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# Blockchain in banking

## While the interest is huge, challenges remain for large scale adoption

April 18, 2017

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# What is Blockchain?

## Understanding the concept, technology and features

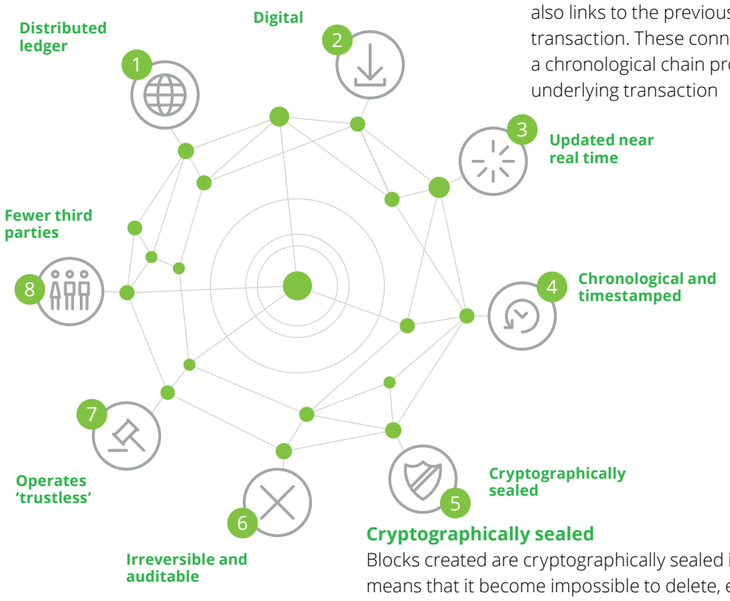
Blockchain technology is defined by its characteristics. In order to understand Blockchain, one needs to understand the key features of the technology and how they are interrelated.

"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"

**Figure 1: Key characteristics of the Blockchain**

### Digital
All the information on Blockchain is digitized, eliminating the need for manual documentation

### Distributed ledger
Indistinguishable copies of all information are shared on the Blockchain. Participants independently validate information without a centralized authority. Even if one node fails, the remaining nodes continue to operate, ensuring no disruption




### Consensus-based
A transaction on Blockchain can be executed only if all the parties on the network unanimously approve it. However, consensus based rules can be altered to suit various circumstances

### Chronological and time-stamped
Blockchain, as the name suggests is a chain of blocks – each being a repository that stores information pertaining to a transaction and also links to the previous block in the same transaction. These connected blocks form a chronological chain providing a trail of the underlying transaction

### Cryptographically sealed
Blocks created are cryptographically sealed in the chain. This means that it become impossible to delete, edit or copy already created blocks and put it on network, thereby creating true digital assets and ensuring a high level of robustness and trust. Furthermore, the decentralized storage in a Blockchain is known to be very failure-resistant. Even in the event of the failure of a large number of network participants, the Blockchain remains available, eliminating the single point of failure. Data stored in a Blockchain is immutable.

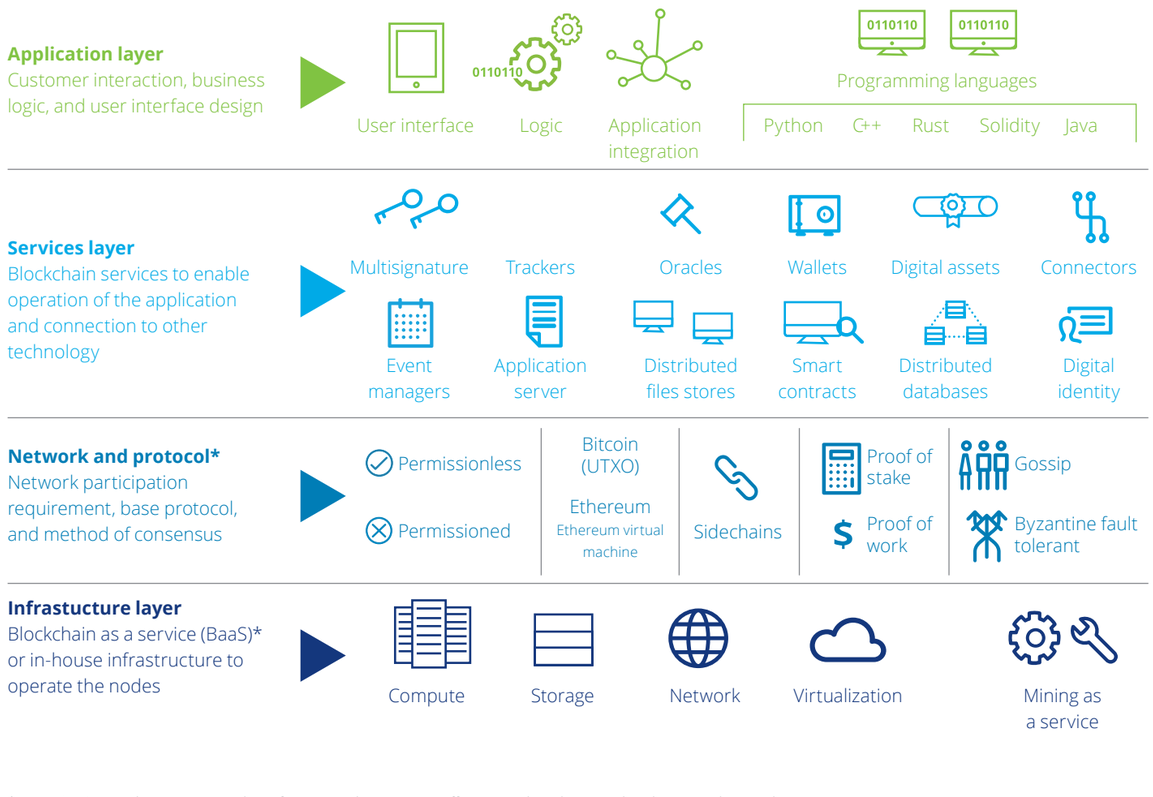
### Smart contracts are an important feature of the Blockchain technology

Apart from above mentioned characteristics, smart contracts is one of the most important feature of the Blockchain technology. They are essentially computer codes stored in a Blockchain to process pre-defined business steps and execute a commercial/ legally enforceable transaction without involvement of an intermediary. Smart contracts can be executed in a cost efficient and secure manner, and in real time. Smart contracts have a far reaching cross-industry applications because they can automate decision making especially when the outcome of a decision is based on the consensus reached between participating members.

### Figure 2 describes the various layers in a Blockchain stack

The development and operation support for a Blockchain is concentrated in the infrastructure layer of the technology stack. A fundamental difference between legacy processes and Blockchain technology is in the way data is stored and processed. Blockchain has features of encryption and verification inherent to its design, with consensus on the network being a required condition for a transaction to be captured in a block.

**Figure 2: Blockchain technology stack[1]**




*Many BaaS provides move up in the reference architenture to offer network and protocol and services layer solutions.
Note: The representation is not meant to be exhaustive (e.g. Ethereum and Bitcoin are not the only protocols and the represented consensus mechanism are also not exhaustive).





## Types of Blockchain

### Public Blockchain

Public blockchain are open-source. Anyone can be part of this type of Blockchain i.e. anyone can participate in the transaction facilitated by the Blockchain, everyone can see what blocks are getting added and thereby anyone can participate in the consensus process i.e. the process of what blocks get added to the chain and what the current state is.

