



## **Blockchain technology in India**

Opportunities and challenges

April, 2017

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## Message from Deloitte

A new disruptive force of digital technology is changing the business models and increasingly becoming a crucial factor around the world. The promotion and adaptation of digital technology

Blockchain technology is generating significant interest across a wide range of industries in India. As the field of applications for Blockchain grows, industry leaders are customizing and tailoring the technology to fit multiple use cases.

In India, Blockchain adoption has seen a lot of traction in 2016. Many banks and business conglomerates have experimented with Blockchain across a range of use cases. Although Blockchain is still in its nascent stage, Bitcoin—the most popular use case of Blockchain, has picked up quite well in India with a number of Bitcoin exchanges and wallets spreading across the country. The regulatory bodies have also taken cognizance of the potential of Blockchain technology and are forming working groups to understand and oversee its growth in India.

Being a part of Institute for Development and Research in Banking Technology (IDRBT) working group, Deloitte is keenly involved in understanding the trends of the early adopters of Blockchain in India to understand the challenges they faced while conducting proof of concept using this distributed ledger technology.

The interest around Blockchain in India needs to be taken to the next level where we see more pilots and production ready applications. With government bodies, consultancy firms, technology giants, and start-ups coming together on multiple platforms, there are lot of exciting days ahead for Blockchain in India.

This publication reviews the concepts of Blockchain as a technology, the various use cases explored on it and initiatives around Blockchain in India. In addition, the challenges faced by the early adopters in developing Proof of Concept and the various mitigation steps undertaken have been discussed.

I wish to acknowledge the contributions of my colleagues Binaifer Karanjia, Shankar Lakshman and Saurajit Goswami for their efforts in preparing the comprehensive report.

I believe ASSOCHAM event and this report will help generate more awareness about Blockchain in India. I express my best wishes for all stakeholders participating at the summit.

With best wishes,



**Rajarshi Sengupta**  
Chief Innovation Officer  
Deloitte Touche Tohmatsu India LLP

# Message from ASSOCHAM

A new disruptive force of digital technology is changing the business models and increasingly becoming a crucial factor around the world. The promotion and adaptation of digital technology by the government of India for implementation of its public policies and schemes that aim at economic reforms are unique in terms of considering the prioritized need for making the services available at ease through digitalization. The corporates, banking, insurance and other financial and non-financial service sector institutions in India are also undergoing massive digital transformation.

In this phase of transformation through digitalization the application of Blockchain Technology is the most innovative one which is being considered as global force of disruption. The Blockchain Technology is gaining attention of even smallest size of producer in India too. The elegance of the Blockchain is that it obviates the need for a central authority to verify trust and the transfer of value. It transfers power and control from large entities to the many, enabling safe, fast, cheaper transactions in a completely transparent manner.

Since, the Blockchain Technology is being seen as an infrastructural need of Indian industries to compete in the global market, hence it becomes imperative that its relevant perspectives, regulation, and result aspects are discussed and shared for advancement of subjective as well as practical know-how.

In this direction, the **ASSOCHAM** is organising **2nd Global Summit “Blockchain Technology- Opportunities and Challenges for Indian Economy”** in April, 2017 in Bengaluru, India. I hope that the summit is very timely and pertinent on the subject of interest of the corporate participants to enrich their knowledge for their informed decisions.

I wish to acknowledge the contributions made by the expert team of **ASSOCHAM Corporate Affairs** and **Deloitte** for their untiring efforts in preparing a comprehensive Knowledge report.

I am sure this Knowledge report will give a rich insight and adequate knowledge to all the stakeholders.

I express my best wishes for a great success of the summit to the organising team, delegates, speakers, sponsors, and participants.

With best wishes,



**Sandeep Jajodia**  
President  
ASSOCHAM

# Message from ASSOCHAM

India has economically sustained even in the global financial turbulent times. The contribution of IT sector in the economic growth and progress of the country is quite visible and the government of India is highly supportive in its policies to the digital and innovative technology led projects. India is at the cusp of a digital revolution and disruptive technological Innovations are bringing in new and fundamentally powerful platforms for businesses. At this stage the blockchain technology is emerging as the revolutionary and trustworthy tool as it allows executing and verifying transactions discretely without human interventions.

The blockchain is an absolute and shared ledger. It is a novel approach for data organizing and is relevant to applications across every kind of digital record and transaction. Several companies are contemplating ways to adopt these technologies to its advantage and transform their operations and create newer and sustainable opportunities.

With an objective to provide the impetus towards accelerating the adoption of effective, efficient, and innovative Blockchain Technology in all possible classes and verticals of the organizations and thereby creating a conducive environment for its fairly growth and development in India, The ASSOCHAM is organising 2nd Global Summit on “Blockchain Technology” in April, 2017 in Bengaluru, India

To provide a holistic outlook with adequate understanding of the current industry scenario, regulatory perspectives and prospects, The ASSOCHAM along with Deloitte as knowledge Partner of the Summit has come up with this knowledge report on subject matter.

I am sure this study will enrich the knowledge of all the stakeholders.

I wish the participants of the ASSOCHAM 2nd Global Summit a great success.

With Best Wishes,



**D. S. Rawat**  
Secretary General,  
ASSOCHAM

# Blockchain – the new age business disruptor



## An introduction

Blockchain, mostly known as the backbone technology behind Bitcoin, is one of the emerging technologies currently in the market attracting lot of attentions from enterprises, start-ups and media. Blockchain has the potential to transform multiple industries and make processes more democratic, secure, transparent, and efficient. Though many financial and non-financial players are excited about the potential of this technology, the question that plagues the mind of the industry leaders is how to identify a good business case for Blockchain?

Financial players are the first movers to capitalize on this technology even though it is still in a nascent stage. A study by the World Economic Forum<sup>1</sup> predicts banks and regulators around the world are poised to experiment multiple Blockchain prototypes in 2017. With 90+ central banks engaged in Blockchain discussion globally, 2500+ patents filed over the last three years and 80% of the banks predicted to

initiate Blockchain and distributed ledger technology (DLT) projects by 2017, the Blockchain technology is on its course to become the new normal in the world of financial services.

Many companies, from a plethora of non-Financial services industries like telecom, healthcare and life sciences, travel and hospitality, and energy, are also keeping a close watch on the potential Blockchain use cases to positively disrupt their traditional business models.

## Blockchain and its features

Companies in multiple industries are exploring and experimenting new ways to:

- Execute transactions quicker for an enhanced customer service,
- Ensure cost efficiency in its operations, and
- Assure transparency to customers and regulators.

With huge volumes of data getting generated every day owing to digitization of records, it becomes important for every organizations to effectively manage the security threats and achieve significant cost efficiencies.

This is where Blockchain, with its promises of decentralized ownership, immutability and cryptographic security of data, is catching the attention of the C-suite executives. Multiple use cases are also getting explored across industries as everyone has started realising the disruptive potential of this technology.

