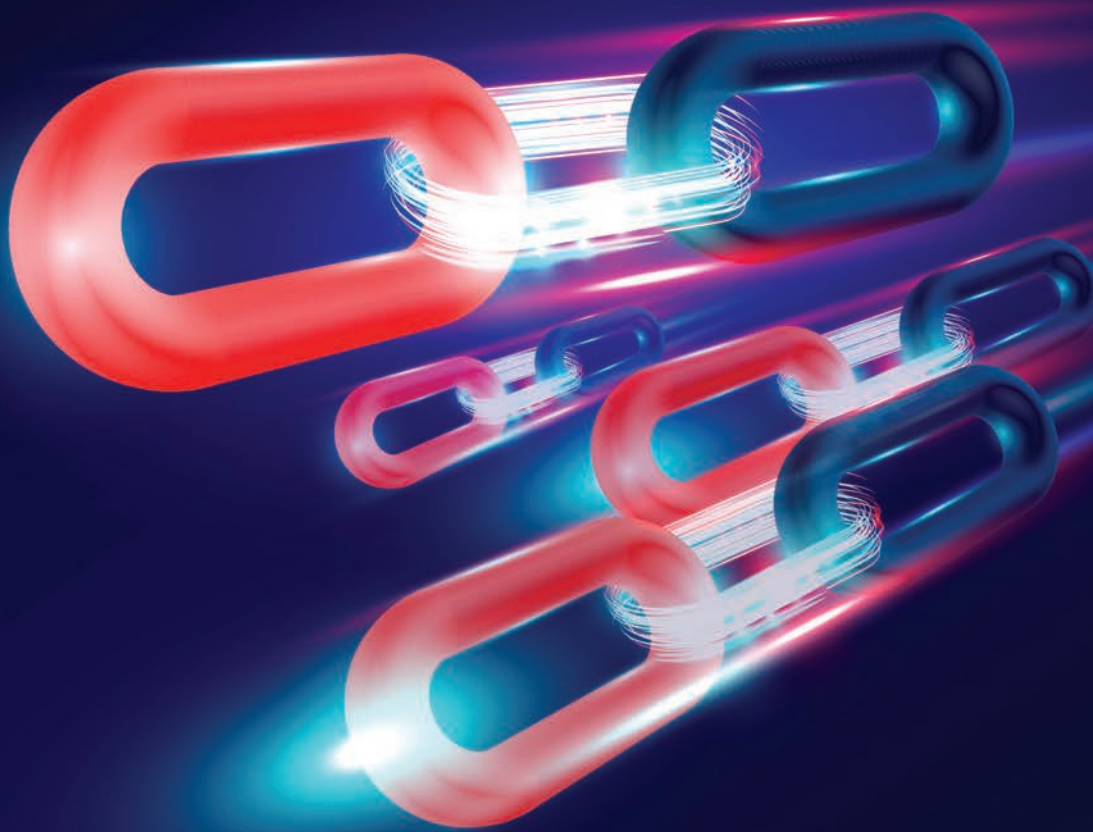


NOVEMBER 2019

BLOCKCHAIN & DLT IN TRADE: A REALITY CHECK

Deepesh Patel (TFG)
Emmanuelle Ganne (WTO)



This is a jointly produced white paper between Deepesh Patel, Editorial Director, Trade Finance Global (TFG), and Emmanuelle Ganne, Senior Analyst at the World Trade Organization (WTO). This white paper is endorsed by the International Chamber of Commerce (ICC).

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Thanks To

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AUTHORED BY

EMMANUELLE GANNE (WTO)
DEEPESH PATEL (TFG)

ASSISTANT EDITOR AND LEAD RESEARCHER

CARTER HOFFMAN (TFG)

SPECIAL THANKS TO

PERSIANA IGNATOVA (TFG)
FABIANA FONG (WTO)
DAVID BISCHOF (ICC)

DESIGN AND LAYOUT

JERRY DEFEO

PHOTOGRAPHS AND ILLUSTRATIONS

FREEPIK COMPANY S.L.

ADDRESS

TRADE FINANCE GLOBAL
2ND FLOOR
201 HAVERSTOCK HILL
BELSIZE PARK
LONDON
NW3 4QG

TELEPHONE

+44 (0) 20 3865 3705

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1 FOREWORD

We're living through exciting times. While international trade in goods has seen little innovation since the invention of the container in the 50s, the tedious, labour- and paper-intensive processes required to ship around the world could well become a story of the past thanks to the advent of new technologies, particularly distributed ledger technology (DLT) - colloquially termed "blockchain".

Rarely has a technology spurred so much hype and hope amongst the trade and trade finance community. Not without reason: The possibilities that blockchain unlocks to track transactions and exchange assets in real-time, in a trusted and highly secure environment using peer-to-peer validation and networks makes it an appealing tool to remove many of the inefficiencies that hinder one of the oldest forms of traditional finance today.

Over the past few years a myriad of projects have been launched to enhance processes related to trade finance, to digitalize trade documentation, and to reduce inefficiencies in transportation and logistics. Some take the form of multi-player consortia and networks, others are building a fabric layer to interconnect these different projects, and others are built to digitize particular aspects of the trade and supply chain.

These international trade actors are changing fast, but how many of these initiatives have moved beyond a proof-of-concept? What are the challenges that these new actors now face as we go past the trough of disillusionment and exploratory phase of DLT in trade?

Building on the WTO publication "Can Blockchain Revolutionize International Trade?" authored by Emmanuelle Ganne and TFG's white paper "Blockchain and Trade Finance", this study provides an overview of the main projects underway in trade, with a focus on trade finance, shipping, and the digitalization of trade documents, and assesses their stages of maturity. Based on a survey of more than 200 actors in the field, it analyses the key challenges that companies involved in blockchain projects are facing and discusses actions that may need to be taken to allow the technology to truly transform international trade. After years of hype around blockchain, the time has come for a reality check.



A handwritten signature in black ink, appearing to read 'Deepesh Patel'.

DEEPESH PATEL
Editorial Director,
Trade Finance Global (TFG)



A handwritten signature in black ink, appearing to read 'Emmanuelle Ganne'.

EMMANUELLE GANNE
Senior Analyst,
Economic Research and Statistics Division,
World Trade Organization (WTO)



A handwritten signature in black ink, appearing to read 'David Bischof'.

DAVID BISCHOF
Deputy Director,
Finance for Development,
International Chamber of Commerce
(ICC)

2 INTRODUCTION

Holy Guacamole, avocado consumption has skyrocketed in the last decade. Health conscious consumers and trendy millennial hipsters across the world have contributed to a striking 150-fold influx in the fruit's consumption compared to ten years ago. Many of the nations contributing to this, such as the Netherlands, the world's second largest avocado consumer, lack the necessary climate to produce the fickle crop. To meet this growing demand without an ability to produce within their own borders, turning to the international market is a must. While popular to eat, many consumers don't fully understand the arduous journey that an avocado makes from the farm to the brunch boutique that doles out their favourite avocado toast.

In 2014, Maersk followed a shipping container of roses and avocados on its way from Kenya to its final destination in the Netherlands to try and see exactly what a shipment must go through. What they found is that the 34 day process involved around 30 actors, over 100 people, and more than 200 interactions. That's a lot of work for a little bit of healthy fat. More importantly though, Maersk found that of those 34 days, ten were spent simply waiting for the plethora of documents to be processed. This is a considerable amount of idle time that could be saved by rethinking and digitizing the entire trade process.

Distributed Ledger Technology (DLT), colloquially termed 'blockchain', is making the bold promise to help bring the trade industry into the digital age. All aspects of the industry, from the financing of transactions, right through to the actual physical movement of goods seem set to be disrupted by innovative thinkers designing new products and revamping processes. The World Trade Organization (WTO), Trade Finance Global (TFG), and the International Chamber of Commerce (ICC) have teamed up to produce this white paper exploring the broader impact that DLT is having on the trade industry.

"Trade finance is being deeply disrupted by blockchain"

Mariana Gomez de la Villa, Program Director DLT, ING Bank N.V.

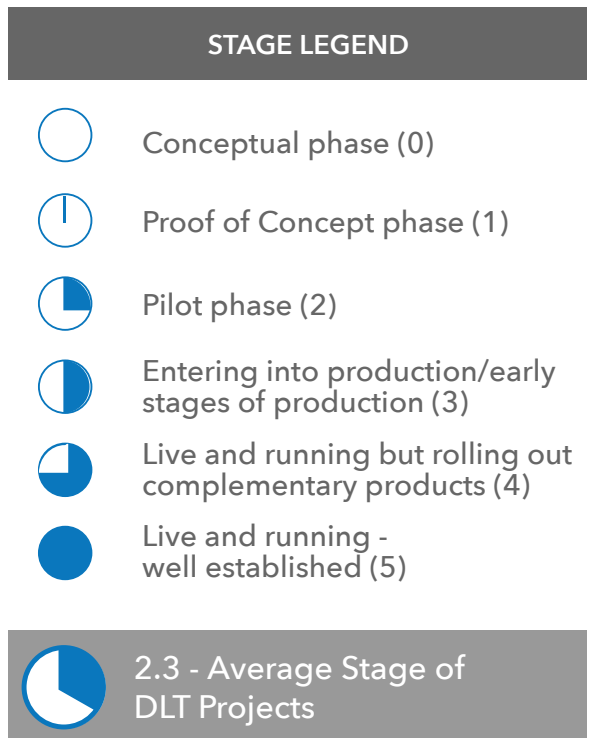
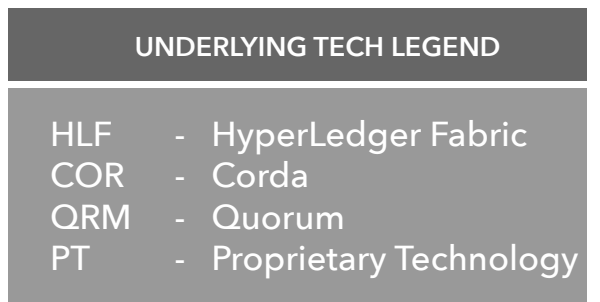
We will begin by introducing our visual depiction of the DLT in trade landscape, the periodic table of DLT projects. Following this we will dive into each of the initiatives being pursued, providing some background as to what each is seeking to accomplish and the tools, participants, and structures that will help them get there. While we tried to ensure a coverage as comprehensive as possible, the trade landscape is changing rapidly. Keeping track of all the initiatives underway can prove challenging, in particular in the area of supply chain finance. The periodic table we introduce is our best assessment of the current trade landscape. Following this we will examine the various products that are being rethought and digitized. Next, we will examine the participation of banks in the various projects and consortia. Lastly, we will dive into the results of both our qualitative and quantitative industry surveys, looking at the assorted insights that these have provided about what the future of the industry holds. Over 200 responses from banks, corporates, fintech companies, and industry associations were received to our general survey on DLT in trade and trade finance, and over 20 consortia, banks and companies involved in the various projects covered in the present study provided detailed inputs.