### Permissioned or closed-loop Blockchain

The difference in a permissioned blockchain compared to the public blockchain is that the right to validate the transaction is provided to only few pre-selected nodes. The right to read the blockchain may be public, or restricted to the participants.

### Private Blockchain

Write permissions are restricted to one organisation. Major applications include database management, auditing i.e. areas specific to a single entity where there is no requirement to provide the right to read or validate to public.



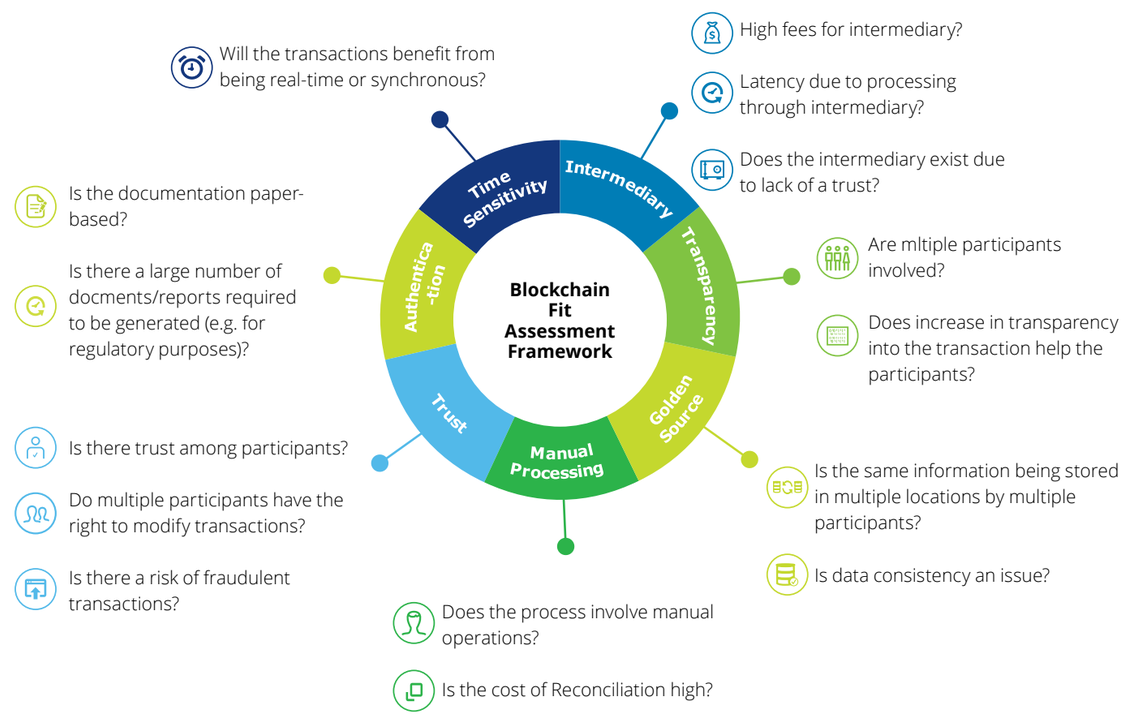


# When is Blockchain the right solution?

## Positioning for the future with Blockchain

Organizations around the world, including banks and other financial institutions are continuously experimenting with multiple use-cases on Blockchain. While experimentation is necessary to validate a solution, it is important to first select the right use-cases to implement a Blockchain based solution.

**Figure 3: Blockchain fit assessment framework**



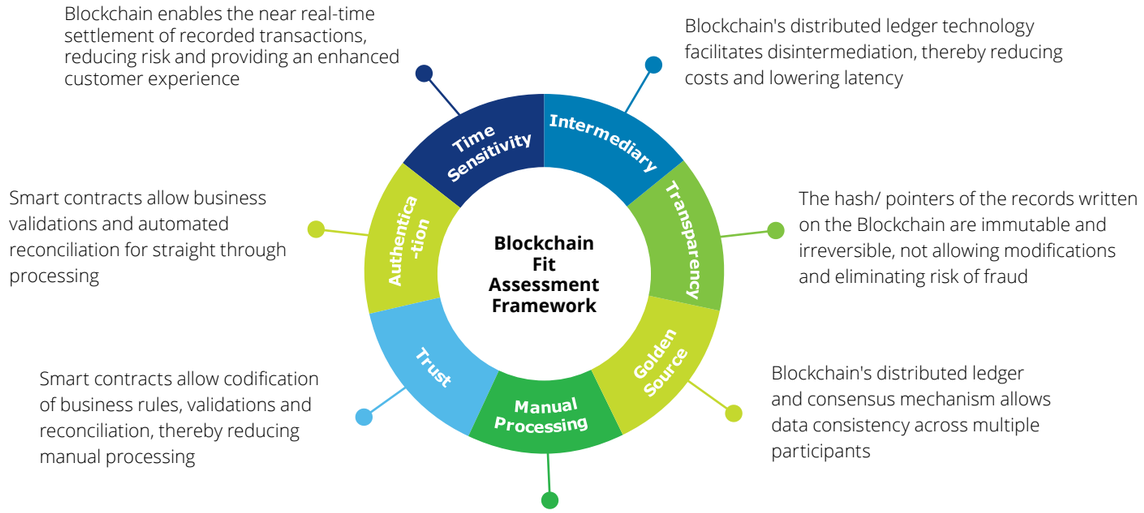

As presented in figure 3 above, Deloitte has developed a **Blockchain Assessment Framework** to evaluate whether a particular process or use-case is the right fit for a Blockchain based solution.

For a process or a use-case to classify as Blockchain-fit, majority of the questions provided in the framework need to be answered in the affirmative

### Assessing the impact of implementing a Blockchain based solution

As we can see from the above framework, each of the evaluation factors uncovers a pain point in the current state process, which could be resolved by a feature of the Blockchain solution. The resulting impact of implementing a full-fledged Blockchain solution is summarized below:

**Figure 4: Impact of implementing a Blockchain based solution**




### Assessing the economic impact of implementing a Blockchain based solution

A firm considering a Blockchain based solution, needs to perform a cost-benefit analysis to evaluate the tangible and intangible benefits vis-à-vis its existing way of doing business. Some of these key questions include:

**Benefits evaluation:**

- Who are the participants and their role in the transaction/process?
- What is the time taken and cost incurred for the process currently?
- What will be the time taken and cost incurred under Blockchain based transaction/process?
- What will be savings in operating cost as a result of implementing Blockchain?
- What will be the intangible benefit to each of the participants if Blockchain based solution is implemented i.e. customer satisfaction, convenience, better relationship, etc.?
- What will be the other tangible benefit to each of the participants if Blockchain based solution is implemented e.g. increase in revenue due to new customers or higher customer retention?

**Cost evaluation:**

- What will be Blockchain model i.e. Private, Public or Consortium?
- Will the participants be willing to integrate on a common system?
- Whether the firm should tie up with a specialized Fintech firm to implement the Blockchain solution or shall it develop it in-house? What will be the cost incurred in either scenario?
- What will be the cost of running a pilot, who will be participants for pilots and within how many days can it go live?
- Whether the Blockchain model be open to modification i.e. from consortium to Public?
- What should be the standardized protocols governing the transaction/ process and what are the associated costs of any such standardization?



