Iris™
When IT matters most.

Perspective Paper

Navigating Distributed Ledger Technologies

DLT evolution in enterprise applications can potentially revolutionize operations

Navigating Distributed Ledger Technologies

DLT evolution in enterprise applications can potentially revolutionize operations

Ashwani Kumar, Principal Architect at Iris Software
Subramanian Viswanathan, Director - Financial Services Practice at Iris Software
Vishwas Kumar Tomar, Associate Director - Automation Practice at Iris Software

Executive Summary

Today's corporates rely heavily on information systems to enable their business processes, which are usually managed and controlled at the level of individual enterprises. However, there are a significantly higher number of multilateral transactions in the modern business value cycle. These span cross-enterprise and require faster, reliable access to the latest, comprehensive transaction data to make them more effective and, eventually, lead to better collaboration among enterprises.

The reality, however, is that with decentralized information systems and each participant managing their version of truth, enterprises end up having an opaque information architecture resulting in **information discrepancies, countless reconciliations, unproductive person-hours spent resolving higher operational risk, weakened trust**, and **increased cost.** Supply chains and payments are good examples of multilateral transactions that would be better served with a shared version of truth across participants.

Decentralization by way of Distributed Ledger Technology (DLT) is a step towards addressing these issues, enabling companies to jointly manage, operate and use a platform to maintain a **single version of truth across participants.** DLT enables a network of independent systems (belonging to different participants) to participate in distributed processing utilizing a centralized ledger (record of the shared truth) without a central authority. DLT facilitates the proposal and recording of transactions between participants through the execution of agreed and automated business logic coded as **Smart Contracts.**

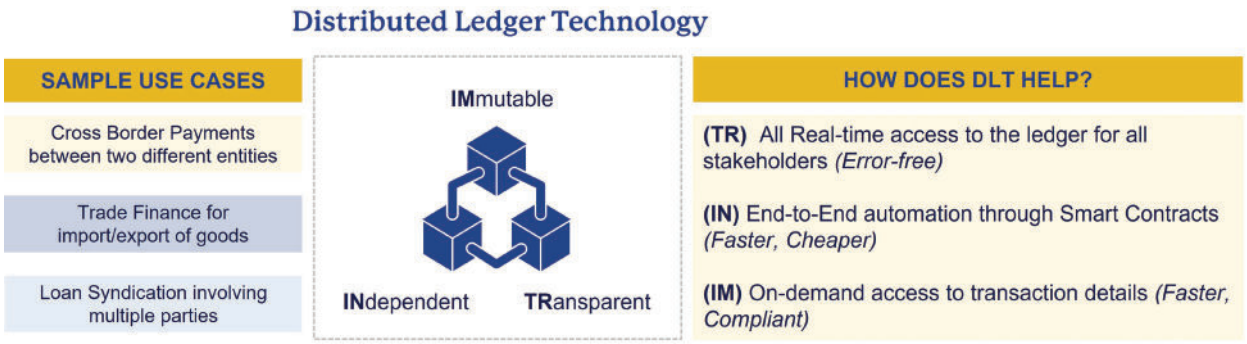
Distributed Ledger Technology has evolved and matured over the last few years. While it was first used with cryptocurrencies, the application of this technology is now seen in alternative use cases benefitting enterprises. The rise in the adoption of DLT across enterprises is mainly due to the convergence of democratization brought in by public blockchain and enterprise-grade features, such as privacy, identity, and scalability, provided by permissioned DLTs.

DLTs leverage the power of decentralized database instances working together to maintain a shared version of truth and strong cryptography to create trust and immutability, which helps reduce the issues mentioned above. The objective is to deliver tamper-proof data and transparency to all network participants in a consensually-agreed manner.

This document shares a perspective on DLT, its evolution and application in enterprises, and how it can be further embraced to realize potential across multilateral solutions.

Bird's Eye View

Multiple sources of truth, high reconciliation effort, and low efficiency in managing transaction data are some common challenges observed in many industries. The adoption of DLT offers significant improvements and advantages in managing these challenges posed by traditional multilateral solutions and broken information exchange systems. The following illustration outlines some of the use cases and benefits:



