# REALISING POTENTIAL ON BLOCKCHAIN AND ITS USABILITY IN THE ORGANISATION

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## INTRODUCTION

Blockchain is an open source software application which provides disruptive technologies and enhanced functionalities that allow digital information to be distributed – but not copied – between unknown parties. It is a technology that created the backbone of a new type of internet, originally devised with decentralised ledger, cryptography and consensus to solve major concerns such as centralised control, mid-layer stage gates, reconciliation etc. Leveraging a universal peer-to-peer network to assure transparent veracity of value exchanged between parties, Blockchain seems likely to benefit several significant businesses that rely upon third parties. It could even prove to be a wider force for decentralisation, transparency and integrity in these businesses – leading to extensive transformation in supply chain and finance as well as typical product companies and telcos. But ultimately, the extent to which the potential of this new technology is realised substantially depends on how well investors and innovators influence its growth and development.

Blockchain technology has already been working flawlessly over the last few years, finding successful application in both financial and non-financial sectors. Distributed as open source, it provides four major disruptive technologies and enhanced functionalities that underline its value even more compared to traditional mindsets and technologies:
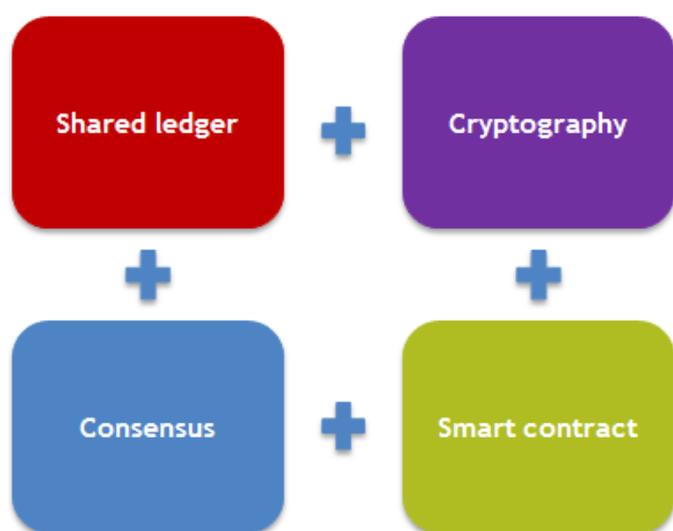


- **Shared ledger:** A shared and decentralised ledger that provides distributed storage flexibility with transparency and security on data sets gathered from individual digital transactions. It also provides visibility to all participating members of the business network and avoids the need for any central repository or body validation.

- **Consensus:** This functionality provides agreement from all – or most – participating members of the business network on transactions, ensuring the ledger is updated only with trusted and network-verified transactions.

- **Cryptography:** It ensures best in class security, authentication and integrity of transactions. By hashing each block, an extra layer of security is provided so that none of the participants can alter or modify the transaction. For authentication, it also provides an elliptic curve (EC) based digital signature for every participant.

- **Smart contracts:** Rather than being related to legal contracts, this is a node based business logic or algorithm which can be implemented based on business requirements. It captures an individual's terms of agreement for the trade that takes place on a particular transaction. It is also used for validating nodes in the Blockchain triggered by initialisation of any transactions.

## WHY DO WE NEED BLOCKCHAIN?

Put simply, Blockchain allows us to trust strangers. It is a technology that provides solutions so any person can get involved and transact with an unknown party with the confidence that the transaction cannot be hijacked or jeopardised by any technological means.

We have been dealing with such transactions without Blockchain for decades using a trusted 'middleman' approach. For example, anyone can buy property from an anonymous party knowing that the party has true ownership because the local administration preserves a trusted record. The person buying the property doesn't necessarily trust the unknown party, but instead has trust in the local administration which can provide details if the property is in dispute.

People live their life precariously in the digital world by relying on third parties for the security, authenticity and confidentiality of their digital assets or any digital data. The fact remains that these third-party foundations can be hacked, cracked, manipulated or compromised – possibly leading to substantial loss. This is where Blockchain technology comes into play. It has the potential to modernise the digital world by enabling a distributed consensus where every online digital transaction – past and present – involving digital assets can be verified at any time without compromising the privacy of the digital assets and participants involved. That is also where distributed ledger and consensus provide flexibility to each other.