**Blockchain in banking** | While the interest is huge, challenges remain for large scale adoption

# Blockchain for Banks

## Understanding relevance of Blockchain in banking

Blockchain is being widely debated and has become the new buzz word for multiple industries, especially banking.

Banks across the country have successfully initiated collaboration with specialized firms (Fintech) and/or consulting firms to build proof-of-concepts and explore various potential use-cases. This implies the seriousness of banks towards the Blockchain technology and its eagerness to understand how Blockchain can address and resolve few pain points in the current-state process.

### Major issues that banks face today?

The Indian banking industry today is faced with issues such as rising costs of operations, increasing susceptibility to fraudulent attacks on centralized servers and challenges in ensureing transparency. All this, primarily because most of the banking transactions – from opening customer accounts to making global payments – may require intensive manual processing and documentation, involve costly intermediaries and is time-consuming as these transactions need to be validated by various participants at various point in time causing the delay thereby resulting in almost lack of fraud-proof real time solution.

### What are banks looking for?

Banks are continuously exploring new ways to perform transactions quicker for an enhanced customer service, while ensuring cost efficiency in its operations and assuring transparency to customers and regulators.

For this, Blockchain potentially provides a solution for banks as it inherently helps eliminate intermediaries, maintain immutable log of transactions and also facilitates real-time execution of transactions. This could potentially reduce the TAT for banking transaction, reducing costs of manual work, and leading to enhanced customer service and satisfaction. Like any other industry, choosing the right 'use case' is the key for Banks to leverage full value of Blockchain.

# Blockchain use cases for Indian banks

Presented below are three specific use cases, where we believe that Blockchain can play a key role for helping Indian banks and financial institutions realize significant benefits.

### Case 1: Vendor financing

Realization of funds at various points in a value chain is a critical concern for anyone who is in the business of manufacturing and selling of goods. Bank's vendor financing program provides credit facilities such as Letter of credit, Bill discounting and financing against purchase orders and invoices. Banks also provide structured financing services against confirmed purchase orders from their customers.

We have examined this landscape using our assessment framework and find a near-perfect candidate for adoption of a Blockchain based solution.

**State of the Market**

| Overall industry Transaction value[2] | Number of days it takes | Cost of funding a vendor financing transaction[2] |
|---|---|---|
| **$1bn** | **3-5** | **0.3%** |

**Vendor financing participants**

**Clients**
Purchase materials from vendors and instruct banks to make payment to vendors

**Banks**
Provide financing to vendors based on documentation provided by vendors

**Vendors**
Supply materials as requested by clients and collect money from banks



**Blockchain in banking** | While the interest is huge, challenges remain for large scale adoption

**Looking at it through the Blockchain Fit Assessment Framework**

| Factors | Assessment Framework | Vendor Financing Fit |
|---|---|---|
| **Intermediary** | • High fees for intermediary?<br>• Latency due to processing through intermediary?<br>• Does the intermediary exist due to lack of trust? | **Yes –** intermediaries such as correspondent banks are added for trust in cross-border transactions, and increase latency |
| **Transparency** | • Are multiple participants involved?<br>• Does increase in transparency into the transaction help the participants | **Yes –** applicant, beneficiary, issuing bank, advising bank, etc. are involved in the transaction. Higher transparency would increase trust in the system, and speed up the process |
| **Information Storage** | • Is the same information being stored in multiple locations?<br>• Is data consistency an issue? | **Yes –** common information is stored across the participants such as Issuing bank, Advising bank, Presenting Bank |
| **Manual Processing** | • Does the process involve manual operations?<br>• Is the cost of Reconciliation high? | **Yes –** it is required throughout the lifecycle of the process. Manual processing is performed at the Branch and CPC (Scrutinizer, Maker, Checker) |
| **Trust** | • Is there trust among participants?<br>• Do multiple participants have the right to modify transactions?<br>• Is there a risk of fraudulent transactions? | **Yes –** multiple participants are involved in the transactions and make changes/ issue instructions. Since these may be unknown to each other, there is a lack of trust and possibility of fraudulent activities |
| **Documentation** | • Is the documentation paper-based?<br>• Is there a large number of documents / reports required to be generated? | **Yes –** The application, PO, validations, bills, insurance, etc. are all paper-based. This is not due to regulatory reporting requirements |
| **Time Sensitivity** | • Will the transactions benefit from being real-time or synchronous? | **Yes –** it will help inproviding enhanced customer experience, and reduce the exposure risk of banks |

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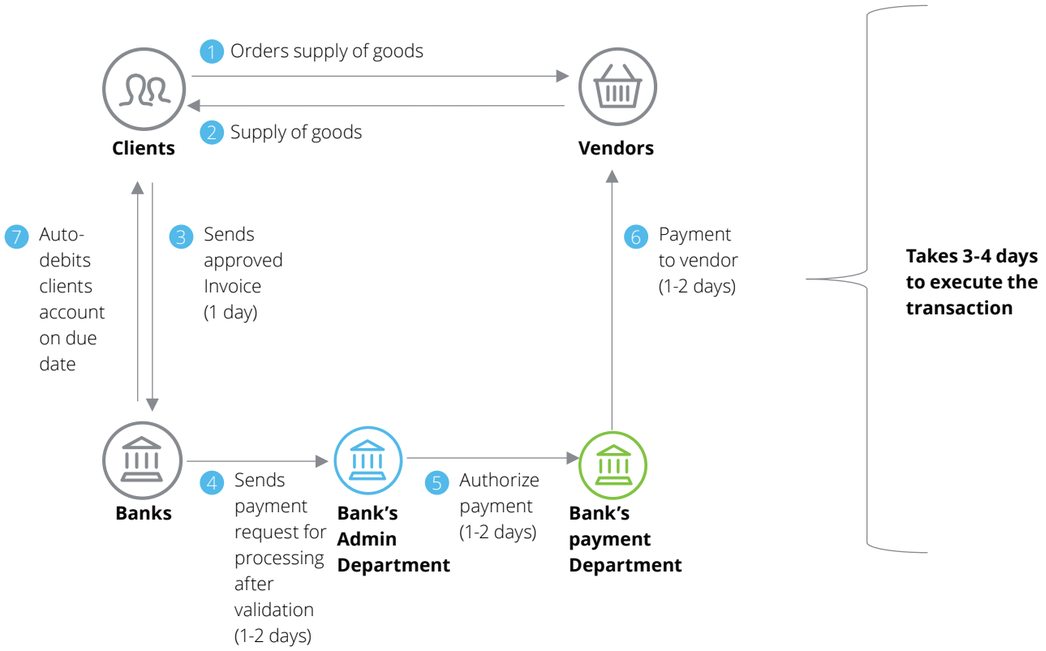



## Current pain points

**Manual documentation**
Manual documentation is required throughout the lifecycle of a Vendor finance process right from raising purchase orders to raising bill of exchange by vendors and submission of invoices and transport documents to banks. This increases overheads for banks and also makes the process tedious for vendors.

**Time-consuming process**
Due to manual processing of the transaction and lack of automation at any point, it takes minimum 4-5 days for vendor to collect funds from the bank against the relevant document. This affects the working capital situation of vendors as the funds remain blocked as long as the processing takes place.