<sup>1</sup><https://www.weforum.org/reports/the-future-of-financial-infrastructure-an-ambitious-look-at-how-blockchain-can-reshape-financial-services>



# What is Blockchain?



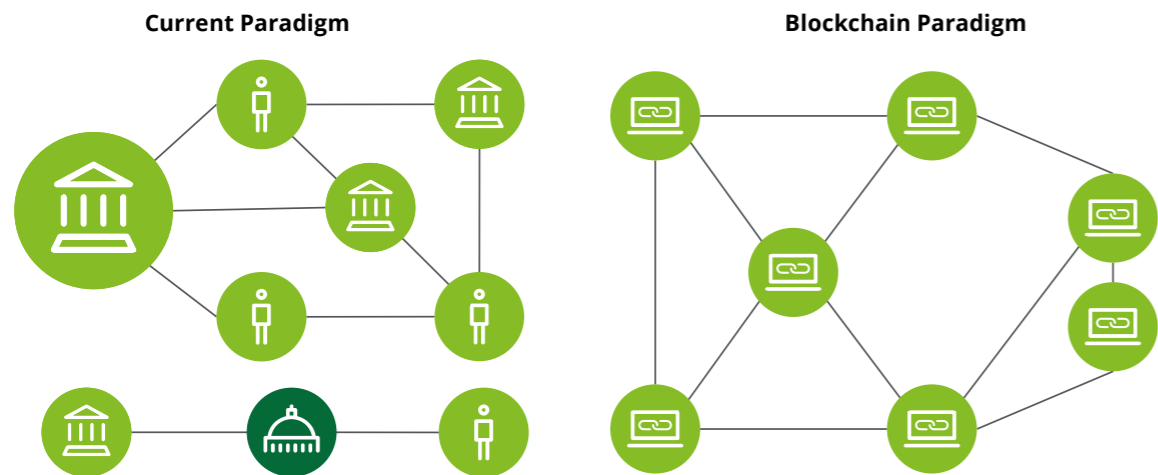
### Understanding the concept

"A Blockchain is a digital, immutable, distributed ledger that chronologically records transactions in near real time. The prerequisite for each subsequent transaction to be added to the ledger is

the respective consensus of the network participants (called nodes), thereby creating a continuous mechanism of control regarding manipulation, errors, and data quality."<sup>2</sup>

Simply put, Blockchain is a protocol for exchanging value over the internet without an intermediary.

Fig 1: Traditional database vs. Blockchain base distributed ledger



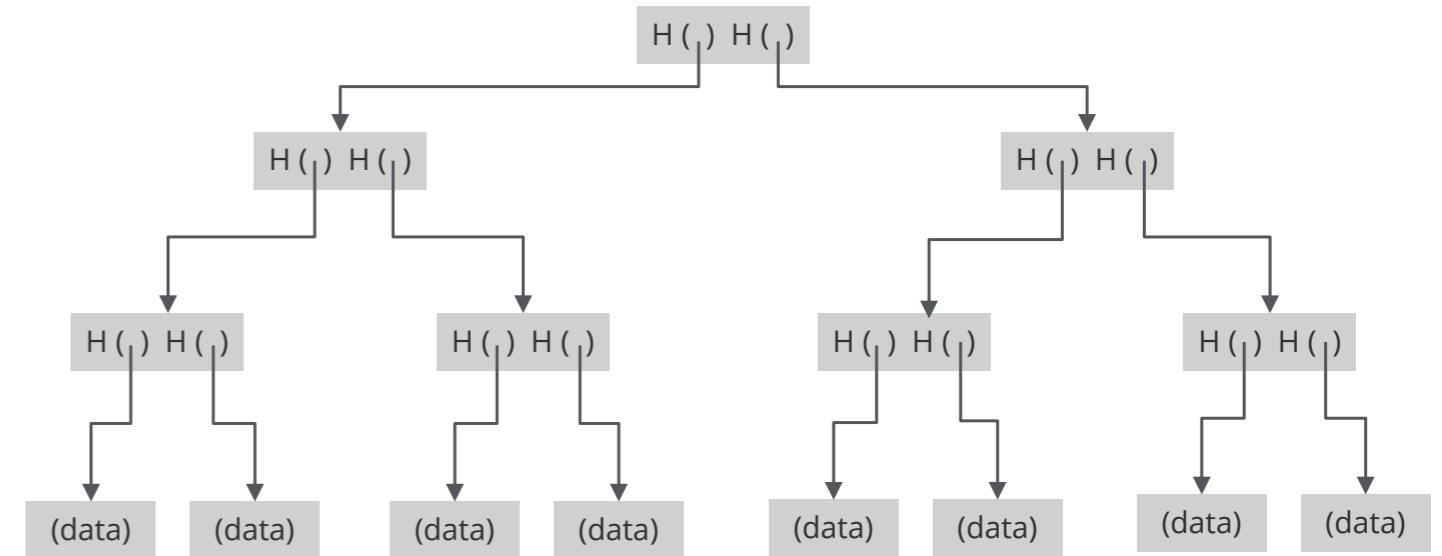
- **Central authorities** transfer actual value between two parties
- **Multiple intermediaries** required to facilitate of assets and create trust

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

The immutability of a Blockchain makes it nearly impossible for changes to be made once established, which increases confidence in data integrity and reduces

opportunities for fraud. The immutability and irreversibility feature of a Blockchain comes from the underlying data structure which is called a Merkle tree or Hash tree.

Fig 2: Merkle tree structure<sup>3</sup>



### Merkle Tree is at the heart of the Blockchain Technology

The cryptographic security in Blockchain comes from a binary data structure with hash pointers. Merkle tree, or hash tree, as it is called, is a distributed data structure where data blocks are grouped in pairs and the hash of each of these blocks is stored in a parent node. This grouping of hash codes continue till the root node. This gives

rise to the immutability of a Blockchain as tampering of any block will lead to tampering of all the preceding hashes till the root node which is tamper proof. The other advantage of Merkle tree is the proof of membership/ownership as knowing the root member is enough to know all the members in the tree. As a result hash tree provides faster processing of data as compared to traditional binary tree.

<sup>2</sup>[https://www2.deloitte.com/content/dam/Deloitte/de/Documents/technology-media-telecommunications/PoV\\_Blockchain\\_Media\\_interaktiv.pdf](https://www2.deloitte.com/content/dam/Deloitte/de/Documents/technology-media-telecommunications/PoV_Blockchain_Media_interaktiv.pdf)

<sup>3</sup>Princeton University report on "Bitcoin and Cryptocurrency Technologies" by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder

**Types of Blockchain**

All Blockchain can be classified into three categories: Public, Permissioned, and Private. A public Blockchain is one where anyone can read or write on the platform, provided they can show proof of work. A permissioned Blockchain offers selective

transparency where only selected nodes have the rights to access and provide consensus on that transaction. The third Blockchain type is a private Blockchain where only chosen players have the rights to join the network which creates a closed loop environment.