3

PERIODIC TABLE OF DLT PROJECTS



Figure 1: Periodic table of DLT projects split by grouping and across various categories, also highlighting the state of development and underlying technology



DESCRIPTION OF PERIODIC TABLE AND PROJECTS LISTED

The Periodic Table of DLT Projects provides a means of beginning to conceptualize and differentiate between the countless initiatives, projects, consortia, and companies operating in the broad space that can be described by the phrase: DLT in trade. While no simplified diagram of the landscape can ever be able to fully encapsulate the minutiae and nuances of each and every project, this table provides a starting point for understanding and analyzing the industry.

To categorize the initiatives, we began by generating four broad groupings: trade finance, network of networks, insurance, and supply chain digitization. To further nuance each group, a subsequent eight categories were developed. These categories, represented by the different colourings in the table, are: trade finance initiatives, supply chain DLT initiatives, Shipping and Freight, DLT digitization of trade documents, non-DLT networks in trade finance, other initiatives in trade and supply chain finance, network of networks, and insurance. Assigning each initiative to a group and a category, and then loosely arranging them based on their current state of development, has left us with an improvised snapshot of the ecosystem.

The periodic table was selected to represent this for several symbolic reasons. Firstly, the Periodic table's natural inclination is to simultaneously represent striking similarities and distinct differences. On the actual periodic table, hydrogen may be most similar to helium in terms of mass, but the two remain radically different when comes to features like reactivity. On the trade finance periodic table, similar comparisons and contradictions can be made between the projects. Simply because two projects are positioned close to one another, does not mean that these projects can be considered similar across every dimension.

Another reason for selecting this design is its pre-supposed intention to grow and morph over time. The first periodic table of elements, developed in the 1860's, was made with intentional blank spaces, intended to one day be filled with elements that were predicted to exist, but not yet known. This design represents an inherent understanding that the landscape existing at any given time is not expected to last forever, but will see changes emerge over time. That is how the periodic table of DLT products has been envisioned as well: merely as a momentary snapshot of the industry as it exists today, with plenty of space to grow and change as the forces of Adam Smith's invisible hand continue to play.



The circles shown in the bottom right elements indicate what we believe is the current stage of maturity of the various DLT projects that we cover in this white paper. If 1 represents the conceptual / proof of concept (POC) stage and 5 represents live and running (across all products and to all customers), the average stage of the projects under consideration is around 2.3, indicating that most projects are between the pilot and early stages of production.

In the subsequent sections we will delve deeper into each of the projects and initiatives that we have identified in the periodic table, providing an inkling of an insight into the purpose of these projects, their composition, and the progress they have made to date.

DIGITAL PROJECTS WITHIN TRADE



Projects within trade finance, network of networks, supply chain digitization and supply chain finance

Projects by Product: Letter of Credit, Bill of Lading, KYC, Shipping

Projects by Bank

4 DESCRIPTION OF PROJECTS

4.1 TRADE AND SUPPLY CHAIN FINANCE

Trade finance is crucial for trading activities. According to WTO estimates, up to 80 per cent of trade is financed by some form of financing. Yet, securing trade finance can be complex, costly and time consuming. Micro, small and medium enterprises (MSMEs), in particular, struggle to receive financing for their trade undertakings.

Many in the industry saw the advent of blockchain as an opportunity to tackle some of the inefficiencies associated with trade financing. Several DLT initiatives have sprung up to help connect various key stakeholders and improve trade finance and supply chain finance processes. While many of the projects that have made the headlines are consortia of banks teaming up to help solve common problems, there is also an increasing number of non-consortia initiatives involved. This section will dive into these various initiatives and consortia.



4.1.1 | BAY AREA TRADE FINANCE BLOCKCHAIN PLATFORM (BATFB)

The Bay Area Trade Finance Blockchain Platform (BATFB) is a DLT based platform that was unveiled by the People's Bank of China in September 2018. The platform, which now incorporates 28 banks in Shenzhen, has processed over \$4.5 Billion worth of foreign exchange transactions to date. The intended purpose of the project has been real-time traceability, the elimination of fraud, and a reduction in the need for manual transactions.

The platform, which is built using proprietary technology, has announced plans to link with the Hong Kong, China-based platform eTradeConnect, which is powered by Hyperledger Fabric.

4.1.2 | CLIPEUM

“Blockchain has gotten companies together around a table to talk about a common problem”

Pierre Sien, Euler Hermes (Clipeum Participant)

Clipeum is a permissioned DLT joint venture initiated by Société Générale in 2017 and built on the Corda framework. The project aims to build a European know-your-customer (KYC) network with the clients at the centre having full control over data sharing and access permissions. Set to go live in 2020, Clipeum consists of 12 European financial institutions including BPCE/Natixis, Credit Agricole, Commerzbank, Allianz, Banque Postale, BpiFrance, Euler Hermes, Tikehau, and UniCredit.

The principle of Clipeum is that every corporate has a vault in which they store their KYC information. Financial institutions can request access to that information and, if the corporate approves the request, the information and all of its updates are made available to the financial institution until the access right is revoked.

The project is set to incorporate later this year which will alter the project governance structure. For now, each company has a voice. Once a third party entity is incorporated, decisions will depend on the amount of shares and investment within the entity.

4.1.3 | eTRADECONNECT



eTradeConnect is an Asia-Pacific consortium managed by the Hong Kong Trade Finance Platform Company Limited (HKTFPCL) and powered by Hyperledger Fabric. Launched in September 2018, the consortium aims to build better trust among trade participants, improve efficiency, reduce risks, and facilitate trade counterparties to obtain financing by digitizing trade documents and automating trade finance processes. eTradeConnect has digitized purchase order and invoice creation, pre- and post-shipment trade finance on open account trade, duplicated financing check, and payment status updates. The network is currently working toward digitizing the connections with logistics service providers, connection with different trade finance platforms from other jurisdictions, and integrations with ERP systems.

Originally initiated by seven banks including Australia and New Zealand Banking Group Limited, Bank of China (Hong Kong) Limited, The Bank of East Asia Limited, DBS Bank (Hong Kong) Limited, Hang Seng Bank Limited, HSBC and Standard Chartered Bank (Hong Kong) Limited and facilitated by the Hong Kong Monetary Authority (HKMA), eTradeConnect has since grown to 12 banks. In October 2018 the network signed a memorandum of understanding with the European we.trade consortium that operates on the same underlying technology. While eTradeConnect primarily focuses on the Asia-Pacific region, this partnership may help open a broader trade corridor between Asia and Europe.

In November 2019, eTradeConnect announced a proof of concept to connect the platform with CargoSmart and shipping industry participants that are proposing to form the Global Shipping Business Network (GSBN). Facilitated by PwC, the PoC is intended to demonstrate that linking the supply chain data, from the shipping industry, with trade finance data, from eTradeConnect, can provide enhanced transparency, traceability, and efficiency for the 12 member banks and their trade finance customers. That same month also saw eTradeConnect complete a proof of concept to integrate the network with existing ERP systems.

Looking ahead, the focus for eTradeConnect will be on establishing connectivity with various DLT trade platforms using cross-chain technology.

4.1.4 | FINACLE TRADE CONNECT



“Finacle Trade connect today caters to a comprehensive set of end to end key trade functionalities required for trade business.”

Mohua Banerjee, Senior Business Development Manager, Finacle Blockchain solutions

Finacle Trade Connect is the comprehensive blockchain-based solution from Finacle, developed specifically to simplify and digitize the trade finance business process requirements of banks using blockchain. Founded in 2017, the solution helps digitize trade finance business processes, including validation of ownership, certificate of documents and making payments, while working on a distributed, trusted, and shared network and was first piloted as the India Trade Connect project. The consortium consists of 14 leading banks in India including ICICI Bank, Axis Bank, Standard Chartered Bank, YES Bank, Ratnakar Bank Limited, Bank of Baroda, Syndicate Bank, Kotak Mahindra Bank, Indusind Bank, and South Indian Bank among others. The consortium is now in the process of being incorporated as a company called Blockchain Infra Company.

Their solution supports a comprehensive set of end-to-end trade products and functions including open

account, letter of credit, bank guarantee, bill collection, C2C and B2C transactions. Finacle Trade Connect, which is built on the principle of permissioned networks, is agnostic to the underlying distributed ledger technology and is certified to work on most major platforms including R3's Corda, Hyperledger Fabric, and Ethereum stacks. Banks can leverage the solution to adopt one of three key strategies: building inter-banking group networks, curating intra-banking networks, and offering trade-as-a-service.

4.1.5 |

GLOBAL TRADE CONNECTIVITY NETWORK (GTCN)



The Global Trade Connectivity Network (GTCN) is a collaboration between the Monetary Authority of Singapore (MAS) and the Hong Kong Monetary Authority (HKMA) to develop a DLT infrastructure for cross-border transactions. The initiative strikes out to reduce the number of pain points involved in traditional trade finance transactions, leveraging Distributed Ledger Technology (DLT) to build an infrastructure for more efficient cross-border trade and trade finance transactions.

To assist with overcoming many of the challenges currently facing the DLT in trade industry, technology and FinTech vendors have been invited to make proposals for inclusion on the platform. The GTCN has since been built on an open architecture so that it will be a seamless process for other jurisdictions beyond just MAS and HKMA to join.



“Komgo has the largest network of banks and corporates in production today, we are looking forward to supporting the industry in its transition to a safer and more secure way of operating”

Souleïma Baddi, CEO at KomGo SA

komgo is a live, fully decentralized commodity trade finance network built on the Quorum blockchain infrastructure. Investors and shareholders of the company include Citi, ING, Credit Agricole CIB, BNP Paribas, Societe Generale, ABN Amro, Macquarie, MUFG, Natixis, Rabobank, Gunvor, Mercuria, Koch, Shell, and SGS.

komgo offers 3 main families of products to its users:

1. Digital trade finance related products (including Letters of Credit, Standby Letters of Credit, receivables discounting and inventory financing), allowing commodity houses and other players to submit digital trade data and documents to financing institutions and apply for credit directly on the platform.
2. A KYC solution, standardizing and facilitating the process while maintaining privacy by transmitting data on a need to know basis: users & non-users benefit from a single source of trust to exchange documents on a secure and private network to perform KYC tasks.
3. A certification feature, that allows komgo users and non-users to stamp their documents on the network to ensure their authenticity.

komgo offers a unique and all-inclusive product suite which answers to the needs of a wide-range of corporate and bank users from across the front, middle and back office functions.

Before reaching maturity and entering the production phase the company embarked on two successful proofs of concepts. The first, in October 2016, was a shipment of crude cargo from Angola to China with Mercuria as the seller, ChemChina as the buyer, ING as the selling bank, and Societe Generale advising. In October 2017, a second successful PoC involving a transaction of soybeans from the USA to China was completed on the network.

The first live transaction on the komgo platform was announced in December 2018. While the firm cannot disclose details of live transactions, they have said that as of September 2019, it has channelled more than \$1 billion of financing on the platform.