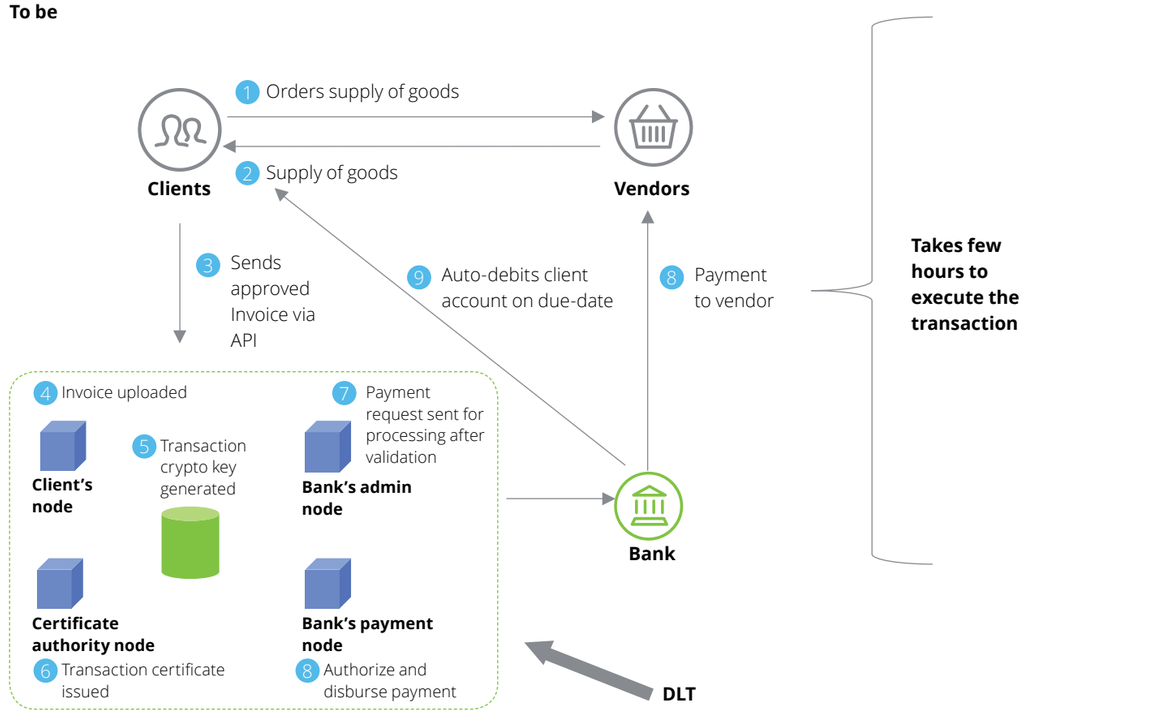
**Lack of mechanism to track status of invoice throughout the process**
Currently, all the participants (banks, client and vendors) cannot simultaneously track transaction in real-time. The status of invoice is known to the participants only through mails.

**Potential of fraud**
As invoice changes multiple hands throughout the lifecycle of a transaction, there are high possibilities for frauds in form of tampering of documents thereby causing delay in release of funds, funds being disbursed to wrong entity. Also, once such transaction happens, it is difficult to keep a track of such fraudulent entities/ practices.





**To be**




## How Blockchain can help

**Automated documentation**
Blockchain helps eliminate the manual steps involved in the company's bill discounting process and the entire transaction becomes paperless.

**Real time settlement of transaction**
Clients can transfer invoices to the Blockchain network using an external technology such as Oracle and once it is on Blockchain, smart contract rules can be triggered, and then the bills are discounted and funds disbursed to the vendor within few hours. An automatic debit to customer account is triggered on the due date.

**Real time-tracking of transaction**
With the transaction being up on Blockchain, all the relevant parties can view and verify the processes. There is only one source of truth and transactions cannot be processed further unless all the relevant parties agree and authenticate it.

**Fraud proof**
Blockchain's DLT and all the relevant parties can view and verify the processes. There is only one source of truth and transactions cannot be processed further unless all the relevant parties agree and authenticate it.

Currently, banks will have to opt for a permissioned or closed loop Blockchain with smart contracts (which in this case would be code-driven, tripartite agreement between banks, clients and vendors. If an open Blockchain is created, then 'many-to-many' relationships can be established between banks/FIs and vendors.

### Win- Win for all

**Clients**

**Intangible**

- Better relationship with vendors

**Tangible**

- Good relationship with vendors thereby leading to a supply of goods at discounted prices leading to cost savings

**Banks**

**Intangible**

- Provision of other financial services to vendors
- Higher client retention
- Cost savings

**Tangible**

- Increase in revenue by INR 25000002 from new clients and higher client retention
- Cost savings to the tune of 70%[3]

**Vendors**

**Intangible**

- Savings in interest
- Instant working capital financing

**Tangible**

- Interest savings for vendors[2]





### Case 2: Customer loyalty programs

Loyalty/reward points are an integral part of the customer retention strategy across industries, and especially for banks with a significant retail business. Loyalty/reward based incentives are offered by everyone right from banks to e-wallets. Reward points help in tokenizing a portion of the customer's spend and using it to increase stickiness.

A variety of reward points schemes are introduced by banks. There reward points can be either merchant specific i.e. can be redeemed only with a specific vendor, or it can provide loyalty points that can be availed across multiple vendors.

### State of the Market[4]

| Average redemption rate | Non-usage due to delayed gratification | Average decline in membership on Y-O-Y basis |
|---|---|---|
| **>80%** | **70%** | **5%** |

### Loyalty program participants

**Clients**
Loyalty/reward point beneficiaries

**Banks**
Issues cards with loyalty/reward points to clients

**Merchants**
Merchants who sell goods against redemption of reward points by clients

**Looking at it through the Blockchain Fit Assessment Framework**

| Factors | Assessment Framework | Loyalty Program Fit |
|---|---|---|
| **Intermediary** | • High fees for intermediary?<br>• Latency due to processing through intermediary?<br>• Does the intermediary exist due to lack of trust? | **No –** there is no real intermediary required, processes are generally within the bank |
| **Transparency** | • Are multiple participants involved?<br>• Does increase in transparency into the transaction help the participants | **Yes –** customer, merchants, vendors, and multiple entities within the bank |
| **Information Storage** | • Is the same information being stored in multiple locations?<br>• Is data consistency an issue? | **Yes –** common customer information is stored across multiple entities of the bank |
| **Manual Processing** | • Does the process involve manual operations?<br>• Is the cost of Reconciliation high? | **Yes –** it is required throughout the lifecycle of the process and involves reconciliation among data across entities |
| **Trust** | • Is there trust among participants?<br>• Do multiple participants have the right to modify transactions?<br>• Is there a risk of fraudulent transactions? | **Yes –** multiple participants are involved in the transactions including merchants, customers, vendors, etc. which are not well known to each other, causing a lack of trust |
| **Documentation** | • Is the documentation paper-based?<br>• Is there a large number of documents / reports required to be generated? | **Yes –** There is multiple documentation required at each participant, with a lot of validations for bills, items of purchase, etc. This is not due to regulatory reporting requirements |
| **Time Sensitivity** | • Will the transactions benefit from being real-time or synchronous? | **Yes –** currently it takes too long to redeem points earned causing delayed gratification |





Since a majority of the questions are answered in the affirmative, this is a right use case for Blockchain.