**Fig 3: Different types of Blockchain**

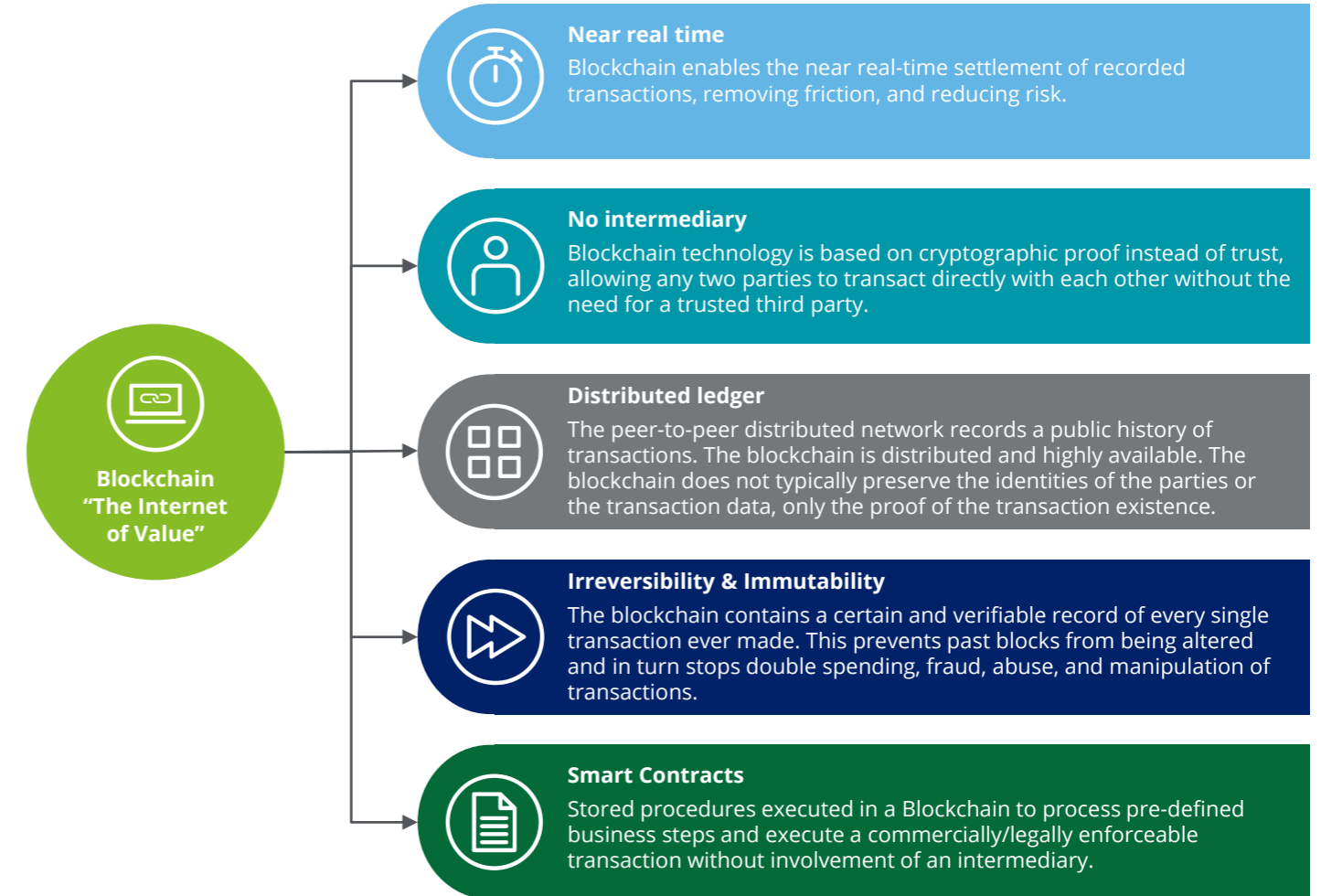
Public Blockchain	Permissioned Blockchain	Private Blockchain
Fully decentralized and Transparent - Anyone can read, send transactions & participate in the consensus process	Quasi decentralized where consensus is controlled by preselected set of nodes and Read permission is restricted to participants	Centralized—requires ‘high trust’ entity where Write permissions are centralized to one entity and Read to all participants
<b>Typical Participant Profile</b>		
<b>Consortium / Regulator</b>	<b>B2B Partnership / Enterprise / Group</b>	
<b>Sample Use Case</b>		
<ul style="list-style-type: none"> <li>• OTC Clearing &amp; Settlement, Replacing Central Clearing (e.g. R3, Citi, JPMC, Santander, etc.)</li> <li>• FX Exchange, Replacing Intermediaries (e.g. Ripple)</li> <li>• Mutual Fund Issuance &amp; Redemption, Replacing Transfer Agency</li> <li>• Insurance Claim with Medical Providers</li> </ul>	<ul style="list-style-type: none"> <li>• Remittances</li> <li>• OTC Clearing &amp; Settlement with Counterparties, Brokers, and Market Makers</li> <li>• Syndicated Loan Among Participants</li> <li>• Supplier Chain Finance (e.g. Barclays, DBS, SCB, BoA, KMB, etc.)</li> <li>• Bancassurance</li> </ul>	<ul style="list-style-type: none"> <li>• KYC among Banks and Authorities, (e.g. Smart Entity Using Vault in UK, Singapore, etc.)</li> <li>• Letter of Credit/Bill of Lading</li> <li>• Transaction costs dictated by one entity</li> <li>• Loyalty for customers or employee rewarding mechanism</li> </ul>

**Inherent features of Blockchain**

Blockchain, by virtue of its design and architecture, offers some inherent benefits which the industry has been looking for quite some time now. The distributed

nature of Blockchain brings in a lot of transparency in processing and thereby reduces the need for manual verification and authorisation.

**Fig 4: Blockchain key features**



**Benefits of using Blockchain**

The benefits of using Blockchain varies from case to case. However, in most cases, Blockchain becomes a good fit when

there is a lot of data that is shared across multiple parties with no Trust mechanism among the participants.

**Fig 5: Blockchain benefits**





# Blockchain use cases

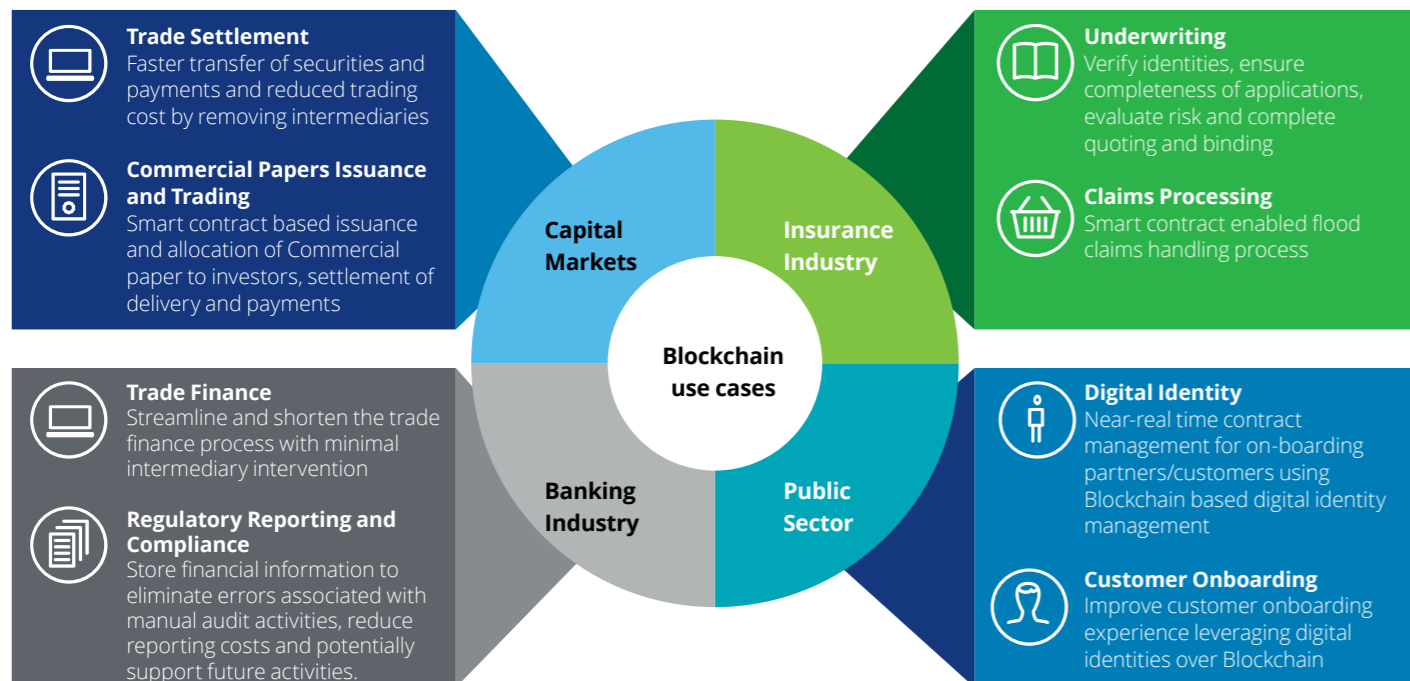


Blockchain is widely explored across industries and multiple use cases are being experimented with. While most of the use cases involve multiple stakeholders in the value chain or at industry level, there are also use cases like loyalty and Know Your Customer (KYC) processing which are specific to a single organisation. Though

financial services players are emerging as the leaders in identifying Blockchain use cases, other industries are also catching up. **Banking and Financial Services sector** The Financial Services industry is witnessing an increasing number of Blockchain-based use cases that yield the potential to drive

operational efficiencies and improve customer experience. There are multiple experiments in "Cross-border remittances", "Post trade settlements", "Trade Finance", and even "Loyalty programs" applications from the financial services giants.