4.17 | “LETTER OF CREDIT NETWORK”, FORMERLY “VOLTRON”



Project Voltron works with over 50 banks and corporates delivering a Corda-powered open industry platform to create, exchange, approve, and issue letters of credit as its first product. The platform, currently accessible to all customers of member banks, will enable banks to provide faster service levels, financing decisions, and lower rates to their customers. In addition to Voltron created documents, trade documents produced on external networks by a corporation’s supply chain partners can also be digitally sent, verified, and processed in Voltron. Integration to electronic bills of lading from platforms like Bolero and EssDOCS have already been tested in Voltron’s over 25 live data pilot transactions and a variety of other partnerships are being developed for other services related to trade finance. One of those, ReChainMe from the United Arab Emirates announced their first pilot transaction with Project Voltron in June 2019.

Project Voltron is the culmination of 18 months of 8 banks working with R3 to evaluate the benefits of letters of credit on Corda. Founded by a selection of global, regional and local banks including Bangkok Bank, BNP Paribas, CTBC, HSBC, ING, Natwest, SEB, and Standard Chartered, this globally reaching consortium completed its first transaction in April 2018. In September 2019, HSBC announced that it had processed a Yuan-denominated letter of credit using the Voltron platform, the first of its kind. Transactions in 15 different countries were tested prior to launching their Beta Network in December 2019.

At the CordaCon conference in September 2019, it was announced that the Voltron platform is in the process of rebranding, incorporating an entity in Singapore and launching their Beta Network in December 2019 to fully scale in early 2020. At the time of writing, there has yet to be a new name selected for “the Letter of Credit Network formerly known as Voltron”.

4.1.8 | MARCO POLO



The Marco Polo Network, powered by R3’s Corda DLT platform, consists of over 30 banks comprising a global reach. The fundamental aim of the network is to facilitate working capital finance solutions via a distributed trade finance platform. This namely includes receivable finance, payables finance, and payment commitment with and without financing. It also provides secure, distributed data storage and bookkeeping, identity management, and asset verification among other features. Open Application Interfaces (APIs) and legacy system compatibility allow banks to easily integrate to their corporate clients with their ERP systems via the Marco Polo Enterprise Resource Planning (ERP) App. This helps to limit internal disruptions and eases communication with enterprise clients.

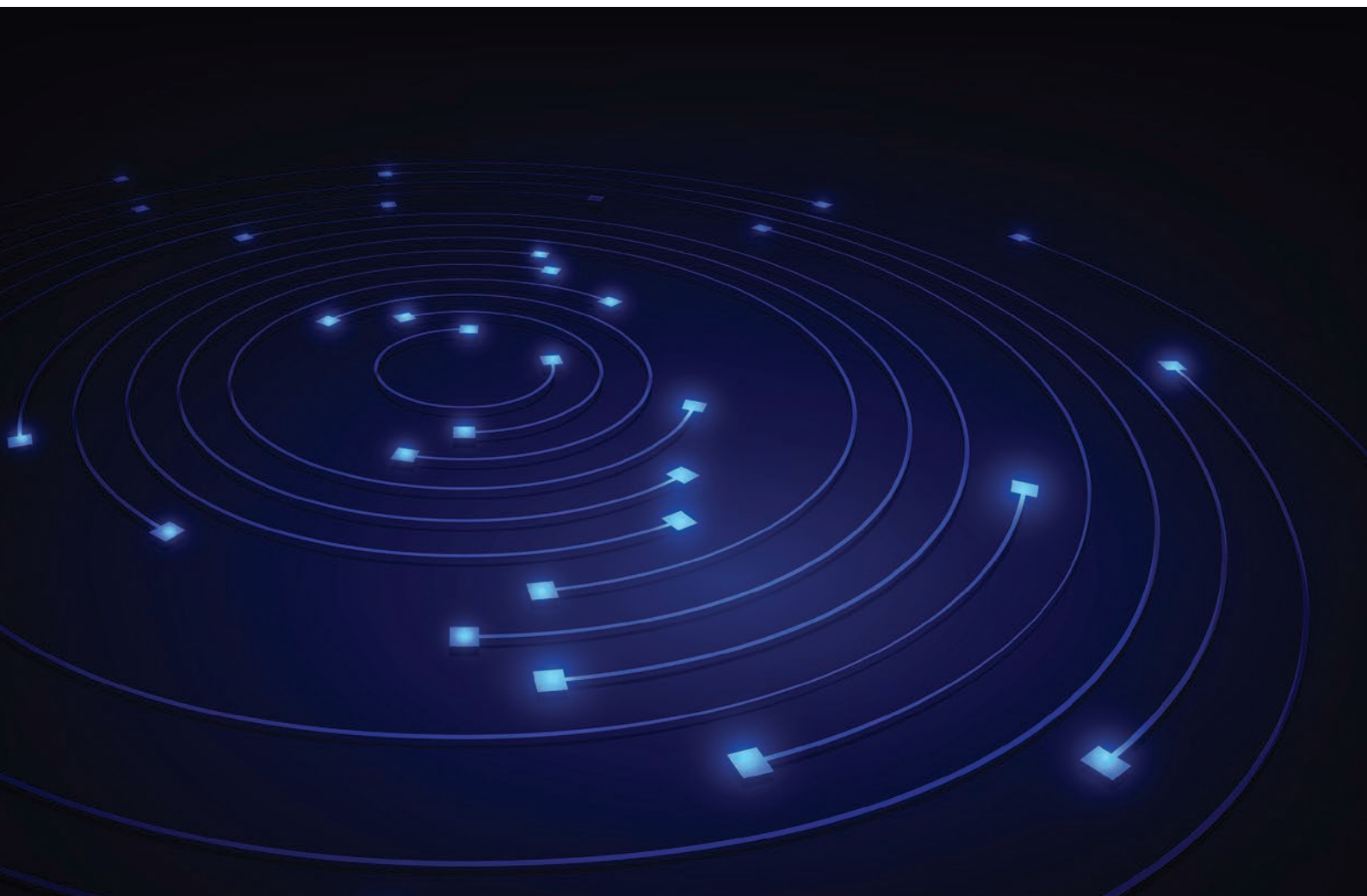
The first transactions on Marco Polo were conducted in March 2019. These transactions, facilitated by the German banks Commerzbank and LBBW, were between the technology company Voith, the pump and valve manufacturer KSB and the logistic company Logwin. Since then, multiple transactions have been piloted successfully with Novolipetsk Steel Company (NLMK), Vesuvius GmbH, Mitsui & Co. Ltd, APA, Schott, Indorama Daimler, Dürr, Bangkok Bank, SMBC, Alfa-Bank, LBBW and Commerzbank.

we.trade Innovation DAC is a joint-venture company owned by 12 European banks that has been in live production since January 2019. It started with nine banks in January 2017 under the name of Digital Trade Chain and later officially changed to we.trade in October 2017. In March 2019, we.trade and Hong Kong, China-based eTrade Connect completed a successful proof of concept (PoC) to connect platforms.

Together with IBM, we.trade has developed a digital trade platform based on Linux Foundation's Hyperledger Fabric to run on the IBM Blockchain Platform. The platform addresses the challenges of open account and documentary trading, providing a digital trade platform that delivers certainty, simplicity and security for all parties in the trade value chain. we.trade is the first blockchain-based trade platform for banks and their commercial clients in Europe and originally aimed to service the micro-, small and medium-sized enterprise (MSME) market.

We.trade's current product line consists of auto settlement, bank payment undertaking (BPU), BPU financing, and invoice financing. Future product deployments are expected to include enterprise resource planning (ERP) connectivity, API readiness, additional payment triggers, and the addition of logistics, insurance and customs functionality.

Licensee banks include: CaixaBank, Deutsche Bank, ERSTE Group, HSBC, KBC, Natixis, Rabobank, Société Générale, UniCredit, Nordea, Santander and UBS are the participating banks of we.trade while UniCredit AG in Germany, CSOB, and Eurobank.



4.1.10 | SUPPLY CHAIN FINANCE INITIATIVES

A myriad of supply chain initiatives have also been launched over the past few years that leverage DLT to enhance transparency of the supply chain and ease access to financing, with a particular focus on micro, small and medium-sized enterprises.

Halotrade



Halotrade is a blockchain-enabled fintech startup focused on the delivery of sustainable supply chain financing. Founded to help curb the issue of disengagement in supply chains, Halotrade creates a system where all of the actions that occur on the supply chain are trackable and transparent. For banks, the Halotrade system creates value by providing a means of de-risking trade finance through access to trustworthy data on sustainability credentials. For brands and retailers it provides them with a means of ensuring that their entire supply chain has been sourced ethically. For farmers and the various producers around the world, Halotrade provides them with better data and insights into their own land, as well as faster access to cash at improved margins.

Hyperchain



Hyperchain is a Chinese Enterprise-level blockchain platform operating in the supply chain finance space. The firm, which began developing its own proprietary DLT technology in 2016, offers blockchain solutions, blockchain open cloud platform, and smart contracting tools, but is heavily oriented towards supply chain digitization. Through those digitization efforts, it aims to help bring digital certificates and supply chain traceability to the ecosystem, driving value for participant firms tamper-proof, traceable, and shared assets.

One application of Hyperchain deployed by China UnionPay and China Everbright Bank is a trusted electronic credential system. Using this, Bank customers can atomically send their electronic credential with electronic signatures to the platform, then the credential can be stored, hashed, encrypted so to support transactions and issue electronic credential with absolute data credibility and traceability. It is estimated that 1.2 million yuan has been saved daily on average due to the reduction of paper credentials.

Hyperchain has worked with a host of banking, financial, and technical partners including the People's Bank of China, Bank of Beijing, Shanghai Stock Exchange, Huawei, Google, and China Telecom to name a few. In addition to its supply chain finance work, Hyperchain is also working heavily with the Ministry of Industry and Information Technology to draft industry standards.

Skuchain



Skuchain's Inventory Control & Finance (ICF) Program uses a Blockchain system to enhance buyers' visibility into their inventory and control and to provide better financing to suppliers by allowing them to get financing at the buyer's cost of capital, which is typically lower than their own cost of capital. Skuchain's ICF Program is currently being deployed across electronics, manufacturing and mining & minerals supply chains of major anchor buyers throughout Asia, South America and the US.



Other initiatives include Linklogis, a supply chain financing service provider that is based in China; Liqease, a supply chain finance solution that enables both suppliers and their buyer counterparts to manage their supply chains more effectively; InBlock, launched by LiquidX in November 2018, which provides an enterprise blockchain solution for supply chain, treasury and working capital; Alibaba's Ant Financial; as well as OneConnect, which has developed a supply chain finance solution called One Enterprise Chain; and Leia2 which focuses on KYC. These are just some of the numerous supply chain finance initiatives that have emerged over the past few years.