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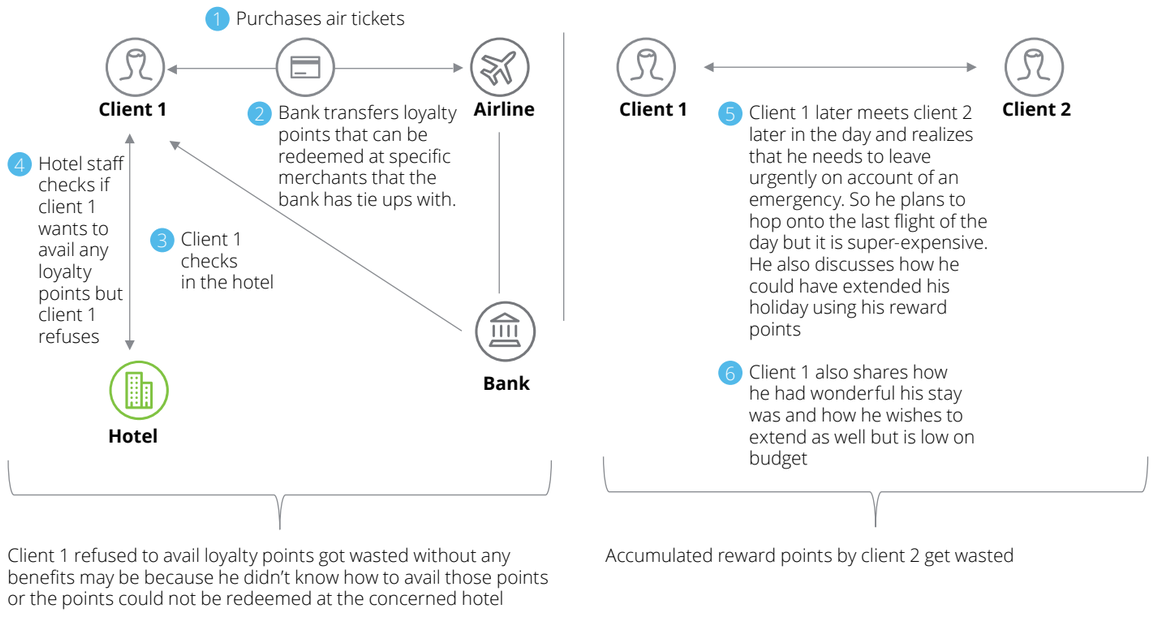


Client 1 refused to avail loyalty points got wasted without any benefits may be because he didn't know how to avail those points or the points could not be redeemed at the concerned hotel

Accumulated reward points by client 2 get wasted

## Current pain points

**Lack of interoperability in reward points**
Various reward point programs offer merchant or category specific reward points. These specific reward points can't be used for any other category or any other merchant outlet. This makes it less attractive for the consumers as there might be instances where the reward points might get expired and customer might not be able to avail the benefit.

**Delayed gratification**
Consumers prefer instant gratification. However, reward points does not get credited instantly, which leads to 70% of the consumers abandoning the points accumulated by them.

**Limited redemption**
None of the reward points currently provide access across all the merchants. In fact, there are cases where reward points can be used only to buy a selected range of goods at the partnered merchant outlet. This decreases the usefulness of reward points for consumers. As per an estimate, the current redemption rate is less than 80%.

**Complex programs**
As per a study, a significant portion of consumers are not aware of all the benefits associated with a reward linked card, process to redeem the points, exclusive benefits to members. Also, according to The 2016 Bond Loyalty Report, 57% of respondents expressed interest in engaging with loyalty programs via a mobile device.

**System inefficiency**
Loyalty program management systems inefficiencies cause poor data integrity. Degree of channel integration is also limited. Real-time integration would help drive more cross-channel integration.

**Limited accumulation of reward points**
The value of each reward point on an average is 25-30 paisa on a purchase of INR 100 and in order to redeem against decent purchase you need at least 500-600 points therefore in order to accumulate 500 points, you should shop for approx. 1-2 lacs.

**Lack of standardization**
Due to lack of product/quality standardization, it becomes difficult to ensure repeat usage of goods by customers

**Information security**
Loyalty programs accumulate large volumes of Personally Identifiable Information (PII) thus they are prone to threats from data security. Identity theft is another area of concern for program administrators

**Financial burden**
Administration of loyalty programs adds to the liability for company financials. Unused reward points are an unwanted liability

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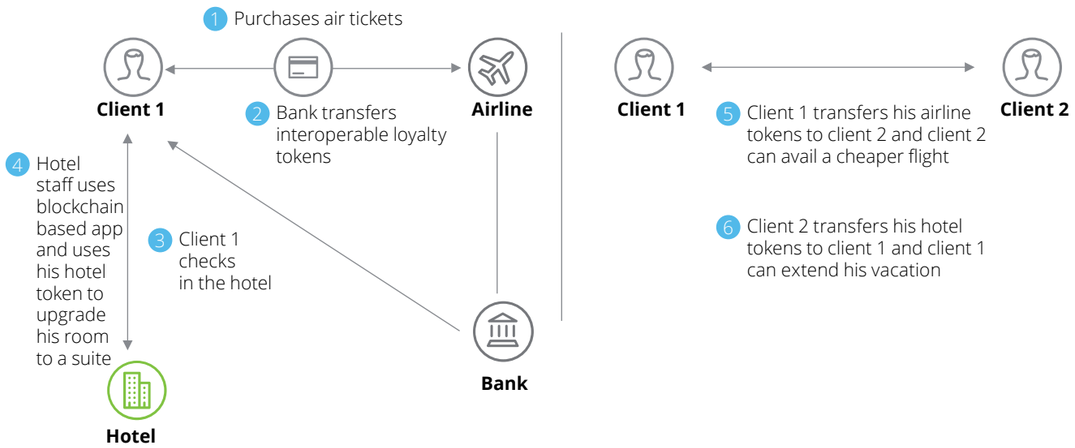



- Hotel's suite services get promoted
- Client 1 has a better experience

- Client 1 is able to extend his vacation
- Client 2 is able to get a cheaper flight
- Airline gets a new customer i.e. client 2

## How Blockchain can help

**Standardized reward tokens**
Blockchain protocol creates an algorithm-generated loyalty token, which is a base for all types of rewards issued by players that sit on the network. This token can be used to initiate and execute any transaction – issuance, redemption or exchange.
The loyalty token's existence and unique identifiers are updated on each participant's ledger and made available across the network.

**Instant gratification & real time tracking of reward points**
Blockchain can facilitate a transaction to be logged and accessed by multiple involved parties in near real time, thereby eliminating the need for coordination with various participants to credit points faster. As customers crave for faster redemption, this would help achieve customer satisfaction and thereby create a memorable experience.

**Smooth integration of new merchants on the platform**
The Blockchain platform can accommodate different and multiple organizations and their loyalty programs, facilitating their interaction, especially in terms of the convertibility and exchange of their points. The network even facilitates a consensus among the merchants, customers and banks without the need for a middleman or clearinghouse.

**Unanimous consensus of reward points**
Several online protocol rules and restrictions govern the way the points behind these tokens function. For example, each participant can set his or her own points exchange values.





**Blockchain makes a more efficient rewards network**


**Rewards Network**

The network connects different participants such as program administrators, individuals, and merchants.

A rewards application operates as a wallet, holding reward tokens, and acts as the interface between the user and the network.