**Fig 6: Blockchain use cases in Financial Services industry**



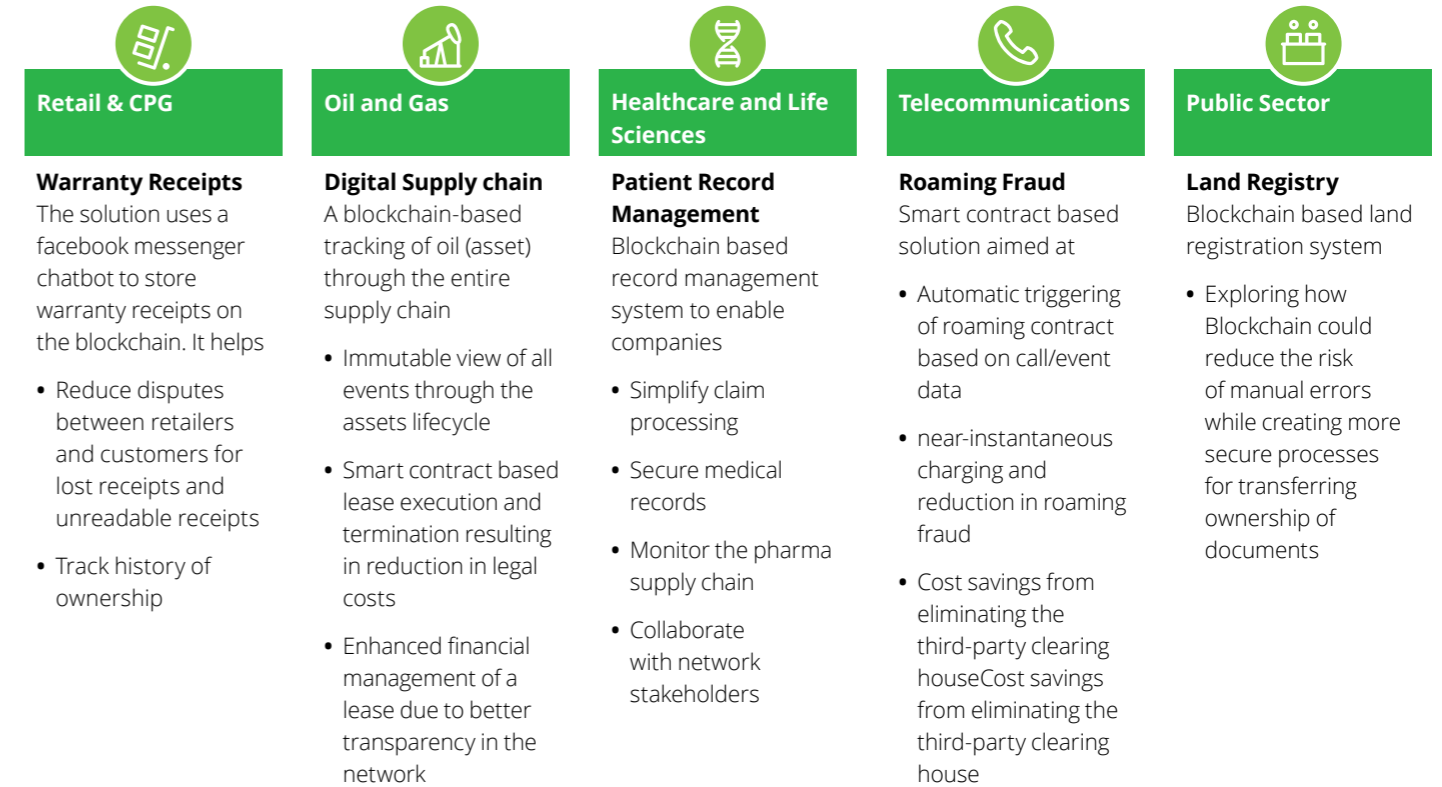
## Non-Financial Services sectors

Despite financial players being the first movers to explore this Distributed Ledger Technology, non-financial players have been paying attention and looking for

ways to leverage the opportunities that Blockchain offers. The front-runners among them are retail, travel, healthcare, telecommunications and public sector industries. The major use cases applicable

to these industries are focused on the decentralized data storage, data immutability, and distributed ownership features of Blockchain.

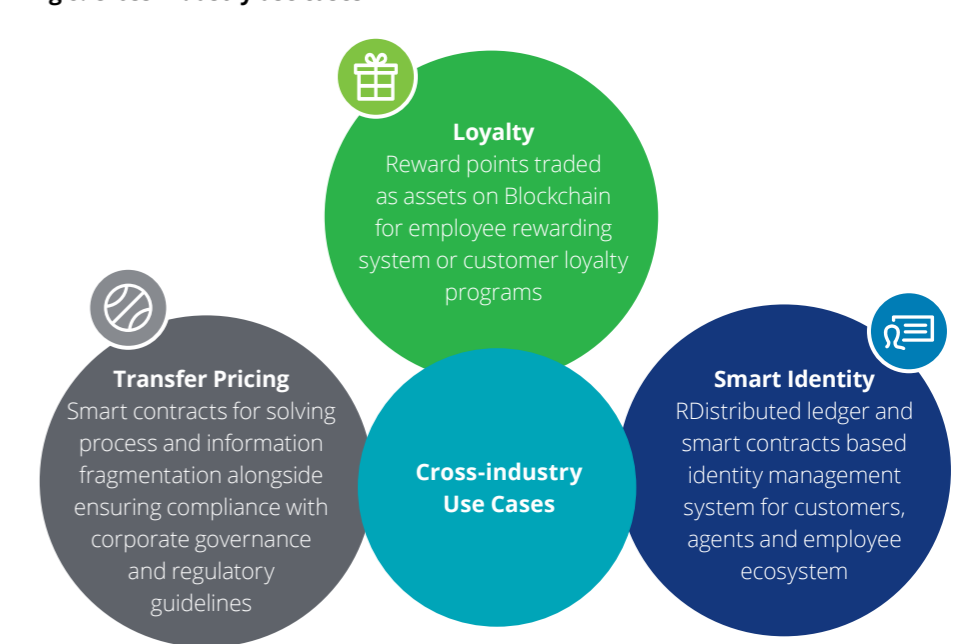
**Fig 7: Blockchain use cases across non-Financial Services industry**



## Cross industry use cases

Some of the use cases are not specific to a particular industry and can be adapted across the different organizations. The prominent among these are Loyalty, Transfer pricing, and Smart Identity

**Fig 8: Cross-industry use cases**



**A deep-dive into some Blockchain use cases**

**1. Public Blockchain: Bitcoins**

Bitcoin, the most popular use case of Blockchain, is a form of digital currency which is created and traded electronically in a decentralized manner where no one verifies or monitors its transactions between participants. Bitcoin is neither printed nor minted like fiat currencies, but is instead created digitally, by a community of people that anyone can join. Bitcoins are mined on the Blockchain network using computing power in a distributed nature by solving a mathematical puzzle. The software is open source; thus anyone can join the Blockchain network and use to transact or buy things electronically which is very similar to how fiat currencies are being used digitally.

In India, people have started investing in bitcoin which has given rise to a number of bitcoin exchanges in India. Some of these players have also created mobile wallets for bitcoin transaction, thereby making bitcoin transaction more convenient for customers. However, this is in direct conflict with the central regulators of money in India. The Reserve Bank of India (RBI) "has not given any license/authorizations

to any entity/company to operate or deal with Bitcoin or any virtual currency and even cautioned those investing in the instruments like Bitcoins<sup>4</sup>. The central bank has raised concerns over the de-centralized nature of Bitcoin and also flagged issues surrounding its valuations.

**2. Permissioned Blockchain: Trade Finance application**

Letters of credit are one of the most commonly used trade finance instruments today and rely on highly manual, paper-based processes. Due to extended processing time in a trade transaction, purchasers and suppliers are not making the most efficient use of their capital as well as the authenticity of trade documents is required throughout the process to prevent fraudulent transactions.

A Blockchain-based solution can capture the details contained in a purchase order, bill of lading, invoice, and tracking of shipment in a smart contract on the Blockchain. Blockchain can reduce the turn-around-time of Letter of Credit (LC) processing by a huge margin; thereby reducing the processing cost and efforts.