DLT Characteristics

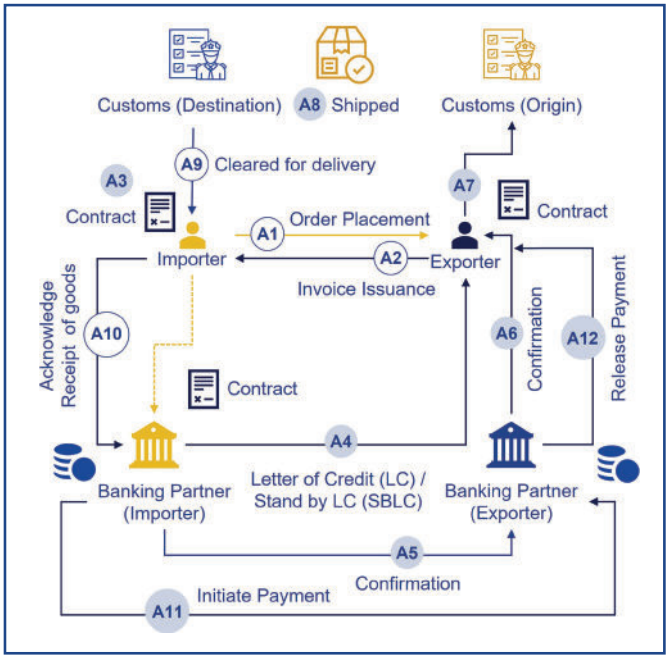
In sum, by offering a decentralized and secure way of storing a single version of truth among multiple participants, DLT significantly reduces the reconciliation effort through increased transparency and efficacy of transactions that can potentially revolutionize many operations.

Distributed Ledger Technology (DLT)

A walk-through of how a typical trade finance lifecycle with its current inefficiencies could be transformed with DLT, would help us appreciate this technology better.

In trade finance, a high number of stakeholders, long processing times, inefficiencies, and high costs have long been some of the main challenges. Some examples:

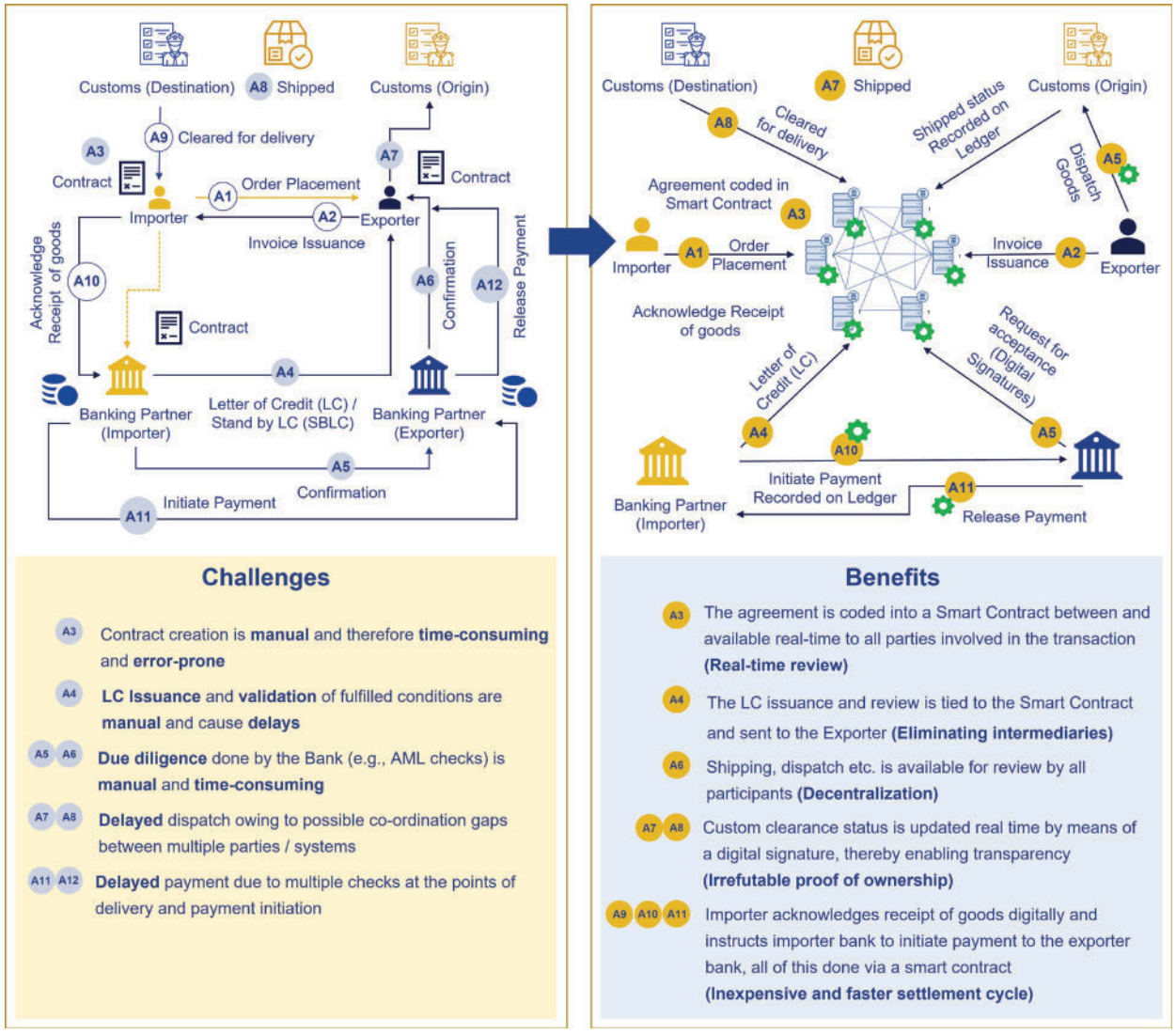
- Manual contract creation, which is time-consuming and error-prone
- Letter of credit issuance and validation of fulfilled conditions are manual and cause delays
- Due diligence is manual and time-consuming
- Delayed payment realization due to multiple checks