There are multiple advantages of Blockchain technology and its use in the industry:

- Speed of transaction: if any transaction goes through a waterfall model where multiple stages or third parties are involved, Blockchain
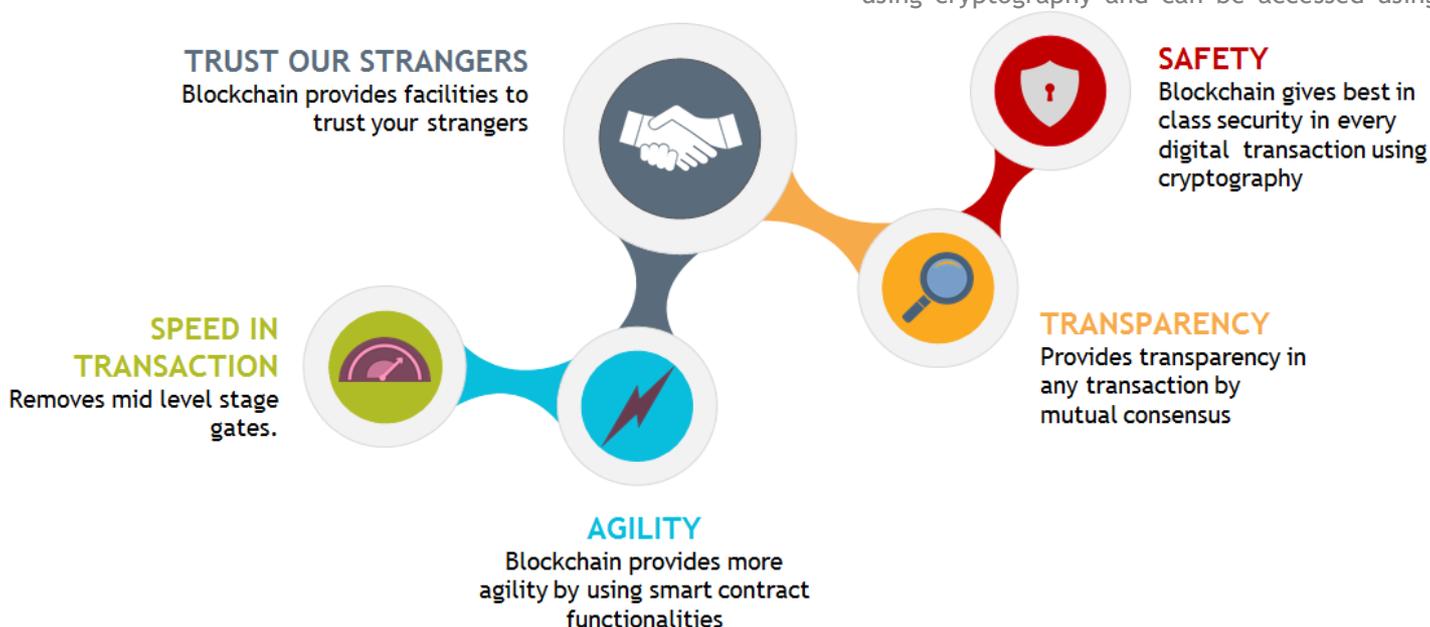
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can bring down the transactional elapsed time. It provides speed in any digital transaction by removing third party or middle layer stage gates.

- Agility: every participant to the Blockchain can create their own business logic which in turn removes the standard procedure of any transaction. Blockchain can automate the business logic dynamically, providing agility using smart contract functionality.

- Transparency: decentralised ledger and consensus functionality of the Blockchain enable this benefit – as every participant can have the visibility of each digital transaction and who is holding it.

## HOW BLOCKCHAIN CAN TRANSFORM OUR WORK

Blockchain can bring significant advantages through its basic functionalities like shared ledger, consensus, smart contract and cryptography. All these functionalities help make Blockchain stronger and sharper compared to other traditional decentralised applications.