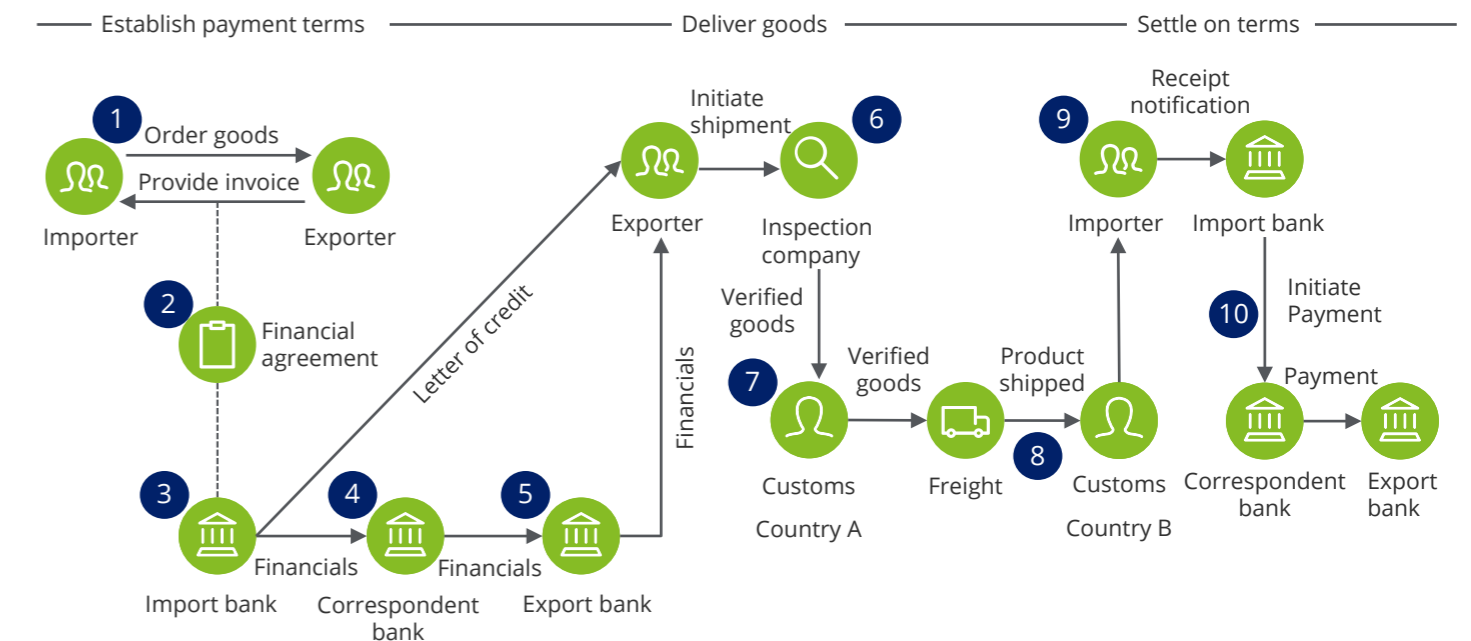
**Fig 9: Some of the Bitcoin Exchanges/Wallets in India**



The solution proposed by World Economic Forum suggests a world where the shipper and customs officer will have a transparent and real-time view of the processing of

a Letter of Credit. This will provide the government bodies and regulators a real-time view of essential documents to assist in enforcement and AML activities.

**Fig 10: Current process of LC processing<sup>5</sup>**



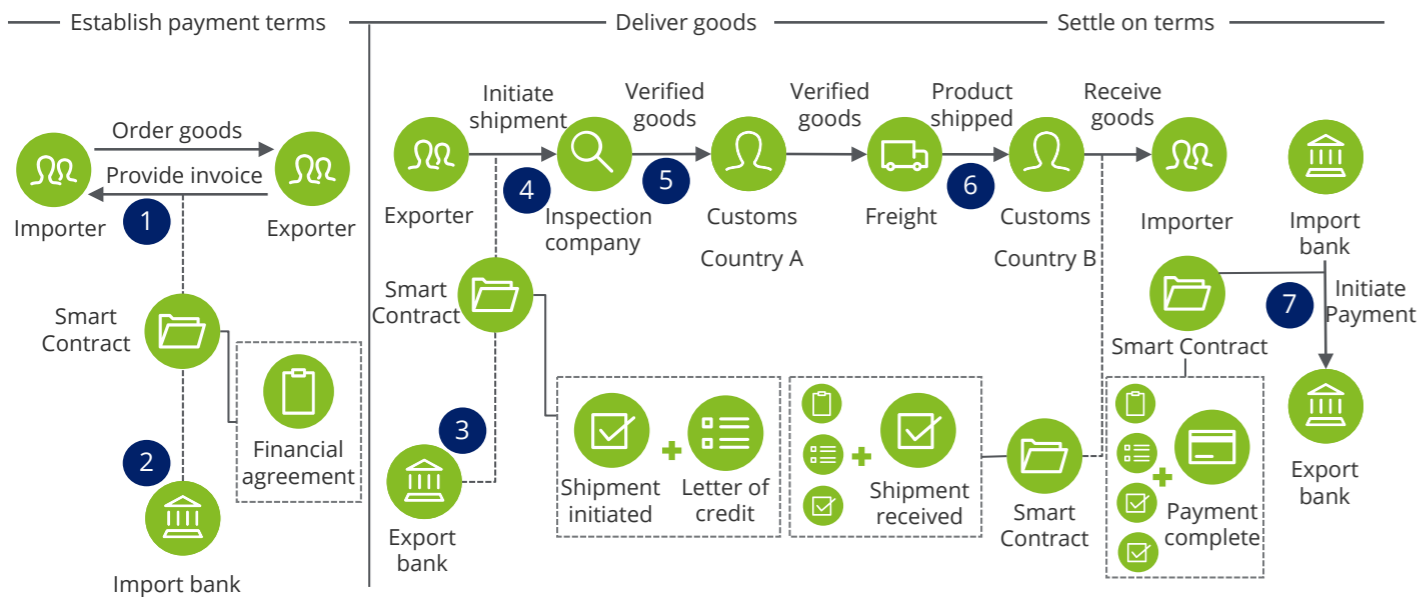
**Future-state process description**

- |   |   |   |
|---|---|---|
| <ol style="list-style-type: none"> <li>1. An importer and exporter agree to the sale of a product at a future date and time</li> <li>2. The financial agreement is captured within an invoice, which identifies the quality of good sold, price and delivery timeline</li> <li>3. The importer provides a bank with a copy of the financial agreement for review</li> <li>4. The importer banks reviews the financial agreement and provides financials on behalf of the importer to</li> </ol> | <ol style="list-style-type: none"> <li>5. The export bank provides the exporter with the financing details, which enables the exporter to initiate the shipment</li> <li>6. A trusted third-party organization inspects the goods for alignment with the invoice</li> <li>7. Local customs agents within the export country inspects the goods based on the country code</li> </ol> | <ol style="list-style-type: none"> <li>8. The goods are transported by freight from Country A to Country B and local customs agents within the import country inspect the goods based on the country code</li> <li>9. Following inspection, the goods are delivered to the importer, which provides a receipt notification to the importer bank</li> <li>10. Upon receiving notification, the import banks initiates the payment to the export bank through the correspondent bank</li> </ol> |
|---|---|---|

<sup>4</sup><http://www.livemint.com/Industry/xma89nytK0wcDu4hBT30RO/RBI-says-it-hasnt-authorized-use-of-Bitcoins-flags-risks.html>

<sup>5</sup>World Economic Forum report on "The future of financial infrastructure"

**Fig 11: Proposed Blockchain based LC processing<sup>6</sup>**



**Future-state process description**

- Following the sales agreement, the financial agreement is shared with the import bank through a smart contract
- The import bank reviews the arrangement, drafts the terms of the letter of credit and submits it to the export bank for approval
- The export bank reviews the letter of credit; once approved a smart contract is generated to cover the terms and conditions of the letter of credit
- The exporter digitally signs the letter of credit within the smart contract to initiate shipment
- Goods are inspected by a third-party organization and the customs agent in the country of origin (all requiring a digital signature for approval)
- The goods are transported by freight from Country A to Country B and inspected by local customs agents prior to being received by the importer
- The importer digitally acknowledges receipt of the goods, which initiates payment from the import bank to the export bank via a smart contract

The solution proposed by World Economic Forum suggests a world where the shipper and customs officer will have a transparent and real-time view of the processing of a Letter of Credit. This will provide the government bodies and regulators a real-time view of essential documents to assist in enforcement and AML activities.