Trado

Trado is an experimental system to financially incentivize fairness and transparency in small holder agricultural value chains that was designed and delivered by Halotrado, Provenance and Meridia, convened by Cambridge's Institute for Sustainability Leadership and funded by global multinational corporates, banks and UK Aid. By linking verified product claims and producer identity data to an immediate financing decision at the point of goods production, the system triggered a mechanism automatically to pay smallholder tea farmers in Unilever's Malawian supply chain many weeks earlier than would normally be possible, using a payment obligation from Unilever to lower the financing rate. This gave rise to a finance saving that was then quantified, agreed by consensus and given back directly to a local NGO to invest in sustainability initiatives for the farmers, such as places at Farmer Field School, with every transaction recorded in the Ethereum blockchain. All of this was achieved without asking the consumer to pay more for their tea - directly as a result of the efficiencies, trust and transparency of the system.

4.1.11 | TECHNOLOGIES

HYPERLEDGER

Hyperledger Fabric, an open-source blockchain infrastructure governed by the Linux Foundation, facilitates a multi-channel global broadcast infrastructure. Within a network, peers are able to interact with one another through a series of channels, which could include all of the peers on the network or smaller subsets of peers for ensuring the privacy of sensitive transactions. Each channel within a network maintains a separate ledger. The ledger consists of two parts: the world state and the transaction log. The world state is synonymous to a database containing the current state of the channel-specific ledger at any given time. The transaction log is an immutable record of all the transactions that have led to this current world state. It can be used as a verifiable provenance trail for the ledger. Individual peers on a network would maintain a ledger record for each channel that they are a part of.

Beyond this core infrastructure, Hyperledger Fabric operates a very modular architecture. This means that aspects of the network such as identity management, consensus, or encryption can be selected from a ranging menu of options providing a comprehensive, yet customizable network. Such customization allows network administrators to select the features most suitable for their individual situation, allowing Hyperledger Fabric to be effectively applied to a wide array of use cases.

CORDA

The Corda DLT platform, developed by R3, employs a point-to-point data broadcast system. Such a design eliminates the notion of a single principal ledger, opting instead for transactional data to be shared only with those entities on the network specifically involved in the transaction. This ensures a higher level of privacy for all nodes by sharing data on a strictly need to know basis.

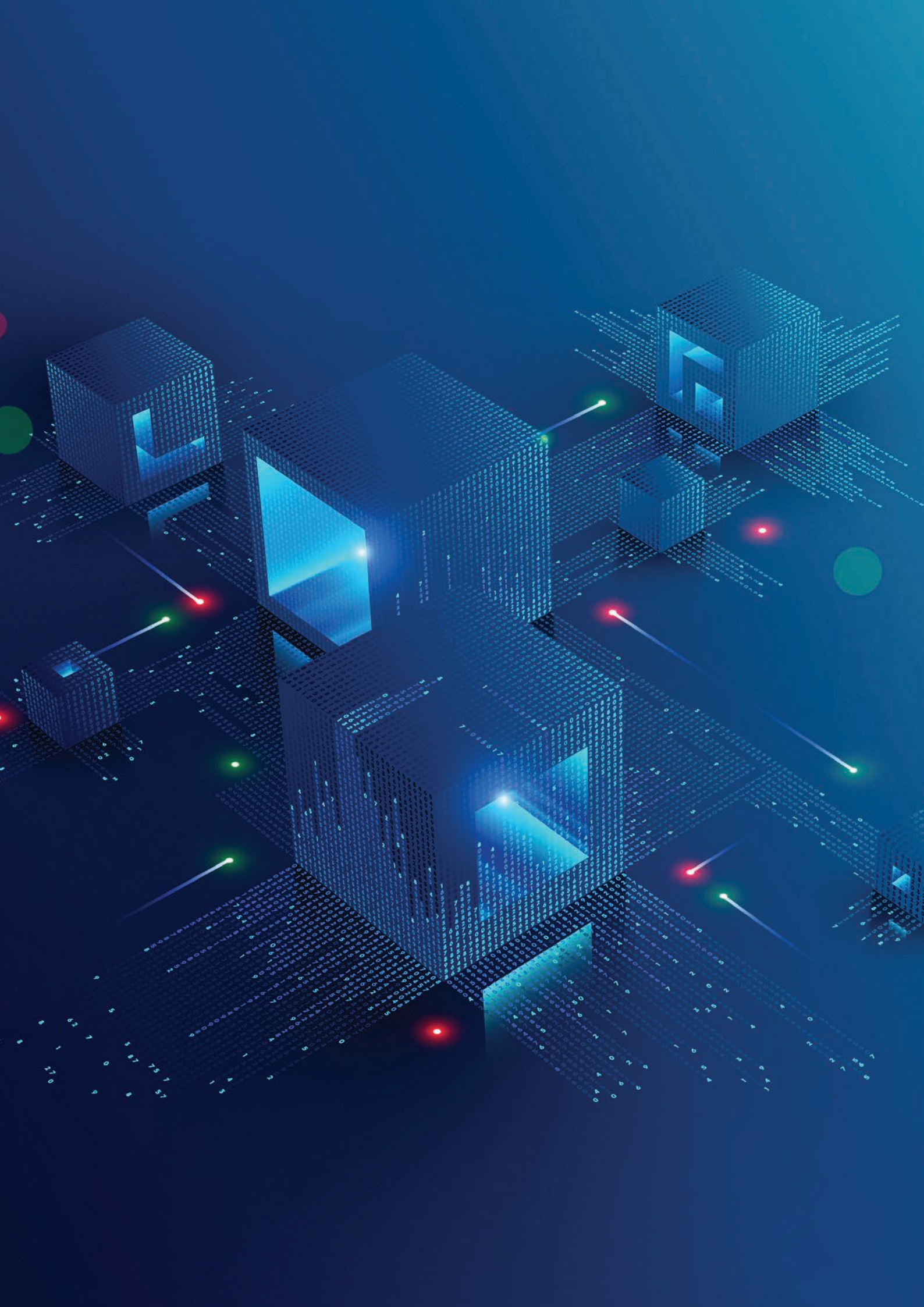
Corda is able to achieve this through a combination of states and transactions. "A state is an immutable object representing a fact known by one or more Corda nodes at a specific point in time." Transactions consume current states as inputs, apply the desired action, and propose a potential new state. Once verified, the potential new states replace the previous current states with the latter being marked "historic".

Corda binds all on chain contracts to a traditionally recognized written legal agreement outlining the intended use of each contract by allowing for an object to be included in the code. This helps to circumvent to current grey area surrounding the legal enforceability of smart contracts. Furthermore, as a permissioned network, each node must be certified and linked to a registered entity providing a further layer of legal accountability.

QUORUM

Quorum is an enterprise blockchain solution built on top of the standard Ethereum protocol layer. Essentially, the Quorum layer seeks to instill the permissioned structure and privacy controls necessary for enterprise use, specifically financial enterprise use.

To help ensure privacy, Quorum prevents all but the authorized parties from seeing a specific transaction. This is done by augmenting the shared, single blockchain with a smart contract architecture that provides for the segmentation of private data. Under this approach, each node on a network maintains both a public state database and a private state database. Nodes then only execute ledger-update smart contracts if they are party to said contract. This is determined either by the contract being public or by the node being party to a private contract. This means that a node not party to a specific private contract, simply will not store that information. Despite this, each node can be assured that all network transactions exist in a cryptographically secure form somewhere on the network.



4.2 NETWORK OF NETWORKS

Networks of networks are initiatives looking to harmonize the goals and efforts other varied initiatives. These projects are an excellent step towards standardizing the industry and bringing all players onto the same field, even if they might be on different teams.

4.2.1 | ICC DSI

“We did not choose DLT. The world chose it and now the need for standardization has become apparent”

Hans J. Huber and David Bischof, Project Managers, ICC DSI

As part of its mandate in setting rules and standards the International Chamber of Commerce (ICC) is now developing a Digital Trade Standards Initiative (DSI) to develop cross-industry digital trade standards that will build on existing work that has been done in the industry by the Universal Trade Network (UTN) as well as other initiatives and organisations.

DSI will be leading efforts to digitise trade, notably by the creation of open trade and technology standards to drive technical interoperability among the numerous blockchain-based networks and technology platforms that have entered the trade and trade finance space over the past two years.

Work is set to commence at the beginning of 2020 and will gradually cover all areas of trade and trade assets. The fundamental aim is to deflate the number of data formats that exist and simplify data exchange between different blockchain systems. The initiative’s ambition is also to design frameworks and standards for cross-ledger attestation and transaction finality as well as standards around digital identities and globally unified rules for the use of smart contracts in trade.

The aim is to promote standards already in use and reconcile potentially competing standards. The DSI supports the creation of standards for all systems, blockchain or otherwise and aim to form a horizontal layer beneath all trade systems and form a network of networks. The ICC DSI initiative will be open for all organisations supporting the core mandate.



“A network of networks does not see competition only interoperability”

Atul Khekade, Co-Founder and Ecosystem Development, TradeFinex Tech Ltd.

TradeFinex aims to be a network of networks by connecting several DLT and non-DLT trade finance initiatives, such as Voltron and SWIFT MT 798. Created in 2017, TradeFinex consists of a company with an underlying network backed by a community of 11,000 members and over 30 MSMEs. The Governing members can opt for a masternode of XinFin Network, the underlying blockchain network, or opt for a Hybrid Council node. Hybrid nodes can combine R3 Corda Enterprise, Hyperledger Besu Enterprise, or Oracle Enterprise Node with the XinFin Masternode.

The project is currently live with receivables discounting and has plans to introduce Letters of Credit by 2020. As a future phase, TradeFinex intends to interoperate with Bolero for accessing Digitized Bills of Lading. TradeFinex also being integrated with Tradeshift marketplace. To accomplish these goals DLT was chosen for its instant access and ownership over data, tokenization of assets, real-time settlements, counterparty risk mitigation, and decentralization.

In 2018, the TradeFinex platform was used by Ramco Air France KLM Labs for a PoC of supply chain finance for Airline suppliers. In 2019, a USD 10 million undisclosed-buyer-led supply-chain management program for engine parts was launched.



4.3 INSURANCE

When dealing with the uncertainty of the shipping industry, insurance is a must. To help simplify and digitize the insurance process for the international trade industry, some initiatives have turned to the blockchain.

4.3.1 | B3i



“In 5 years plus, DLT and other new technology will offer new ways of doing things - new processes, different business models, and elimination of many things we need to do today through automation.”

B3i

B3i is a Switzerland-based consortium startup looking to bring innovation to the insurance space with distributed ledger technology. The firm’s first product for the Reinsurance market, which will be available to the market for the January 2020 insurance renewal season, is a Catastrophe Excess of Loss tool.

B3i supports the insurance industry by providing its own industry wide platform called B3i Fluidity. This is built on R3’s global Corda network on which both B3i and partners can create applications. This allows a high level of integration between applications as well as to other business networks (e.g. Banking) also running on the Corda network.

As a private company, exact investment details have not been disclosed, but shareholders include a wide array of global companies from the insurance industry, including Achmea, Aegon, Ageas, Allianz, AXA, China Pacific Insurance Company, Deutsche Rück, Generali, Hannover Re, Liberty Mutual, Mapfre Re, Munich Re, SBI Group, SCOR, Swiss Re, Tokio Marine, VIG Re, and Zurich Insurance Group.

