2 – Proof of Concept

- Identify key use cases for POCs that have a specific impact on business, and assess if blockchain can scale to reduce costs while maintaining security
- Engage with regulators, auditors, peers, and ecosystem to focus resources on most important and inefficient processes that will benefit from blockchain adoption
- Goal of POC must be to assess if blockchain based processes offer benefits beyond existing technologies in terms of performance, cost, speed, and scale
- While there may only be a couple of viable blockchain consortiums left standing in 2017, industry players will have to cooperate and collectively agree on open standards that are flexible and versatile.
- Governments and regulators will also play a key role, protecting consumers yet fostering innovation.



2019-2020

Phase 3 – Shared Infrastructure Emerges

- Industry players start to adopt technology products that may be specific to business lines
- Leveraging shared infrastructure, APIs and interfaces for a wider use of technology
- As blockchain implementations begin, we'll see a paradigm shift toward standardization and consolidation
- FIs that were once in competition will realize the benefits of a unified approach for various business operations, such as accelerated trade processes, enhanced detection, and better data management.



2021-2025

Phase 4

- Proliferation of blockchain-based networks
- Interoperability standards and communication channels will be further strengthened

Any implementation or POC for blockchain would need collaboration between banks, platform providers, FinTechs, and regulators. Regulators will have to provide clarity on policies while Platform/FinTech providers will lend themselves to building the technology infrastructure. The entire ecosystem needs to come together for blockchain technology to proliferate.

While blockchain still maybe some way away from massive mainstream adoption, banks are already seeing the benefits from the implementation of POCs. However, **blockchain isn't merely a disruptive technology**. When adopted, blockchain will create a new foundation for banking processes. It will introduce efficiency in banking transactions and change the way we exchange value and money in the society.

The potential that blockchain offers in terms of cross-industry collaboration is unmistakable and it won't be long till we start seeing blockchain move out of POCs into production.



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