**3. Private Blockchain: Loyalty application**

Loyalty reward programs are currently fragmented, costly, and slow. Some of the key problems include:

- High lag between availing of service and credit of loyalty points

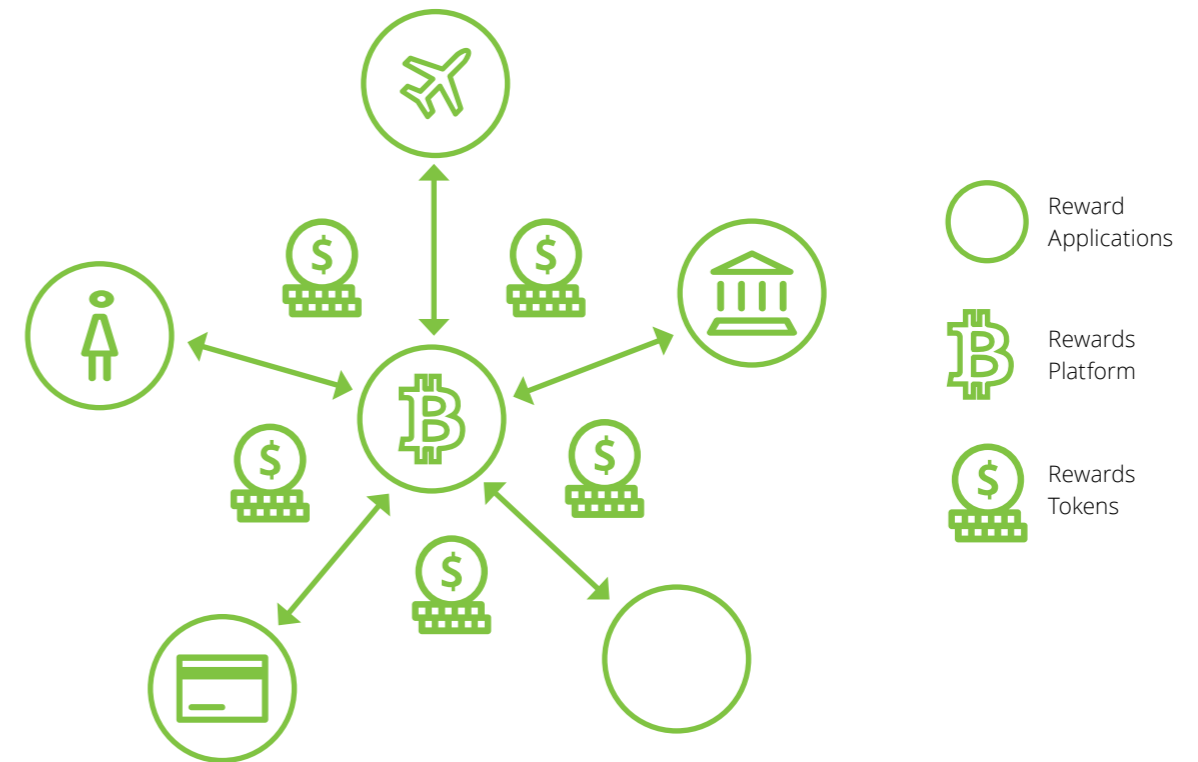
- Customers can't use or check points instantly
- Inherent inefficiencies with the system (and high associated cost)
- Poor data integrity leading to security threat and data privacy abuse
- Usage of reward points doesn't live up to the potential due to limited redemption options

A Blockchain-based loyalty rewards programs can address the above issues. An omni-channel customer loyalty program based on multi-token Blockchain

can be configured easily (with multiple reward types and reward rules) to near-instantly reward points to customers upon purchase/usage of company products/

services. Tokens accumulated can then be redeemed for a variety of reward options by adding new vendors on the Blockchain.

**Fig 12: Proposed Blockchain based Loyalty program**



**4. Blockchain application by Government bodies: Honduras Land Title Registration<sup>7</sup>**

To help stem long-standing corruption in Honduras' land title registry system, in 2011 the World Bank announced it would loan the Honduran government \$328 million to digitize title files and upgrade tools and processes. While subsequent efforts did help modernize and standardize the government's administrative capabilities, they also made it easier for corrupt players to hack into central databases and illegally alter digital land records.

In May 2015, Factom, the organization that manages open source software for securely recording transactions through a distributed, decentralized

protocol, announced that it would be working with Epigraph, a land title software vendor, to help the government of Honduras recreate its digital land title registry system in a Blockchain. The goal of this effort is simple: Use Blockchain technology to create a transparent land title registry system in which digitized records are tamper-proof. The system being developed addresses existing security vulnerabilities in several ways. First, individual land records are digitized—“hashed” or encoded with an immutable fingerprint—and stored permanently on the Blockchain. The system then tracks and documents every change of ownership, every loan made against a single piece of land, and every contract made against mineral

rights. Users can track the entire history of a land title instantly. They cannot, however, alter anything currently in the system. They can use a stored version to create a new document, but they will not be able to recreate or replace a hash once it is filed.

The Honduran Blockchain initiative is in a pilot program for a single city, with a system built and capable of accepting entries. In the coming year, project leaders plan to roll out the pilot to additional municipalities.

<sup>6</sup>World Economic Forum report on “The future of financial infrastructure”