Initially founded at the end of 2016 and incorporated in March of 2018, the firm launched its lighthouse reinsurance application on October 15, 2019, which customers will use in a live parallel run during the year end reinsurance renewal season. The firm believes that the parallel run will show the power of what they have built, and increase the opportunities for B3i, challenging them to maximize scalability, resilience and ability to deliver at speed on multiple products simultaneously.

Insurwave is a SaaS private blockchain that connects insurance clients with the insurance market in an efficient, private, and data-rich manner. The company seeks to address the challenges that exist in the complex marine insurance ecosystem, which naturally consists of multiple parties, high transaction volumes, and significant levels of reconciliation. The insurwave solution improves risk assessment and service proposition and reduces costs through the automation or removal of various processes surrounding a sales.

Insurwave describes itself as a privacy fabric that connects risk owners, intermediaries, insurers, and capital, minimizing data degradation and maximizing efficiency. The project is a joint venture between EY and technology firm Guardtime. Founding participants for the project include Maersk, AXA XL, MS Amlin, and Willis Towers Watson.

Currently in its second year of trading, the platform has experienced tremendous growth since its inception in March 2018. In the year-long span between October 2018 and October 2019, the initiative grew from just 3 participants to 20, with its operational use skyrocketing from just 25 notifications per month to over 10,000. The venture has won nine international awards for innovation across the insurance and maritime sectors and has now set course to continue trials in Tokyo, Singapore, the USA, and China.



4.4 SUPPLY CHAIN DIGITIZATION

The loose notion of a supply chain is as old as trade itself. To help modernize the concept and provide firms with greater transparency, efficiency, and traceability, several innovative projects have been working towards the goal of supply chain digitization.

4.4.1 | BOLERO INTERNATIONAL



“ Only by cooperation between different platforms, solutions, and parties a change can be realized.”

Jacco de Jong, Global Head of Sales, Bolero International

Bolero is a non DLT, messaging based platform which allows for secure communication between various Trade parties like shipping carriers, corporate clients, and banks. Every party on the Bolero network can send and receive trade transactions using the Bolero messaging protocols. The company has also been fundamental in spearheading the development and striving for the adoption of electronic bills of lading (eBL). Their technology ensures that eBLs are created and transferred between various parties in a trade transaction and their title registry modules maintain eBL title throughout the transaction lifecycle.

While Bolero’s original founding in 1998 long pre-dates the era of DLT, the firm has recognized the growing importance of the new technology in the space and has been working heavily with it. Bolero’s technology is blockchain agnostic and their aim is to interoperate between different blockchain platforms as well as non-blockchain platforms allowing access to Bolero services through open APIs.

In November 2018, following a series of pilots to integrate Bolero’s eBL service with the trade finance consortium Voltron, the first successful integration was achieved by participants HSBC and ING. Bolero seeks to develop its technology to be able to operate with any other trade digitization initiative, regardless of its underlying technology.

4.4.2 | CAMELONE



CamelONE is a platform that integrates and connects all stakeholders in the supply chain. The initiative, spearheaded by Singapore-based vCargoCloud, seeks to digitize the entire end-to-end process for trade and supply chain by creating an ecosystem for interaction between government agencies, traders, freight forwarders, warehouses, airlines, shipping lines, banks, financial institutions, and cargo insurance companies. At its core, CamelONE consists of a trade facilitation platform, a cargo community platform, and industry specific eCommerce verticals.

A key feature of CamelONE is the idea that it has been designed and implemented on open industry standards allowing it to be fully technology vendor agnostic. This open nature is a crucial aspect contributing to the platforms scalability and general ability to connect all players in a supply chain.

CargoX is an independent supplier of an on-chain bill of lading powered by the Ethereum network. They have created a Blockchain Document Transaction System (BDTS) open source protocol to tokenize, encrypt, and transfer the bill of lading along with any additional documents required for trade processes. The system API is enabled for integrations and is interoperable with other blockchains, meaning it can be integrated into other ERP systems to supplement their functionality. The authors note that according to information on the CargoX website, their blockchain-based bill of lading solution is live.

DELIVER is a neutral, open platform with a decentralised architecture that seeks to optimise the physical, financial and related information flows within international trade. The platform creates interoperability between various value adding services. The platform supports a number of functions across networks, including document notarization, asset transfer, and double financing prevention. Additionally, DELIVER offers a connectivity layer for service providers and consumers of these services to connect and transact benefiting from the “connect once, connect to many” principle.

DELIVER is an initiative of the Dutch bank ABN AMRO, the Port of Rotterdam Authority and Samsung SDS. In June 2019 the consortium announced that they have completed the proof-of-concept phase. They have successfully tracked and instantly financed a shipping container on the trade lane between South-Korea and the Netherlands using the automated and paperless blockchain-based platform. Today, the consortium analyses the results of their pilot stage. They are writing an investment memorandum to secure funding for a commercial launch in the second half of next year.

“The swing to open account trade puts the power in the hands of the buyers, so sellers need quick and simple access to trade finance so they can better manage their cash flow and stay competitive.”

Horace Mak, Managing Director, eCOM Asia

The eCOM Registry, created by eCOM Asia, is a platform for the data economy that allows participants to create trusted data, maintain ownership and control of their data, and to securely share the data with other authorised participants. The solution uses proprietary DLT combined with tools like BigChainDB, Tendermint, and MongoDB, to record the signed metadata and hash of Trade Documents as assets to create trust and to facilitate the secure exchange of data. This is achieved through an enterprise deployed private registry of trade data and subsequent sharing of trusted data to a shared registry for discovery by other actors.

The eCOM registry is currently being used as a trading and finance platform for one of China’s largest food importers. The platform allows the importer to use their own liquidity to finance Chinese distributors using preferential financing rates outside of China. They offer up to 90 per cent funding from order and shipment to

China, with the balance paid by the distributor when they collect the product. eCOM's DLT solution provides the tracking, visibility and trust across the import-export trade documents so they can manage the financing process and risk.

The eCOM registry is also employed in one of China's largest free trade zone platform modernization projects. The project, consisting of the free trade zone and around 9000 traders, involves API enablement of legacy platforms to open up data for reuse.

These projects, along with some others, are the current active projects that eCOM Asia has disclosed to date focusing on International Trade. The company, initially founded in 2006, is targeting other initiatives in the trade space, and plans to extend the solution for use cases into other industries.

4.4.6 | ENIGIO TIME



"Technology will help to digitize physical trade flows as well as document flows."

Gunnar Collin, Client Executive, Enigio

Enigio is a technology company offering solutions ensuring integrity and provenance of all types of digital data and information.

The Enigio trace:original solution makes it possible to issue, accept, preserve and possess an original document in digital form. The created digital original is fully traceable, protected, and immutable but still transferable. Any copy of the trace:original document can be distinguished from the original when validated. The solution makes use of DLT as an assurance mechanism - "a mathematical notary service". According to Enigio, their Enigio trace:original solution meets the requirements for trusted electronic services according to the European eIDAS Regulation and is compliant with any General Data Protection Regulations.

Enigio's trace:original solution can be used for any type of documents and is a unique technology for freely negotiable instruments, documents of title and certificates in compliance with existing industry practices, laws and regulations.

Most recently, Enigio, which was originally founded in 2012, has been supporting the International Trade and Forfeiting Association (ITFA) with a pilot to enable trading counterparties to move away from paper by relying on digital negotiable promissory notes and bills of exchange, whilst retaining the undoubted benefits of bills of exchange and promissory notes. This initiative, which was launched at the ITFA annual meeting in September 2019, will help to define market-level usage guidelines, document tags, rules, and legal opinions for digital negotiable instruments.



essDOCS is a paperless, digital trade solution. The company, which has several unique offerings, is best known for its CargoDocs and DocEx solution which is all about electronic Bills of Lading (eBL), electronic warehouse warrants, and technology in a legal solution to facilitate cross border paperless documentation.

With 45,000 customers using their solution, essDOCS is tackling the problem of siloed digital islands by using APIs to connect across different platforms and across different consortium solution sets. Doing this essentially allows them to connect across the whole supply chain. To help achieve this supply chain-wide reach, essDOCS has partnered with around a dozen DLT-based consortium including Voltron and Vakt.

The company has been working heavily on developing their new Cmatch product which they intend to launch by the end of 2019 as a replacement to the SWIFT TSU which is being decommissioned next year.

4.4.8 | GLOBAL SHIPPING BUSINESS NETWORK (GSBN)

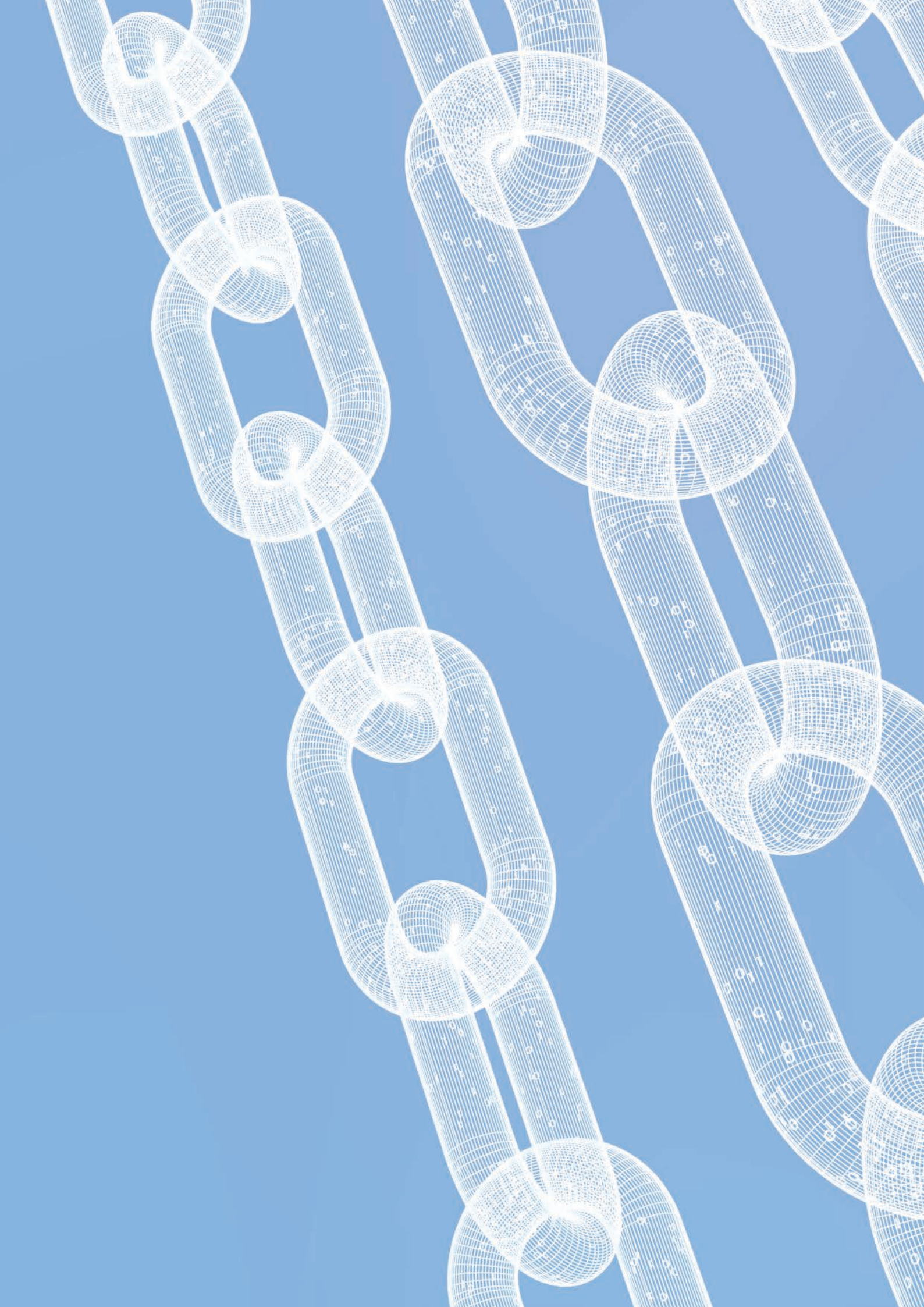
“A well-governed blockchain consortium where industry stakeholders collaborate and innovate is vital to the success of trade digital transformation.”