- Shared ledger: A shared or decentralised ledger can be described as a ledger of any digital transactions or contracts maintained in decentralised form across different locations, eliminating the need of a central authority to keep a check against any kind of manipulation. All information is securely and accurately stored using cryptography and can be accessed using

**TRUST OUR STRANGERS**
Blockchain provides facilities to trust your strangers

**SAFETY**
Blockchain gives best in class security in every digital transaction using cryptography

**SPEED IN TRANSACTION**
Removes mid level stage gates.

**TRANSPARENCY**
Provides transparency in any transaction by mutual consensus

**AGILITY**
Blockchain provides more agility by using smart contract functionalities

- Safety: though best in class securities such as hashing, EC encryption and ECDSA (elliptic curve digital signature algorithm) digital signature, Blockchain provides safety to any digital transaction. It is for this reason that Bitcoin applications have become so popular and widespread for monetary transactions.

These are the main advantages Blockchain can bring to any organisation to transform the overall structure. With both financial and non-financial institutions trying to develop and invest in Blockchain, this won't just enable speed, agility, transparency and safety, but also reduce the turnaround time (TAT) in any business process – in turn boosting revenue and productivity of the company.
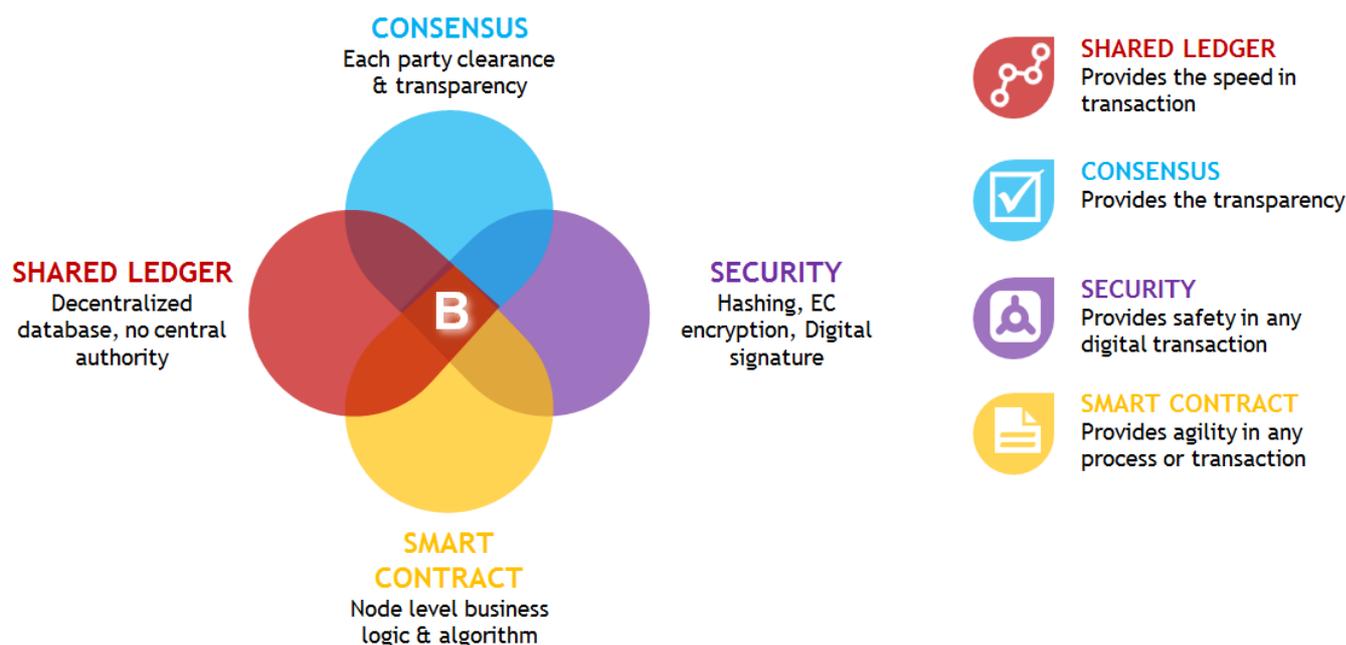
Financial and non-financial organisations – like ICICI, SBI, HDFC, IBM, Ericson, Cisco, AT&T to name a few – are all focusing closely and investing in research and development on Blockchain, as well as how it can bring value to the organisation.

keys and cryptographic digital signatures. Once the information is stored, it becomes part of an immutable database and is governed by the rules and regulations of the network. While centralised ledgers are prone to cyber-attack, distributed ledgers are inherently harder to target because all the distributed copies need to be attacked simultaneously to be successful. Further, these records are resistant to malicious changes by a single party. Also, once the block in the Blockchain framework is created, it's automatically hashed and replicated in a decentralised manner – so participants will not be able to alter the digital asset or information.