<sup>7</sup>“Tech Trends 2016” by Deloitte University Press

# Blockchain in India – experiments undertaken and challenges faced

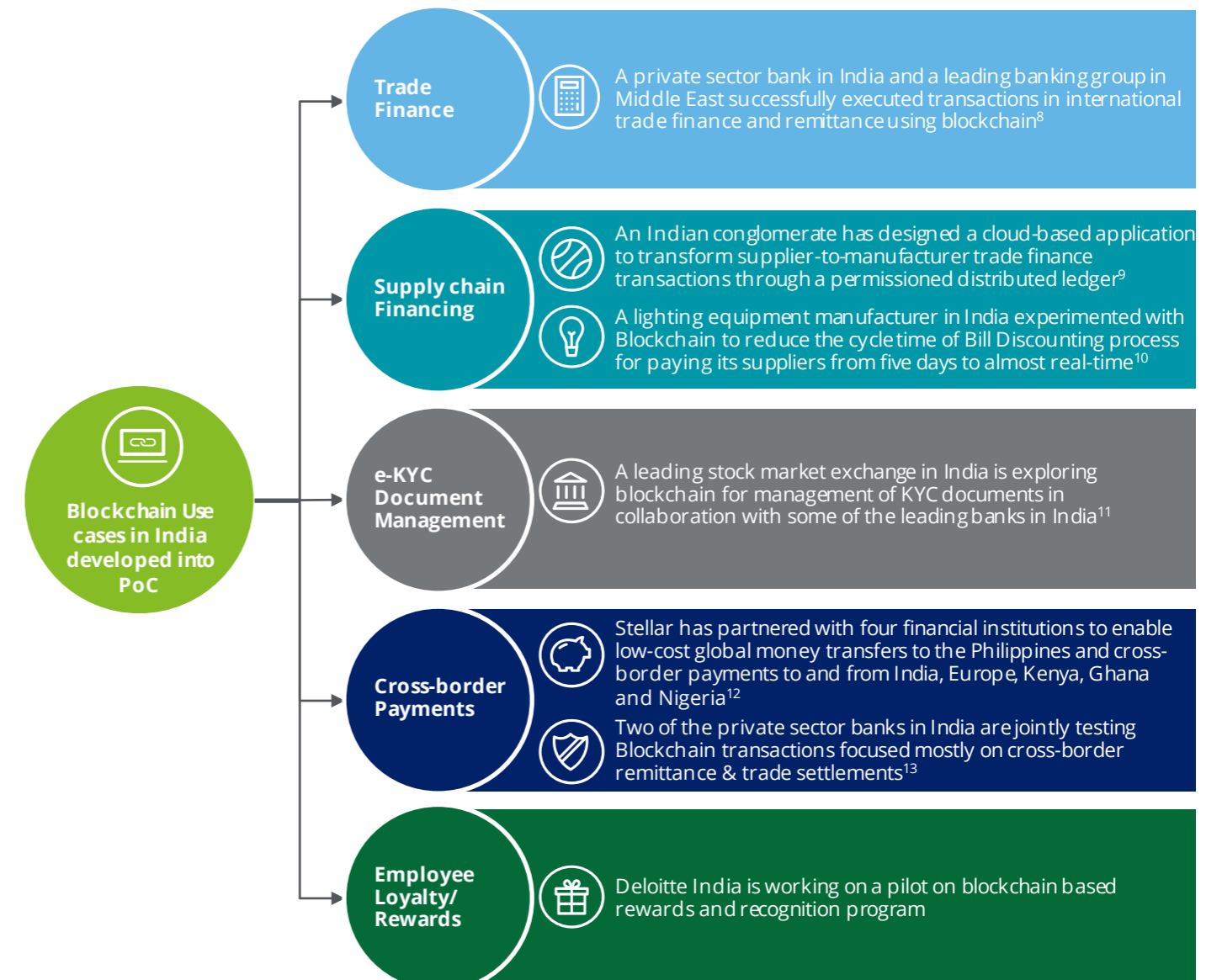


Blockchain is seeing a lot of traction within India majorly in Banking, Insurance and Cards industry. In most of these industries, players are coming together to form a consortium to realize the benefits of Blockchain at an industry level. However, some of the business conglomerates have evinced interest to explore Blockchain for improving their business processes across their subsidiaries and business partners as well.

### Blockchain applications explored by Indian players

A lot of Indian players have tested usage of Blockchain in the areas of Trade Finance, Cross-border Payments, Bill Discounting, Supply chain financing, Loyalty and Digital Identity areas. Some of the Indian banks, business conglomerates, and one stock exchange are among the pioneers for exploring Blockchain in India.

Fig 13: Blockchain experiments by Indian players



Though all these early adopters wanted to experiment with Blockchain to identify a futuristic solution, the road that led to these experiments were full of challenges. The major reasons for this were lack of awareness, evolving nature of Blockchain platforms, and application integration challenges. Late last year, Deloitte, a member of the IDRBT working group, conducted a dipstick survey via interviews

and questionnaires of early adopters in the Indian market both from a customer and technology vendor perspective to understand the challenges for a full-blown implementation. The analysis from the study was presented at the IDRBT conference in Hyderabad on 7 January, 2017.

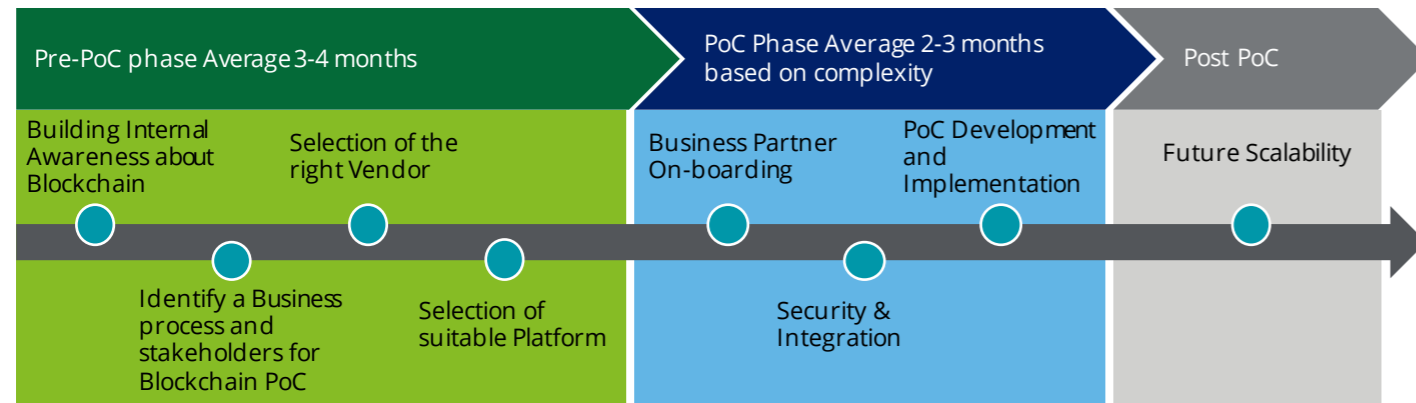
<sup>8</sup> <https://www.icicibank.com/aboutus/article.page?identifier=news-icici-bank-executes-indias-first-banking-transactions-on-blockchain-in-partnership-with-emiratesnbd-20161210162515562>  
<sup>9</sup> <http://www.mahindra.com/news-room/press-release/Mahindra-and-IBM-to-Develop-Blockchain-Solution-for-Supply-Chain-Finance>  
<sup>10</sup> <http://www.livemint.com/Companies/BcqXQgey9fieFps9xVZxrK/How-Bajaj-Electricals-uses-blockchain-to-pay-suppliers.html>  
<sup>11</sup> <http://computer.expressbpd.com/news/nse-looking-at-blockchain-for-ensuring-settlement-guarantees/18956/>  
<sup>12</sup> <http://www.ibtimes.co.uk/stellar-connects-icici-bank-offers-cross-border-payments-india-africa-philippines-1595052>  
<sup>13</sup> <http://www.livemint.com/Industry/loztj0R98Ea6m58Ng8jUzM/Blockchain-technology-catches-Axis-Kotak-Mahindras-fancy.html>

**Challenges faced by early adopters – a report from the trenches**

The survey conducted among the participants revealed that the Blockchain

journey was clearly segregated into three major stages, with challenges skewed towards adoption than implementation.

**Fig 14: Stages of Blockchain implementation**



Based on the observations from the trenches Deloitte classified the challenges faced by businesses while performing the proof of concepts (PoC) broadly under the following six major areas:

- Lack of Internal Awareness
- Identification of business case and business partners for PoC
- Selection of vendor/platform
- Partner on-boarding
- Development environment and security related issues
- Integration challenges

On deep dive into each of the areas, it was discovered that the challenges related to adoption and use case identification were the most difficult to surmount in pre-POC stage of development while lack of common standards and complexity of current IT landscape is a key deterrent for PoC development and subsequent full-fledged implementation. However, ensuring the right mix of business partners, platform and vendor was what made the difference between a successful PoC and a failure.

**Mitigation steps adopted against the challenges faced**

**Lack of Awareness:** The major hindrance to Blockchain adoption being lack of awareness, the first step undertaken by the business houses was to form an internal team focussed to understand the technology, its impact, and areas of usage. In some cases, employees were sent for external conferences and industry working-groups or internal knowledge sessions and Hackathons were conducted. Some firms even included Blockchain as part of their Strategic investment.

**Identifying the right platform, vendor, and partner for PoC:** Once the use case had been identified, the next hurdle was to identify the right platform, vendor and partner firms for conducting a successful test. To overcome this challenge, organisations created cross-functional teams, conducted focussed group discussions with the IT team of the partner firm identified, and developed a detailed project charter with milestones and metrics defined.

**Integration and data security challenges:**

To ensure that integration and data security challenges (e.g., customer data encryption) don't pose a threat to the execution of PoC, early adopters ensured only a minimum viable product was being built to test out the potential of Blockchain and identified alternate strategy for data purging/masking (e.g., destroy the key to data block to ensure nobody can access it).