Lionel Louie, CCO, CargoSmart Limited

The Global Shipping Business Network (GSBN) is a joint venture blockchain consortium, convened by CargoSmart Limited, aimed at accelerating digital transformation of the shipping industry. This is done by bringing together industry leading global carriers and terminal operators. The consortium, which will be set up as a not-for-profit joint venture, will establish strong data management and governance frameworks, including those related to data privacy and transparency, once it has successfully undergone its legal and regulatory approval. The group plans to invite stakeholders in supply chain and across other industries to form Industry working groups to collaborate and come up with innovative ways for the industry to leverage the underlying cross-industry Blockchain Schema and facilities.

The CargoSmart solution platform is built on top of the Hyperledger Fabric DLT framework. Within the solution there are three main layers: a business API layer, a platform service layer, and a blockchain persistence layer. The business API provides an entry point for applications to interact with the platform. Once a transaction has entered through the API and been encrypted and committed to the blockchain layer, the platform service will divert the transaction data to the appropriate parties based on the pre-defined data governance rules.

The signatories of the GSBN services agreements intend to fully establish the network in early 2020, subject to all requisite approvals. In the meantime, CargoSmart, the driving firm, is currently piloting a solution for Dangerous Goods Shipping Documentation on the proposed Blockchain platform with several founding members of GSBN. As it stands, the potential founding members for the GSBN include CMA CGM, COSCO Shipping, Hapag-Lloyd, Hutchison Ports, OOCL, Port of Qingdao, COSCO Shipping Ports, PSA international, and Shanghai International Port Group.



4.4.9 | MINEHUB



Minehub runs on a permissioned blockchain, powered by Hyperledger Fabric, and is designed to be the digital supply chain platform for the mining and metals industry. The first solutions built on this platform tackle the digitization of mine-to-market provenance, contract management, credit management, invoice, and payments, track and trace, mine performance-monitoring and data driven insights. By digitizing the supply chain, Minehub post-trade solutions can increase the level of automation, reduce operational and fraud risk, and increase the speed of settlement. This creates the opportunity for transformative efficiencies and cost reductions throughout all aspects of trading operations and risk management.

Minehub has been working closely with IBM and law firm White & Case to develop the platform. At the time of writing, the consortium members include leaders across the mining supply chain such as ING Group, Wheaton Precious Metals, Ocean Partners USA, Kutcho Copper, Capstone Mining, and, most recently, Kimura Capital, which joined the consortium in October 2019.

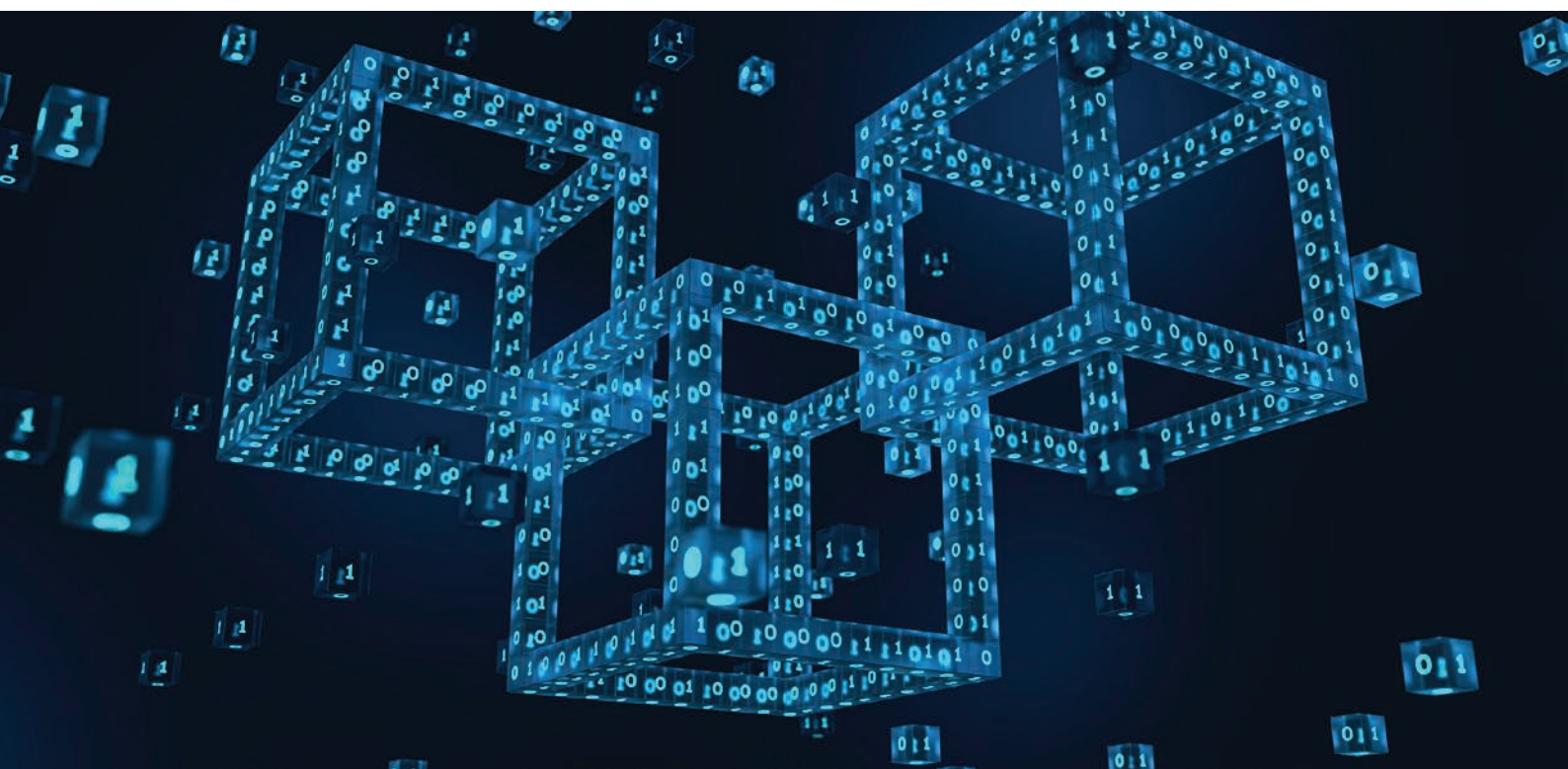
The Canadian-headquartered consortium officially went live on October 15, 2019 and while anticipation remains high, at the time of writing no live transactions have been publicly announced.

4.4.10 | OPEN TRADE BLOCKCHAIN



Open Trade Blockchain (OTB) is a blockchain platform for the trade communities powered by Global eTrade Services (GeTS), a Singapore-based FinTech firm. The platform provides the basic utilities of trade document registration and verification. This is intended to improve efficiency and drive down the costs related to document exchange.

The platform works by allowing partner nodes to register an original trade document which can then later be confirmed as an original. To date, OTB has four partner nodes, supports 15 document types, and has registered over 2.5 million different files.



4.4.11 | RECHAINME

ReChainME is a permissioned blockchain platform initiated by Landmark Group, a multinational conglomerate based in the UAE. It ensures seamless connection amongst key participants involved in supply chain, resulting in greater transparency, speed and accountability.

In June 2019, Landmark Group and HSBC completed a first-of-its-kind transaction that connected ReChainME and Voltron, two independently built blockchain platforms powered by Corda, proving their interoperability and showing how collaborative technologies can further accelerate international trade in the future. The transaction involved a shipment from Hong Kong for Babyshop, Landmark Group's family retail brand in the United Arab Emirates (UAE). All the key participants along the logistical supply chain could view documents and track progress of the shipment in real-time, thereby reducing the overall time to complete the transaction by up to 12 days. It also helped reduce the need for paper, as retail supply chains typically involve large numbers of paper documents that are screened and updated at multiple touch points.