- Consensus: There are four main methods of finding consensus in a Blockchain (and all distributed systems).

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**CONSENSUS**
Each party clearance & transparency

**SHARED LEDGER**
Decentralized database, no central authority

**SECURITY**
Hashing, EC encryption, Digital signature

B

**SMART CONTRACT**
Node level business logic & algorithm

**SHARED LEDGER**
Provides the speed in transaction

**CONSENSUS**
Provides the transparency

**SECURITY**
Provides safety in any digital transaction

**SMART CONTRACT**
Provides agility in any process or transaction

These four methods are:

1. The practical byzantine fault tolerance algorithm (PBFT)
2. The proof-of-work algorithm (PoW)
3. The proof-of-stake algorithm (PoS)
4. The delegated proof-of-stake algorithm (DPoS)

Each party maintains an internal state (ongoing specific information or status). When a party or node receives a message, they use the message in conjunction with their internal state to run a computation or procedure. This computation in turn tells that individual party what to subtract from the message in question. Then, after reaching its individual decision about the new message the party shares that decision with all the other parties in the system. A consensus decision is determined based on the total decisions submitted by all nodes. Among other considerations, this method of establishing consensus requires less effort than others. However, it comes at the cost of anonymity on the system. Decentralised ledgers can bring down the monopoly in any traditional transaction and speed up overall transactional time.

- Security: cryptography provides security for every digital transaction:

  o Integrity of ledger: to maintain the integrity of the ledger, cryptography uses hashing functionality so that none of the participants can alter or tamper with the triggered transaction.

  o Authenticity of transactions: to provide original and genuine authenticity of any transaction, cryptography uses the ECDSA algorithm to generate a unique digital signature. Every participant provides their authenticity using their unique digital signature for every transaction.

  o Privacy of transactions: every digital transaction is encrypted with EC point encryption provided by OpenSSL. Due to this extra layer of security, cryptography can provide privacy for any unique transaction.

  o Identity of participants: each participant's identity is based on their public and private key. Every participant generates their unique private key, creating their own digital signature for identification.

All these functionalities are provided by the cryptography, which in turn secures the transaction in Blockchain framework.

- Smart contract: smart contract is a term used to describe computer program code that is capable of facilitating, executing and enforcing the negotiation or performance of an agreement (i.e. contract) using Blockchain technology. The entire process is automated and can act as a complement or substitute for legal contracts where the terms of the smart contract are recorded in a computer language as a set of instructions. These computer programs act as agreements where the terms of the agreement or business logic of a transaction can be pre-

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programmed with the ability to self-execute and self-enforce. This can revolutionise the way contracts are executed and negotiated across all industries and create security and transparency in each transaction.

## WHAT BLOCKCHAIN CAN BRING TO THE ORGANISATION

During usability research within Tata Communications, multiple ways were identified in which organisations across many industries could digitally transform themselves and generate value with Blockchain.

**INTERNAL PROCESS**
OSS & BSS process automation

**CENTRAL SUPPORT SYSTEM**
End-to-end legal, marketing, sales transactional execution

**HEALTH CARE**
User data storage & transmission

**IDENTITY MANAGEMENT**
Authentication across devices, apps & management

**BLOCKCHAIN**

In short, through automating and decentralising the ownership, all OSS and BSS processes can be transformed using Blockchain technology.

- Central support system: in general, a traditional centralised team works in a waterfall based process and there is huge opportunity for Blockchain to introduce the parallel process where all stakeholders can work simultaneously. Benefits range from reduced turnaround time to transparency in all third party operations.

- Health care: Blockchain can bring values to health care sector too. In traditional systems, there are multiple parties involved in the overall transaction for patient cases – such as the doctor's proposition and interaction, billing systems, centralised hospital authorities etc. Using Blockchain technology, a decentralised ledger based storage system means multiple parties can work on the outputs generated by the individual monitoring systems.

- Identity management: Blockchain can also be useful for identification as well as authorisation of incorporated OEM/ODM and other devices. An identification management system can also be used for mobile applications and enterprise

software authentication. Even for employee identification, Blockchain application can be used at an organisation level.