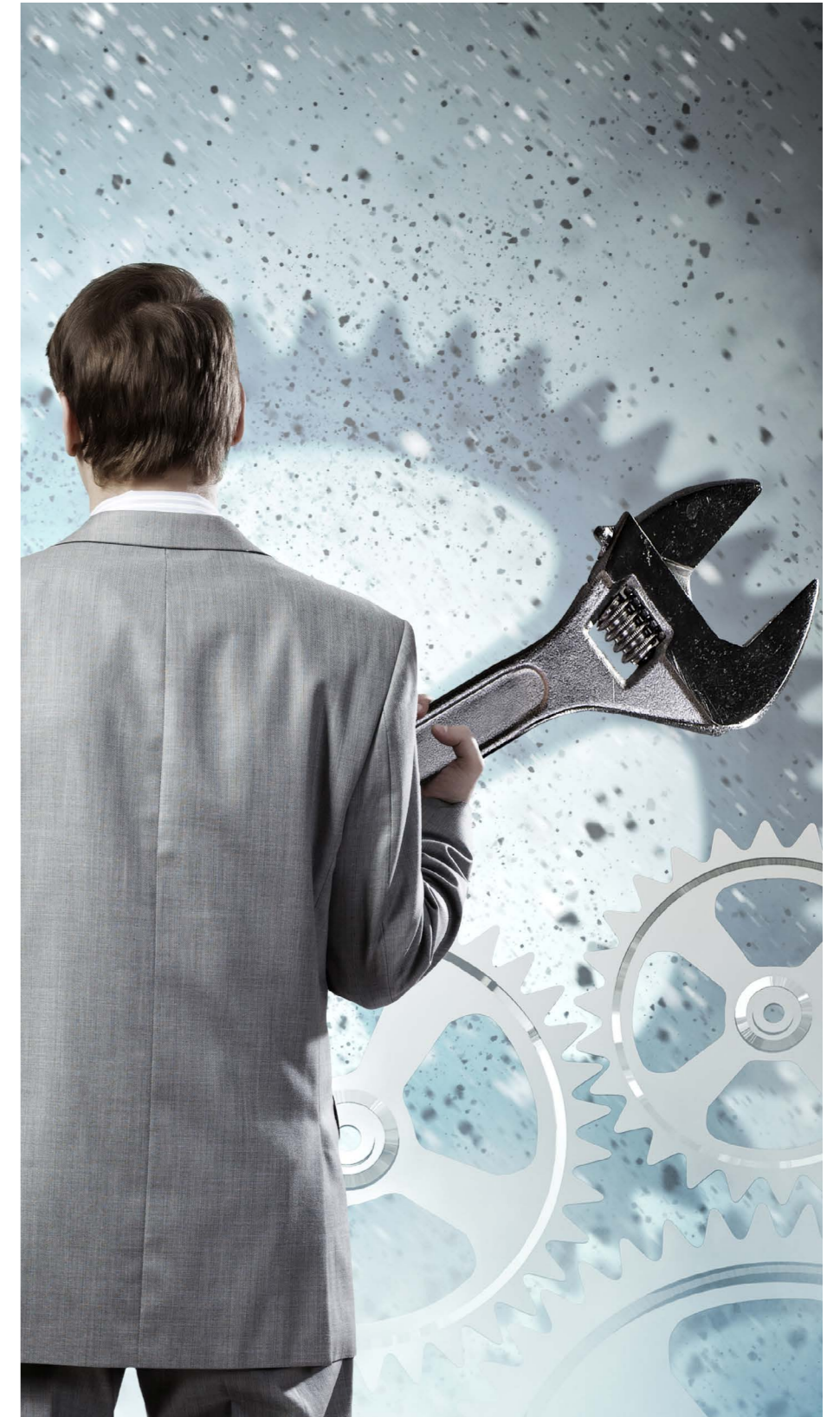
**Reserve Bank of India's activities around Blockchain**

Reserve Bank of India (RBI) has been closely monitoring developments related to Blockchain technology. In July 2016, Institute for Development and Research in Banking Technology (IDRBT) the technology research arm of RBI took the initiative of exploring the applicability of Blockchain to the Indian Banking and Financial Industry by conducting a workshop involving all the stakeholders such as the academicians, bankers, regulators and technology partners.

The working group included experts from the central bank, IBA, NPCI, CCIL, ISI, State Bank of India, Punjab National Bank, Bank of Baroda, ICICI Bank, HDFC Bank, Axis Bank, Citi Bank, Deutsche Bank, Infosys, TCS, IBM Research, Deloitte and MonetaGo. In the process, the participants of the workshop came together to bring out a White Paper detailing the technology, concerns, global experiences and possible areas of adoption in the financial sector in India.

The whitepaper highlights several advantages of Blockchain technology, such as cost savings, efficiency, and transparency have been highlighted.

The Institute has also developed a Proof-of-Concept (PoC) on the applicability of Blockchain to a trade finance application with active participation of NPCI, banks and solution provider, the details of which are presented in the White Paper which was also highlighted in the paper.<sup>14</sup>



<sup>14</sup><http://www.bankingtech.com/702131/rbi-investigates-blockchain-for-financial-applications-in-india/>

# Way Forward



Blockchain today may be compared to what the Internet was in the early 1990s. While we have witnessed how the 'Internet of Information' has changed our society over the past two decades, we are now entering a phase where Blockchain may do the same by ushering in a new paradigm comprising 'Internet of Trust' and 'Internet of Value'.

The financial services industry may be one of the firsts to be impacted by wider adoption of Blockchain and its associated Distributed Ledger Technologies. The extent of this impact is contingent on how nimbly the industry players capitalize on this technology and the nature of support it garners from wider stakeholders.

# About Deloitte

We believe that we're only as good as the good we do.

All the facts and figures that talk to our size and diversity and years of history, as notable and important as they may be, are secondary to the truest measure of Deloitte: the impact we make in the world.

So, when people ask, "what's different about Deloitte?" the answer resides in the many specific examples of where we have helped Deloitte member firm clients, our people, and sections of society to achieve remarkable goals, solve complex problems or make meaningful progress. Deeper still, it's in the beliefs, behaviors and fundamental sense of purpose that underpin all that we do.

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# About ASSOCHAM

## The knowledge architect of corporate India

The Associated Chambers of Commerce and Industry of India (ASSOCHAM), India's premier apex chamber covers a membership of over 4 lakh companies and professionals across the country. ASSOCHAM is one of the oldest Chambers of Commerce which started in 1920. ASSOCHAM is known as the "knowledge chamber" for its ability to gather and disseminate knowledge. Its vision is to empower industry with knowledge so that they become strong and powerful global competitors with world class management, technology and quality standards.

ASSOCHAM is also a "pillar of democracy" as it reflects diverse views and sometimes opposing ideas in industry group. This important facet puts us ahead of countries like China and will strengthen our foundations of a democratic debate and better solution for the future. ASSOCHAM is also the "voice of industry" – it reflects the "pain" of industry as well as its "success" to the government. The chamber is a "change agent" that helps to create the environment for positive and constructive policy changes and solutions by the government for the progress of India.

As an apex industry body, ASSOCHAM represents the interests of industry and trade, interfaces with Government on policy issues and interacts with counterpart international organizations to promote bilateral economic issues. ASSOCHAM is represented on all national and local bodies and is, thus, able to pro-actively convey industry viewpoints, as also communicate and debate issues relating to public-private partnerships for economic development.

The road is long. It has many hills and valleys – yet the vision before us of a new resurgent India is strong and powerful. The light of knowledge and banishment of ignorance and poverty beckons us calling each member of the chamber to serve the nation and make a difference

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# Glossary

DLT	Distributed Ledger Technology
WEF	World Economic Forum
B2B	Business to business
OTC	Over the counter
JPMC	J. P. Morgan Chase Bank
FX	Foreign Exchange
DBS	Development Bank of Singapore
SCB	Standard Chartered Bank
BoA	Bank of America
KMB	Kotak Mahindra Bank
KYC	Know Your Customer
FS	Financial Services
LC	Letter of Credit
AML	Anti-Money Laundering
RBI	Reserve Bank of India
IDRBT	Institute for Development and Research in Banking Technology
PoC	Proof of Concept
IT	Information Technology
IBA	Indian Banks' Association
NPCI	National Payments Corporation of India
CCIL	Clearing Corporation of India Ltd.
ISI	Indian Statistical Institute
TCS	Tata Consultancy Services
IBM	International Business Machines Corporation

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