The applications facilitate the exchange of rewards tokens between users

The program administrator governs the network and reward validators

The Blockchain allows this to happen in a frictionless, secure environment

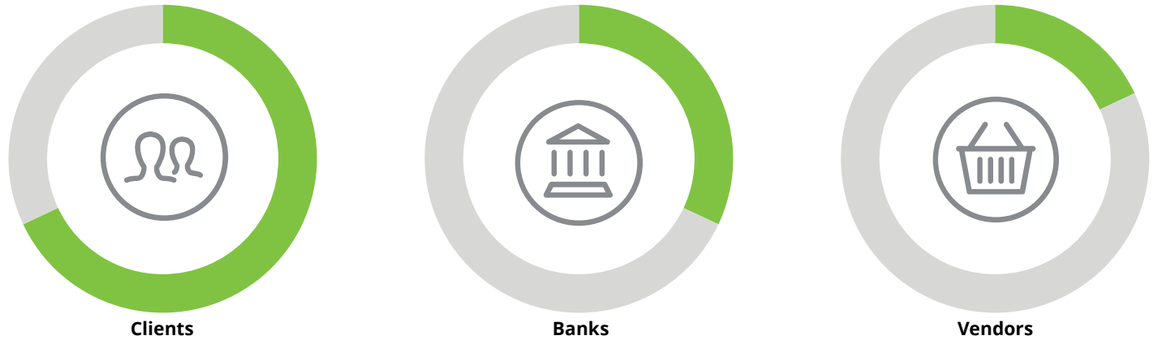
**Reward Applications**

- ✓ Identity information secured through digital signatures
- ✓ Programmable to reward users
- ✓ Customizable reward tokens
- ✓ Integrated reward system

**Reward Tokens**

- ✓ Tokens serve as the medium of exchange
- ✓ Can be freely traded to enable versatility
- ✓ Programmed with rules & restrictions that govern functionality
- ✓ Can be redeemed with ease

**Win- Win for all**




**Clients**

**Intangible**
- Customer satisfaction
- More transactions
- Economic purchases

**Tangible**
- 27% increase in volume of transactions[2]
- 5% average savings on purchase transactions[2]

**Banks**

**Intangible**
- Higher client retention
- Cost savings

**Tangible**
- Increase in revenue as clients will make more use of cards
- Cost savings as most of the manual processes gets eliminated

**Vendors**

**Intangible**
- Repeat purchases
- New customers
- Brand advocacy

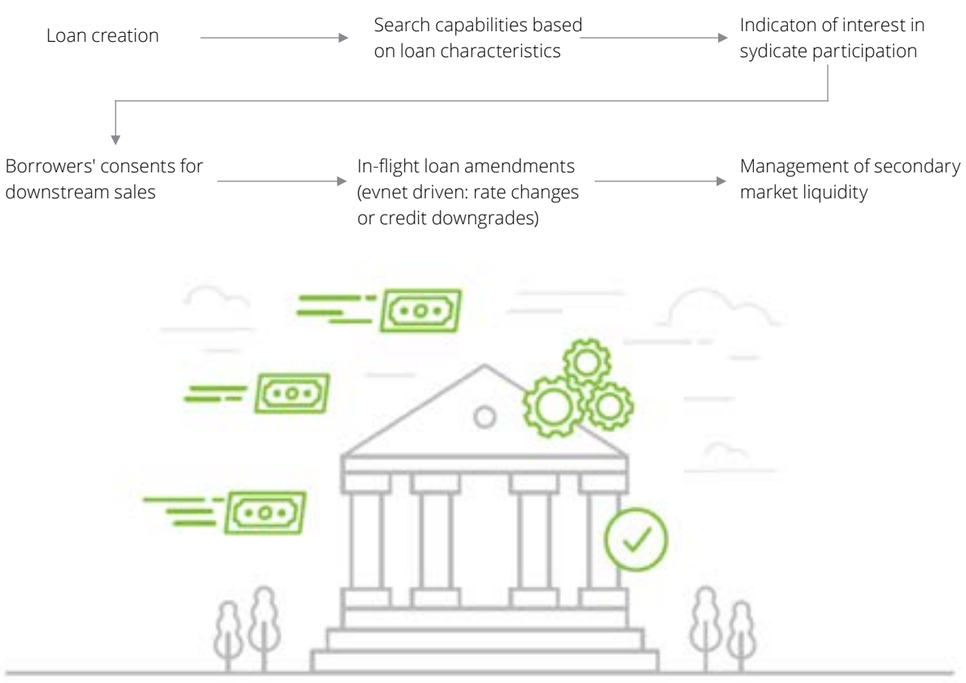
**Tangible**
- Increase in revenue by 50% driven by customer loyalty and brand advocacy to new customers[2]

### Case 3: Syndicated Loans

Corporations undertake multiple large projects such as development of roads, train systems, airports, factories, new business centers, etc., which requires large-scale financing. Procuring these large funds necessitate the institutions to come together to form syndicates and diversify the financial risk among its members.

The corporate clients seeking the loan initiates contact with a Lead Arranger, which coordinates with syndicate members, manages and administers the entire process. The Lead Arranger carries out a KYC for the client, forms a syndicate of members which are willing to fund a percentage of the loan and diversify the risk, and also takes on underwriting of the loan.

The Global Syndicate loan volumes and number of deals seem to have plateaued between 2011 and 2015. Since the APAC markets are growing, it provides opportunities for setting up of syndicate loan back-office operations for global firms.