- Roaming: Blockchain technology can be used for subscriber authentication and billing in roaming & interconnect management – bringing value in potential use cases such as fraud detection and minimisation, number porting etc.

- IoT connectivity provisioning: Blockchain based decentralised ledger and authentication can be used for IoT device authentication, configuration and maintenance.

**ROAMING**
Subscriber authentication, billing & payment

**IoT CONNECTIVITY PROVISIONING**
Authentications, configuration, maintenance

**DIGITAL ASSET TRANSACTIONS**
Mobile data, documents & other digital matters

**SMART CITY**
Network connectivity, smart payment

- Digital asset transactions: maintaining digital asset transactions is also a feasible use case for Blockchain application.

- Smart city: with smart city related network connectivity and smart payments, Blockchain technology can create first mover advantage for any organisation.

## CURRENT INITIATIVE ON BLOCKCHAIN

**Smart Contract Management application**

This is a Blockchain based application to provide an end-to-end one-stop solution for legal contract management and secured external vendor transactions where, traditionally, there have been multiple pain areas:

- The typical waterfall execution of legal contract between multiple parties increases the turnaround time as the next step waits for previous step in the waterfall.

- Manual transaction of legal documents though email communication increases the likelihood of loss when individuals leave the organisation.

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## Business benefits

**Productivity** to increase by approx **30%** on smart contract execution

**Automatic** vendor & client onboarding management

## Product features

**Parallel clearance** of smart contract by multiple parties

**Decentralized** data storage in web based application

**Digital signature** by replacing electronic signature

**3-layer** of best in class security encryption

- No automatic storage mechanism or search option is maintained for executed/current legal documents as hash tagged repository of the contracts.
- Manual Excel based tracking of legal contract transaction.
- Email based client/vendor on boarding legal process.
- Traditional electronic signature based authentication.

**Benefits of Blockchain based Smart Contract Management solution:**

- Parallel/agile execution of legal contracts
- Smart contract management application with automatic transaction status tracking and history
- Decentralised ledger for storage with additional security layer plus search functionality
- Web based tracking dashboard to transparently show the status of each contract-based digital transaction
- One stop shop vendor/client management application
- Highly secured legal transaction with digital signature feature

This makes a compelling case for the new emerging technologies in creating opportunities to deliver business value and agility. The solution was completely developed in-house by the Digital & Innovation team using the open source packages and on premises infrastructure. The application helps to automate the vendor and client on boarding management process and promises to increase productivity by at least 30%.

## FUTURE STEPS

The future steps for increasing the capability of this Blockchain based application include:

- Version management, tracked changes and workflow management
- Automatic approval from all stakeholders if the contract meets Tata Communications terms and conditions
- Role based information access – review comments will be visible to Tata Communications only, not external parties
- Handling different jurisdiction specific workflows due to respective regulatory norms
- Integration with CLM, Salesforce other centralised systems

## CONCLUSION

In today's world, how fruitful is the widely-used concept of Bitcoin? It's just the start of an infinite contest – with many other notions likely to evolve based on Blockchain essentials, bringing revolution not only to society and industry, but also in human thought processes.

While Blockchain may have become common grammar for geeks and the talk of the town in every organisation, the essentials of Blockchain can solve lots of everyday industry wide challenges. As we move ahead, Blockchain becoming ubiquitous in all business operations is a near certainty. It is therefore imperative for all organisations to find and embrace Blockchain, however cherished current solutions may appear today. Innovative organisations must take it upon themselves to shape the future using Blockchain prerequisites.

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**About Tata Communications**

Tata Communications Limited (CIN no: L64200MH1986PLC039266) along with its subsidiaries (Tata Communications) is a leading global provider of A New World of Communications™. With a leadership position in emerging markets, Tata Communications leverages its advanced solutions capabilities and domain expertise across its global and pan-India network to deliver managed solutions to multi-national enterprises, service providers and Indian consumers.

The Tata Communications global network includes one of the most advanced and largest submarine cable networks and a Tier-1 IP network, as well as nearly 1.5 million square feet of data centre and collocation space worldwide.

Tata Communications' depth and breadth of reach in emerging markets includes leadership in Indian enterprise data services and leadership in global international voice.

Tata Communications Limited is listed on the Bombay Stock Exchange and the National Stock Exchange of India.

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