Trade Finance Lifecycle – current state

The advent of DLT, however, has provided a promising solution. The approach of securely storing and sharing trade finance data in a decentralized ledger infrastructure helps enhance the transparency and efficiency of the overall ecosystem.

Distributed Ledger Technology is a digital system for recording transactions in an immutable fashion. Primarily it refers to the technological infrastructure and set of protocols that allow the simultaneous access, validation and updating of records that characterize distributed ledgers. Consensually agreed transactions and their details are recorded in multiple participating nodes at the same time.



Trade Finance - Transformation with DLT

This system represents a paradigm shift in how multilateral transactions are recorded and exchanged by moving record-keeping from multiple disconnected participant-specific systems to a distributed ledger system in which all participating nodes can view and modify the transactions with appropriate controls. This results in a universal view of all participating nodes indicating who is using and updating the ledger using the transaction proposal.

DLT WORKS ON STRONG PILLARS OF:

- **Consensus Algorithm:** A decision-making process used to reach an agreement on a data value among distributed systems, critical to ensure that there is a shared version of truth across nodes and participants. Since there is no central authority in decentralized systems, the consensus algorithm helps arrive at a conclusion following a set of agreed rules, e.g., Proof of Work, Proof of Stake.

- **Cryptography:** The science of developing techniques for protecting data at rest and in transit. It follows the triad of confidentiality, integrity and availability. Cryptographic hashes and digital signatures are important techniques, amongst others, that are essential for ensuring the DLT is an immutable ledger which offers the feature of public verifiability and helps achieve consensus.

- **Distributed Database:** The core of DLT is having a digital system for recording transactions and their details in multiple places at the same time. Every node maintains an individual instance of the database where the replica of a single version of truth is maintained.

- **Peer-to-Peer Network:** DLT originates from the very idea of a peer-to-peer network in any P2P network. Peers communicate without the need for any centralized entity.

This immutable nature of data and the transparency of DLT helps establish a high level of trust among the participants and practically eliminates the chance of fraudulent activities occurring in the ledger, hence providing a single source and version of truth available to everyone at all times.

Smart Contracts are another important constituent of DLT, which enables programmable execution capability. Smart Contracts are programs that encapsulate business process agreements into code and get executed once a certain condition is met and all participants get to know the outcome.

DLT Platforms

Numerous DLT/blockchain platforms have emerged in the last few years, each having their own specific focus. A DLT has various characteristics; platforms can be differentiated based on these. Choosing the best platform in each specific instance would be dictated by the key use case of the particular business problem domains.

Below is a high-level comparison of some key platforms:

DLT Attributes\Platform	R3 Corda	Hyperledger fabric	Ethereum
Type	Private	Private	Public
Smart Contract	Yes	Yes, termed as chain code	Yes
Consensus Service	Notary-based	Orderers & Endorsers	Proof of Stake
Energy Consumption	Very Low	Very Low	Moderate
Privacy	Strong privacy; ledger contains transactions that are to be known	Strong privacy; utilizes a concept called channel that allows privacy to be maintained among a subset of participants on that channel	Transactions and smart contract codes are visible to everyone, linked through pseudonymous identifiers
Scalability	Highly scalable and configurable	Highly scalable and configurable	Limited, however, several L2 solutions enhance transaction scalability
Governance	Code maintained by R3 and network governance is Consortium-based	Open Source and governed by Hyperledger Foundation Community	Open Source and improvement through Ethereum Improvement Proposal (EIP)

Though Ethereum has been shown as public, there are numerous products where Ethereum has been used as a private ledger.