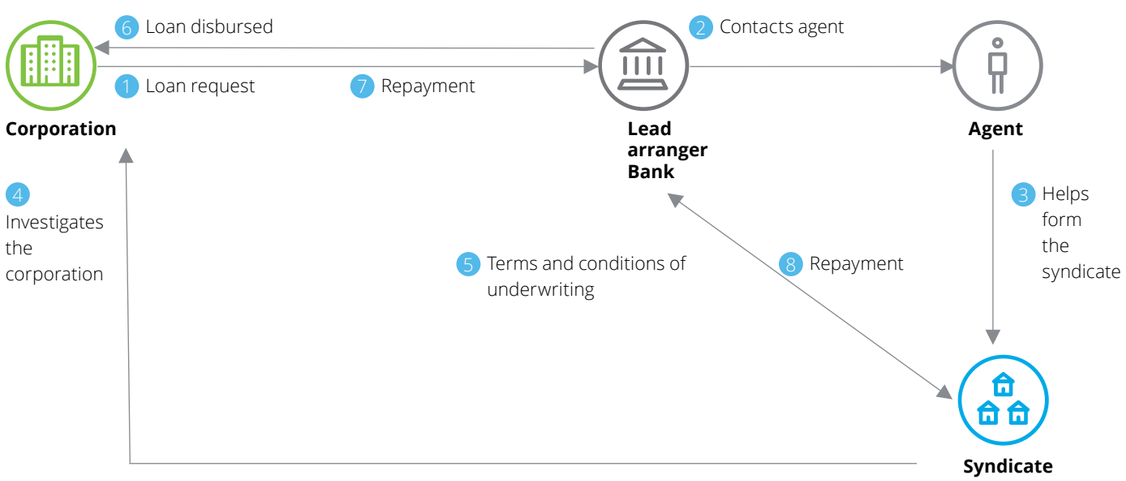



**Looking at it through the Blockchain Fit Assessment Framework**

| Factors | Assessment Framework | Syndicated Loans Fit |
|---|---|---|
| **Intermediary** | • High fees for intermediary?<br>• Latency due to processing through intermediary?<br>• Does the intermediary exist due to lack of trust? | **Yes –** agents and intermediaries are appointed at high fees to manage and administer the process |
| **Transparency** | • Are multiple participants involved?<br>• Does increase in transparency into the transaction help the participants | **Yes –** syndicate members seek transparency customer's rating, loan administering, etc. while customers seek transparency in underwriting |
| **Information Storage** | • Is the same information being stored in multiple locations?<br>• Is data consistency an issue? | **Yes –** customer information has to be gathered from multiple sources for underwriting. Each member also stores a copy of the customer details |
| **Manual Processing** | • Does the process involve manual operations?<br>• Is the cost of Reconciliation high? | **Yes –** the entire lifecycle is very paper-intensive with customer details, negotiated terms and conditions among members, etc |
| **Trust** | • Is there trust among participants?<br>• Do multiple participants have the right to modify transactions?<br>• Is there a risk of fraudulent transactions? | **Yes –** multiple participants are involved in the transactions including agents, customers, syndicate members, etc. who may not be well known to each other, causing a lack of trust |
| **Documentation** | • Is the documentation paper-based?<br>• Is there a large number of documents / reports required to be generated? | **Yes –** There is multiple documentation required at syndicate formation, as well as payment with a lot of validations for bills, items of purchase, etc. This is not due to regulatory reporting requirements |
| **Time Sensitivity** | • Will the transactions benefit from being real-time or synchronous? | **Yes –** the turnaround time can be reduced and risk lowered if payment settlements become real time |

Since a majority of the questions are answered in the affirmative, this is a right use case for Blockchain.

**As is**




## Current pain points

**Time-consuming process**
Selection of members based on financial soundness and industry expertise, evaluation of borrower's financial background and then negotiation of term and conditions is a tedious and time consuming process for the Lead Arranger.

**Intermediary Fees**
Agents and intermediaries have to be appointed at high fees to manage and administer the process

**Manual Processing**
The technology systems are obsolete and processes are manual and paper intensive, taking a long time as well as increasing the cost of operations

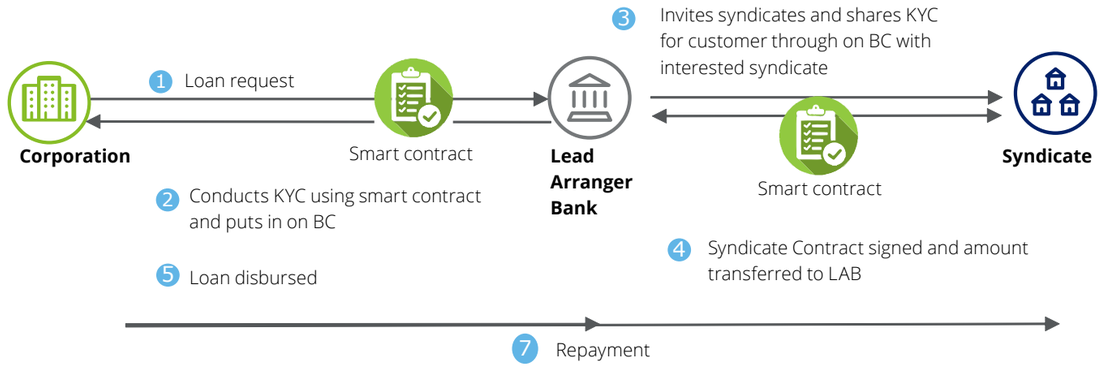
**Duplication of effort**
The lack of technology integration for due diligence and underwriting causes referencing of different applications and sources during the process. Document duplication also leads to risk of fraud

**Delayed settlement cycles**
Delayed settlement cycles for payments lock up capital and increase default risk





**To be**




## How BlockChain can help

**Faster syndicate formation**
Automated selection criteria for syndicate formation in programmable smart contracts

**Digitization of documents**
Agreements, contracts, terms and condition documents, etc. are digitized on the BlockChain and validations and checks are automated

**Quicker KYC for the Clients**
Blockchain can facilitate immediate KYC by the Lead Arranger through digital identity for clients

**Technology integration**
Automated due diligence and analysis of information for loan underwriting through Blockchain, reducing TAT

**Reduced settlement periods**
Blockchain can facilitate near real-time loan funding and payment settlements with activities executed via smart contracts

**Document immutability**
Immutability feature of the Blockchain eliminates need for multiple copies of the same documents being held

Implementation of Blockchain would lead to cost savings in the range of 70-80% for a syndicate loan transaction facilitated by banks[2]





# Challenges and Implementation Roadmap

While the interest in the technology is all pervasive, there exists a number of challenges for its widespread adoption

### Nascent technology

As most of the firms are still experimenting with Blockchain and trying to develop PoCs, there is a high chance of failure due to lack of any precedence. As such, identification of a use-case by the bank will not suffice. Bank will have to consider other allied factors such as transaction speed, verification process, codes for smart contract and data limits.

### Clarity around regulatory status

As few of the use-cases involving Blockchain as a solution, requires use of a virtual currency to perform the transaction, this will require changes in current regulation by government and other agencies like RBI. This necessitates absolute clarity around how the change will impact the dynamics of a transaction in terms of compliance. Another regulatory issue relates to smart contract mechanism of Blockchain. While incorporating the smart contract mechanism in their solution, banks would have to address the traditional concepts associated with a contract such as offer and acceptance, certainty and consideration, etc. to ensure its legal enforceability.

### Integration procedure and change adoption

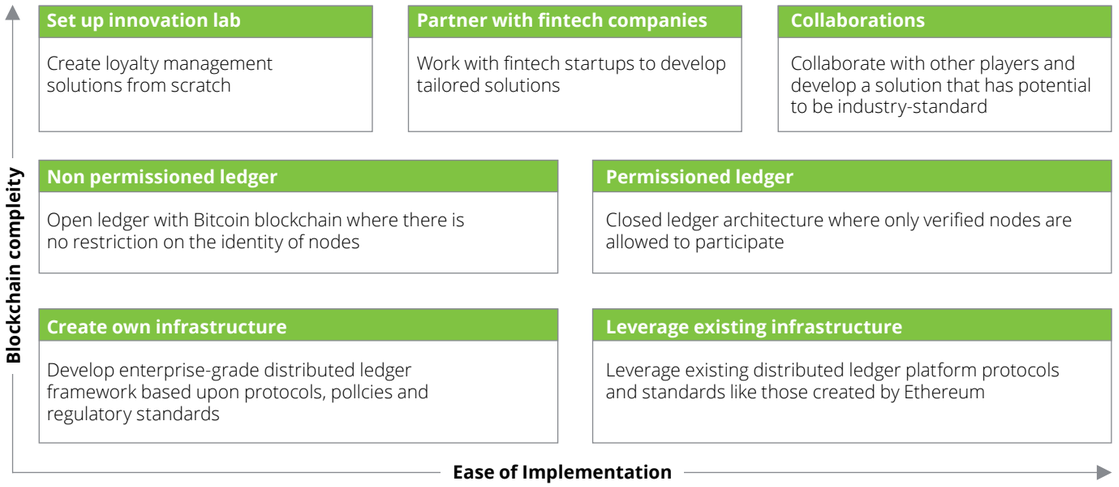
Blockchain applications offer solutions that require significant overhaul of existing systems. In order to make the switch, companies must strategize the transition. It needs to be a consortium based approach as banks need to make sure that all the relevant stakeholders for the underlying use-case agree to come together on the platform. This will require conducting workshops with the stakeholders and educating them about usage and usefulness of Blockchain based system.