4.4.12 | TRADELENS

TRADE
LENS

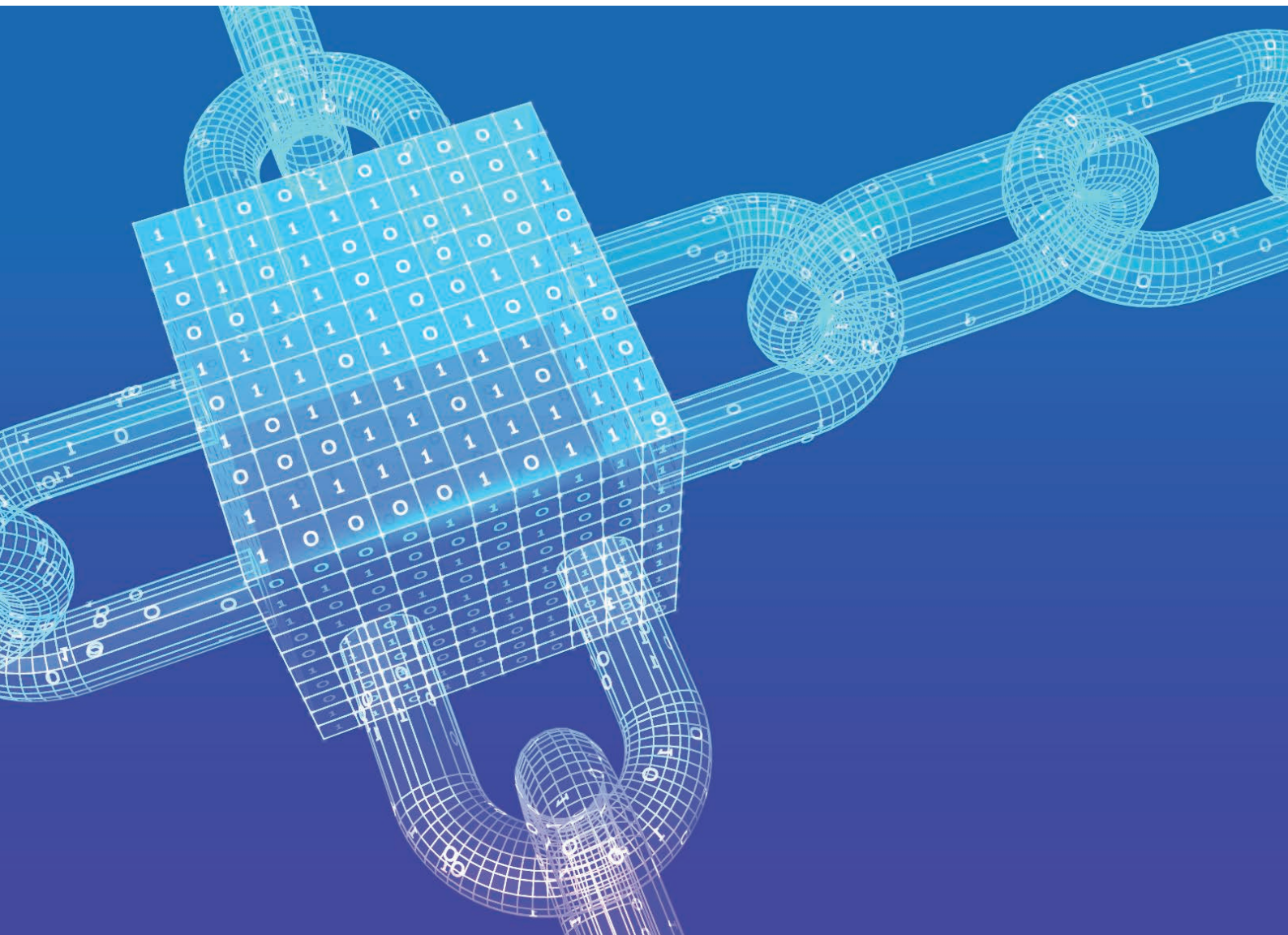
"TradeLens is working cooperatively to ensure standardization of information across the supply chain."

Daniel Wilson, Head of Strategy and Operations, Maersk GTD

TradeLens, a collaboration between IBM and Maersk is a trade platform for the supply chain, connecting the entire supply chain ecosystem. The platform is designed to facilitate the sharing of end-to-end supply chain shipping information and documentation across the large number of diverse and interdependent parties involved in typical supply chain transactions. Supply chain information on TradeLens is communicated and stored with privacy and security at the forefront, restricting visibility to authorized parties on the channel. The platform is underpinned by Hyperledger Fabric.

TradeLens has digitized many trade and supply chain processes in either Proofs of Concept, Proofs of Value, or production environments. They include documentary trade processes, open account processes, marine cargo insurance issuance, Bills of Lading, shipping instructions, Advance Ship Notice (ASN) document creation, and customs clearance documentation creation, among others. These processes have either been done as part of the TradeLens offering or through third parties in the TradeLens Marketplace. Many of these documents and business process automations are done leveraging the TradeLens blockchain, as well as more typical cloud-native APIs. Blockchain technology brings three key elements: an immutability of information without trust of a centralized, vulnerable information keeper; management of identities across businesses and business networks; and the ability to leverage smart contracts to automate information and securely store data for easy verification.

The current TradeLens ecosystem consists of various organizations including carriers, ports, terminal operators, and freight forwarders. To date, over 150 ecosystem members operate on TradeLens, with a focus on containerized shipping volumes. The platform has support from two thirds of container shipping lines globally, over 80 terminals and ports, 17 customs authorities, dozens of inland providers, many corporates and banks, and several leading global and regional freight forwarders live on the platform. As of November 2019, more than two million events and over 15,000 documents are transmitted through the platform daily.





Vakt, powered by Quorum, is a blockchain based post-trade platform designed for the oil industry. As a post-trade platform, it connects key parties to trades allowing them to handle every step between the initiating trade and final settlement. This includes deal recap, confirmation, contract, logistics, and invoicing. Essentially, Vakt's management of the post trade cycle eliminates reconciliation and paper-based processes.

Partnering with Komgo's commodity trade financing network, Vakt will concentrate on the actual raw material transaction, allowing for deals to be processed through the platform. It was originally launched in 2018 by nine of the largest players in global energy commodities trading. Since its launch, it has grown to 12 major shareholders, seven of whom it shares with the Komgo network.



Wave is a secure All-In-One communication protocol designed to meet the special needs of the B2B community. The Fintech's service supports all types of trade and trade finance activities including the digitization of original documents such as bills of lading, bills of exchange, and promissory notes among others as well as normal documents and messages. Having developed its proprietary blockchain in house, Wave says that they selected the technology for its ability to guarantee the uniqueness of documents, ensuring that a holder of a bill will not be able to use the same bill twice. Furthermore, DLT is the only technology that allows the digitization of Bills while ensuring the full negotiability, transferability, and anonymity of the holder.

Wave works by providing the base communications for message and documents exchange and either connects parties directly for documents exchange or delivers the documents to the different trade finance service providers. Wave is used as a network of networks for interoperability, in the sense that it can be used to connect various parties like the carriers, banks, cargo owners, and platforms.

Since founding in 2015, Wave completed the world's first live pilot using the application in 2016 together with Barclays Bank, Ornua, and more. Since then, Wave managed to complete the first pilot in the maritime shipping industry together with the Israeli shipping company ZIM and Hong Kong, China-based logistics firm Sparx Logistics. Today, the solution is rolled out with Zim shipping Line and has completed further pilots with 67 banks, 5 Carriers, and hundreds of corporates. So far the company has not announced any further product development but has articulated its intent to remain focused on developing the Wave network and connecting the B2B world.



5 PROJECTS BY PRODUCT

5.1 LETTER OF CREDIT

Trade finance as a whole had been struggling to traverse the divide into the digital age until it got a boost from blockchain technology. The Letter of Credit (LC) may have been a particularly nagging culprit, weighing down the entire transition. Traditional, non-digitized LC transactions typically required seven to ten long days of painstaking interbank communication to be fully completed. In the new DLT-powered digital world, this processing delay can be drastically reduced, with many early proofs of concept bringing it down to a mere four hours.

Leading the way when it comes to digitizing the LC are the DLT consortia Voltron, Komgo, and Finacle Trade Connect. To reap the benefits of digitized LCs, ReChainMe has entered into a strategic partnership with Voltron to leverage their technology. Some other initiatives that are working with digital, DLT-underpinned LCs are TradeFinex and the Trade Information Network, among others.



Figure 2: Projects by Product: Letter of Credit

5.2 BILL OF LADING

The concept of a Bill of Lading (BL) and the complex series of steps that it must undertake along its journey from shipper to receiver, has undoubtedly caused many international business students a few sleepless nights learning what is often depicted as a 12+ step process. Taking the process out of the classroom and putting into the real world, where each of these steps takes place across continents and involves countless stakeholders, does not make things much easier. This is where electronic Bill of Lading (eBL) providers are hoping to make a difference.

Companies Like Bolero, essDOCS, and Wave are leading the way in the eBL space, focusing their efforts on the product. Other document digitization projects such as the eCOM registry, Enigio trade:original, and CargoX have all included eBL functionality in their offerings.



Figure 3: Projects by Product: Bill of Lading

5.3 OPEN ACCOUNT

There is a growing trend to trade on open account terms, despite the fact that trading on open account terms can be a risky game for exporters and incurs further challenges around third party authentication as well as the detection and prevention of fraud.

These shortcomings have led banks, fintech startups and IT companies to explore the potential of blockchain in the open account and supply chain finance space.

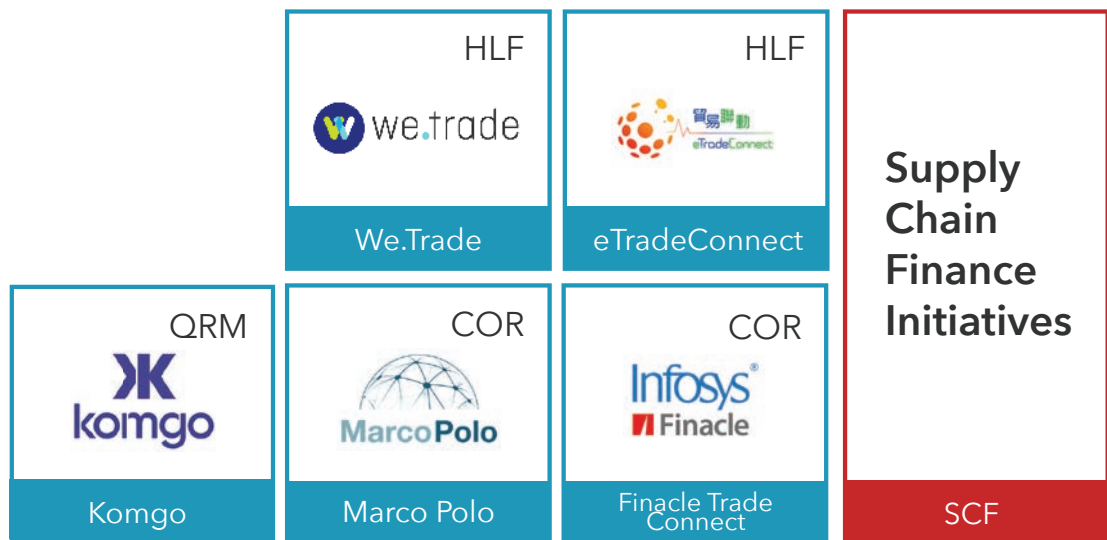


Figure 4: Projects by Product: Open Account

5.4 KYC

Conducting Know Your Customer (KYC) checks, has been dubbed as a tedious and time consuming process by many institutions required to perform it. Many firms and initiatives like Komgo, Clipeum, and Finacle Trade connect are seeking to drive down the time and hassle of this regulated check by bringing companies together in a single network and allowing them to share KYC data amongst each other.

Other projects, such as Leia2 and OneConnect are working to solve the inefficiencies related to KYC in other innovative ways.