Key Steps in Establishing a DLT for Multilateral Use Cases

Embracing DLT has implications for corporates that wish to utilize it for one or more multilateral use cases. With distributed ledger in place, instead of having separate databases, companies now have a distributed, collaborative database that all stakeholders can access at any time. The following need to be considered for the viable application of DLT to specific use cases:

- **Shared Infrastructure:** Companies coming to an agreement over the use of DLT would predominantly need to set up a shared infrastructure, i.e., Corda Cluster or Hyperledger Fabric network, with either the collective or designated facilitator(s) taking ownership to set up and manage the shared infrastructure.

- **Business Logic:** To use DLT, the companies must jointly agree on rules for adding, storing or changing (business logic) data and what the automated processes that the DLT can execute should look like. That is where business logic is put together in smart contracts, which usually are written in various languages such as Kotlin, Go, Java.

- **Enterprise Integration:** Replacing bespoke copies of truth with a DLT-based single version of truth has implications in terms of initial setup and ongoing integration with other applications in various participants' organizations.

Is Bitcoin a DLT Platform?

A Blockchain is a form of DLT where transactions are bundled as blocks and chained together using the cryptographic hash of the previous block. Bitcoin is a cryptocurrency that leverages this form of DLT. So, Bitcoin is not a DLT platform but a prominent use case of it.

Challenges

- **Adoption Inertia:** DLT systems work best in multilateral solutions; that is, it helps when businesses come together, realizing the need for a working group to collaboratively handle similar problems faced by all.
- **Niche Technology (Low Workforce):** Given that the DLT space is evolving and the technology landscape is different, at times, organizations may find it difficult to engage competent resources who understand it well.
- **Regulatory Compliance:** Enterprises need to comply with the laws of the land, and it is often difficult to ascertain if current frameworks are up to the mark on regulatory compliance.

Conclusion

DLT is steadily gaining mainstream adoption, on the back of substantial research, proof of concepts, and prototypes. There are multiple examples of successful implementation across various industries, such as Financial Services, Supply Chain, Real Estate, Media and Entertainment.

Central Bank Digital Currency (CBDC), which has its roots in the DLT platform, is being adopted by more and more central banks across the world. This itself is a testament to the fact that regulators are fast adopting this technology. This is likely to foster additional multilateral use cases in Financial Services and related industries.

With real-life adoption, the DLT platforms are likely to evolve and mature over the coming years and support many more use cases for which they will provide unique value.

Industry Case Studies

Use Case	Industry / Domain	Platform
Marco Polo: Corda network that enables banks and corporates to streamline and automate their global trade and working capital finance activities	Trade Finance	R3 Corda
Spunta Banca: Backbone of Italian banks for interbank reconciliation	Finance	R3 Corda
Walmart Canada: Freight-invoice management	Retail	Hyperledger Fabric

About the Authors

This perspective paper is co-authored by Ashwani Kumar, Subramanian Viswanathan, and Vishwas Kumar Tomar of Iris Software.

Ashwani Kumar, Principal Architect is the author of the book, Hyperledger Fabric In Depth. Ashwani has considerable knowledge and experience with DLT/Blockchain platforms such as Ethereum, Hyperledger Fabric & R3 Corda. As a technology enthusiast, he has successfully developed and delivered numerous large-scale enterprise solutions.

Subramanian Viswanathan is the Director - Financial Services Practice and a passionate digital transformation specialist. Subramanian's expertise includes building end-to-end crypto currency wallets, spanning product management, technical architecture, all phases of implementation, and partnerships with crypto exchanges.

As the Associate Director - Automation Practice, **Vishwas Kumar Tomar** is responsible for driving the growth of the Automation Practice and development of DLT solution capabilities. Vishwas has excellent command of DLT blockchain technology and is an expert in crafting innovative Automation solutions across verticals.

About Iris Software

Iris Software has been a trusted software engineering partner to Fortune 500 companies for over three decades. We help clients realize the full potential of technology-enabled transformation by bringing together a unique blend of domain knowledge, best-of-breed technologies, and experience executing essential and critical application development engagements. With over 4,300 skilled professionals, Iris builds mission-critical technology solutions across banking, financial services, insurance, life sciences, and manufacturing. Iris Automation services and solutions include Intelligent Automation, Quality Engineering, and Low Code No Code development.

Click here to read about the milestones of our 30-year journey.

Learn more about our Automation capabilities at:
https://www.irissoftware.com/services/automation/