### Cost

Blockchain offers tremendous savings in transaction costs and time but the initial cost of investment in the technology might be high and the payback period might be high. Hence, Banks will have to consider it from a long term investment perspective and make sure that the investment is aligned to their vision statement.

The figure 5 below explains the two dimensions that needs to be considered while implementing Blockchain, i.e. ease of implementation and Blockchain complexity[5]

**Figure 5**




## Implementation roadmap to reduce the impact of challenges

Though there are definitive challenges in implementing a Blockchain based solution, we believe that an effective implementation roadmap can mitigate or address most of the challenges.

Once a suitable business case has been identified, it's vital to align all the relevant stakeholders and then design and structure the Blockchain stack. Once the architecture is ready, a prototype needs to be developed first, and then successfully tested on a pilot basis on multiple transactions. Post successful pilots, firms should plan to make solution live.

**We have presented below an indicative roadmap for implementation of Blockchain:**

| | Business Case Identification | Stakeholder Aligment | Design | Proof of Concept Testing | Solution Commercializing |
|---|---|---|---|---|---|
| Key Activites | • Operational effectiveness assessment<br>• Risk Assessment | • Incorporate industry standards<br>• Regulatory assessment | • Design Blockchain stack<br>• Define roles and location of nodes | • Sandbox Testing<br>• Extended pilot phase with high confidence counterparties | • Identify key geographies<br>• Partners with strong local banks to increase reach |
| Key Considerations | Consider both hard and soft dollar cost Assess the one time and recurring cost | • Priority may be given to extension of digital solutions that are already on traction | • Security, Scalability, speed and robustness | • Stakeholders to be Stakeholders to be technical footing | • Prioritize markets where regulators and clients are more open to innovation and adopting digital initiatives |





# Summary

Though the potential of Blockchain is widely claimed to be at par with early commercial Internet, it is important that firms understand the key features of the technology and how it can solve the current business issues as on one hand, internet enabled exchange of data while on other, the Blockchain can involve exchange of value. Banks need to identify opportunities, determine feasibility and impact, and test proof of concepts.

This will involve answering a series of fundamental questions related to dynamics of transaction and regulations underlying the transaction. The questions related to dynamics of transaction such as cost of implementation of the Blockchain based solution, structure of Blockchain i.e. public, private or consortium, and key stakeholders can be answered by the bank. However, the questions around regulations will have to be resolved through focused discussions with competent regulatory authorities and incorporation of their thought-process. Banks will also need to have a concrete plan for transaction scalability.

Due to lack of any precedence, banks will have to opt for a trial-and-error approach either through internal trials or partnering with a specialized technology firm.





# Deloitte credentials and experience

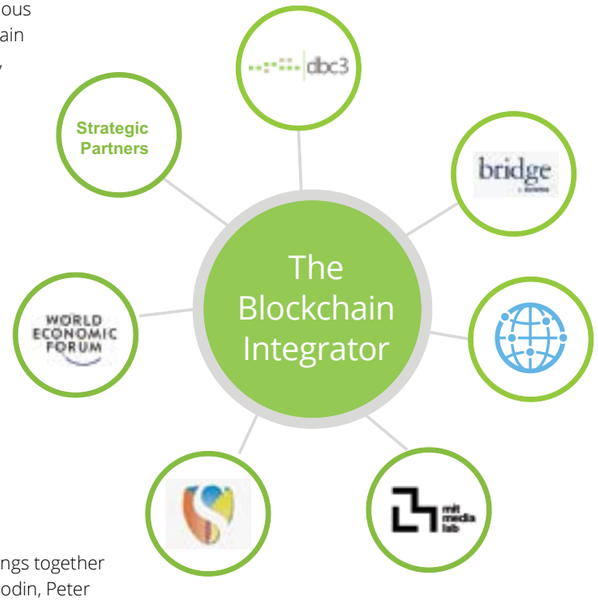
## Deloitte's Blockchain ecosystem

Deloitte's is growing an ecosystem of the world's top entrepreneurs, scientists, technologists and business leaders while developing our own expertise

**Strategic partnership**
Deloitte has partnered with various FinTech players such as Blockchain Cypher, Bloq, Stellar, Consensys, Loyyal

**World Economic Forum**
Deloitte partnered with the WEF to explore the transformative potential of innovation. This exercise involved over 40 financial industry leaders and over 100 technological innovators

**Singularity University**
An educational institute that brings together top experts, such as Michael Rhodin, Peter Diamandis and Marc Goodman, to inform financial services leaders how technology is impacting business




**Deloitte Blockchain and CryptoCurrency Community (DBC3)**
Internal group of 350+ practitioners in 26 countries, focused on educating, building eminence, supporting clients, engaging technology companies and creating solutions

**bridge by Deloitte**
Artificial intelligence platform matching enterprises and startups to accelerate innovation

**10+ global teams**
Numerous teams have assembled globally to address market demand and develop the next generation of solutions

**MIT MediaLab Digital Currency Initiative**
Working with Brian Forde, former senior White House advisor for mobile and data innovation, and world-renowned faculty members from Sloan School of Management and the MIT media Lab to research Blockchain and its possible implications on society

## Deloitte's experience

Deloitte is partnering and working on various pilots/PoCs with organizations in India and globally and are investigating how distributed ledgers can enable the next-generation solutions for Banking Industry leveraging the capabilities provided by the technology platform

**Major global bank**
Current bank pilot program representing interoperability of real estate, bank card and employee rewards, leveraging a single, global loyalty platform, powered by Blockchain and offering market leading customization capabilities.

**Major Indian bank**
Deloitte partnered with a major Indian bank to pilot a cross-border trade finance transaction for an Indian importer on Blockchain. It also on-boarded the foreign bank to execute second leg of the transaction directly to the Blockchain.

**Major foreign exchange**
A major European bank partnered with Ripple to facilitate cross-currency payments by connecting banks directly to each other via the Blockchain.

**Major telecom**
A major Dutch telecommunication company helping financial transactions announced that it is following the evolution of Blockchain and acknowledges potential for Blockchain technology.

**DCoins**
Deloitte in partnership with Loyyal has developed an application called DCoins. These can be used as a medium of exchange in scenarios involving transfer, exchange and redemption of reward points.

**Thought Leadership**
Unprecedented levels of investment across industries is being applied towards exploring new and innovative applications of the Blockchain technology



**Blockchain in banking** | While the interest is huge, challenges remain for large scale adoption

# References

[1]Deloitte US PoV: "Investment management firms: getting started with Blockchain.pdf"

[2]Industry estimates and Deloitte analysis

[3]Economic times article: "http://economictimes.indiatimes.com/industry/banking/finance/banking/yes-bank-upbeat-on-using-blockchain-to-add-more-processes/articleshow/56314280.cms"

[4]Experian, CRM search, Loyyal, Transera

[5]Deloitte US PoV: "Making blockchain real for loyalty rewards programs.pdf"

# Contacts

**Monish Shah**
Partner
Deloitte Touche Tohmatsu India LLP
monishshah@deloitte.com

**Suchintan Chatterjee**
Director
Deloitte Touche Tohmatsu India LLP
suchintanc@deloitte.com

Deloitte.