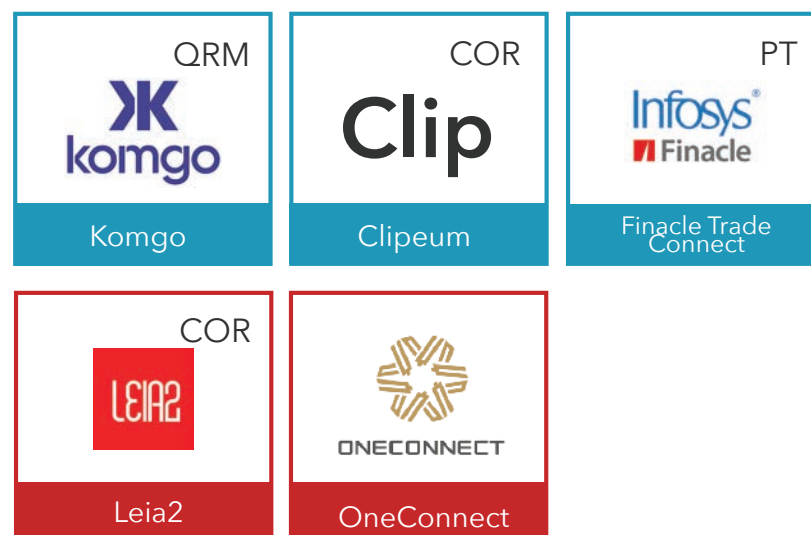


Figure 5: Projects by Product: Know Your Customer (KYC)

While physically moving goods from point A to point B cannot be done without the help of all the different products mentioned above, there is much more to it still. This is where shipping products like Tradelens come into play. Initiatives of this sort seek to leverage blockchain technology to assist with the physical transportation and its associated logistical challenges. Combining DLT-based smart contracts with IoT devices allows for real time tracking of goods in transit and provide the transparency into shipments to make informed decisions much sooner than has previously been possible.

While some initiatives in this space, like GSBN and OTB, exist for the wider market, other initiatives like Vakt and Minehub are seeking to serve only a specific niche, concentrating their efforts and cornering their respective segments.

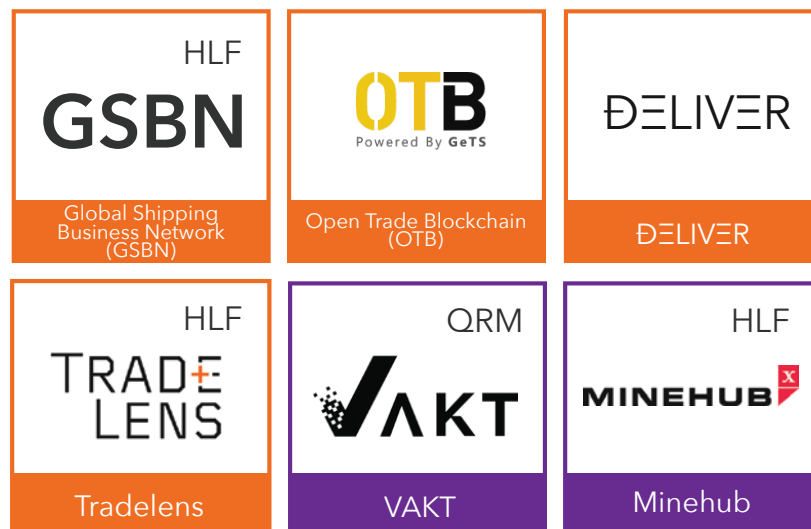


Figure 6: Projects by Product: Shipping and Tracking



6 PROJECTS BY BANK

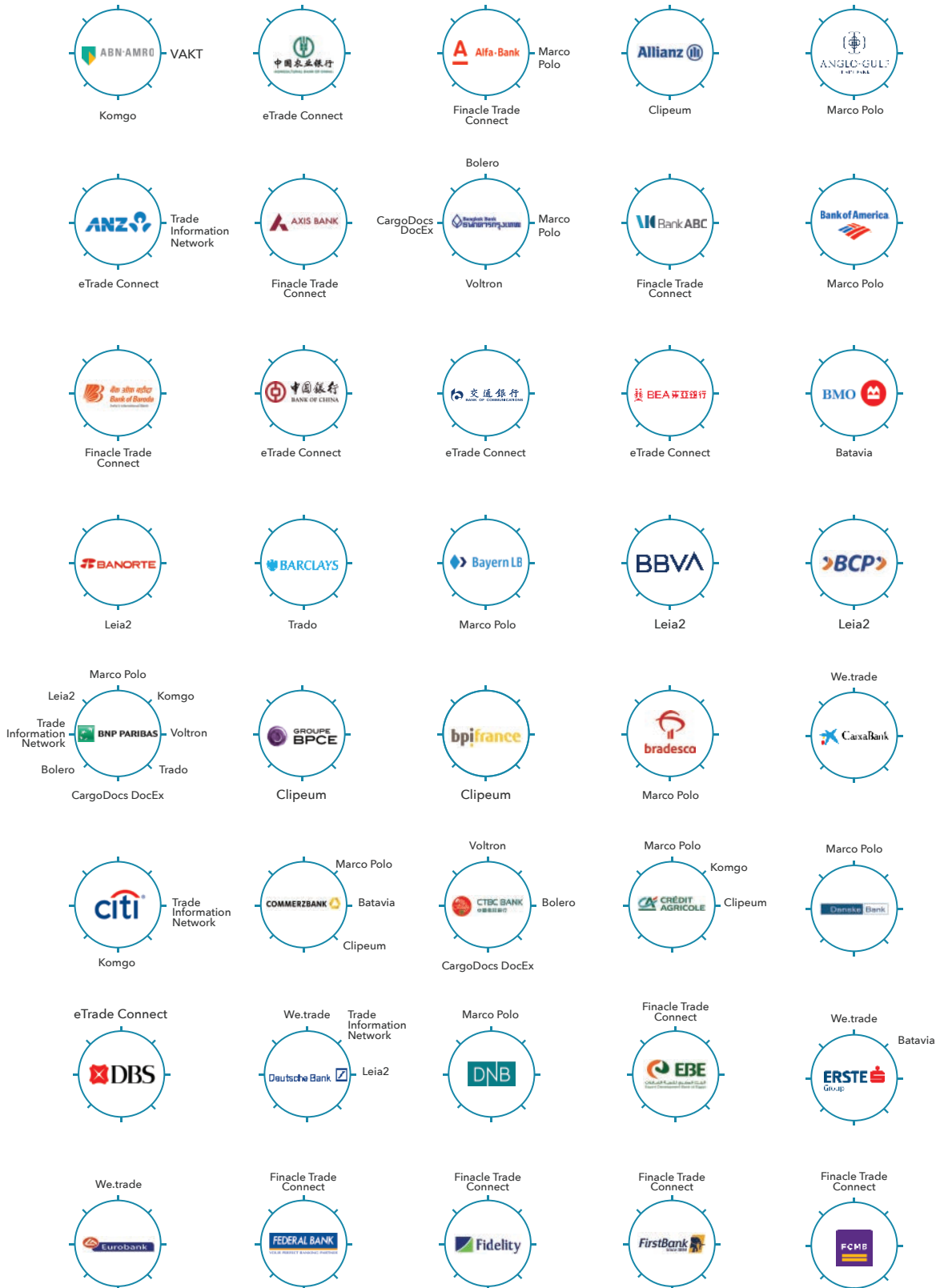


Figure 7: Projects by Bank



7 FUTURE LOOKING PERSPECTIVE

7.1 AN EXCITING TIME

Looking forward it is clear to tell that this is an exciting time for DLT in the trade industry; a time ripe with opportunities. According to the industry experts the greatest opportunities for DLT in the trade and shipping space lie with its cost savings through improved efficiencies, its function as a catalyst for change and innovation, and its ability to accelerate standardization.

7.1.1 | COST SAVINGS THROUGH IMPROVED EFFICIENCIES

Perhaps the most widely known and oft cited opportunity for DLT in the trade and shipping space is its ability to streamline tedious processes, driving efficiency and slashing costs. When asked to list their top three benefits for DLT in the trade finance sector, 44 per cent of respondents using or developing DLT indicated gains in speed and efficiency as being part of their top three, and 35 per cent indicated cost reductions. These trail behind only transparency, with 55 per cent, as the most indicated benefits. Transparency into the processes at play, however, will likely serve as a key driver of the efficiency gains that are to be experienced.

The paper-plagued processes that were necessary in the past to instill a pseudonymous sense of trust amongst counterparts seem set to become laughably obsolete. The immutable and distributed nature of DLT instills that same trust through a direct, digital, and transparent environment. Real time, trusted data flows, enabled through a combination of cryptography and digital signature technology, have been touted by many experts as facilitators for automated and simplified practices such as KYC, AML, and risk assessments. The cost savings for this digitization is twofold: automating the current labour intensive processes and reducing risk by making illegal practices such as Trade Based Money Laundering (TBML) increasingly more difficult to pursue. In general, expert views support those held by the mainstream media that DLT presents a tremendous opportunity to cut costs and improve efficiency in the trade and shipping space.

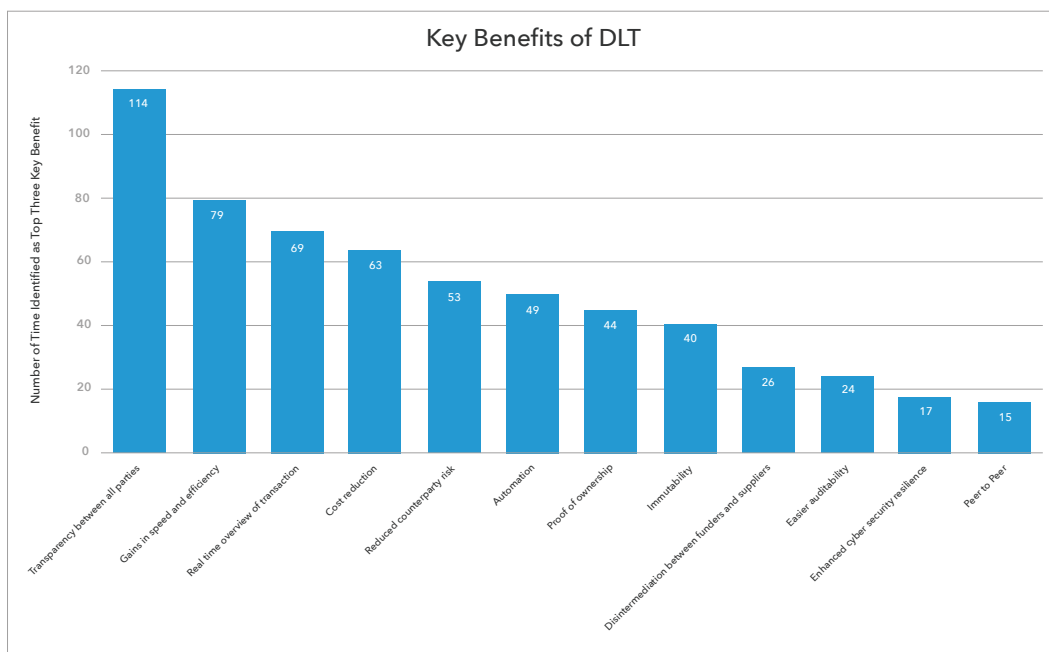


Figure 8: Key benefits of Distributed Ledger Technology (Source: TFG, ICC and WTO Blockchain for Trade Survey, October 2019. Responses from corporates, banks, consultancies and vendors, n = 202)

“It’s like building the new trade finance backbone for the world from scratch”

Atul Khekade, Co-Founder and Ecosystem Development, TradeFinex Tech Ltd.

7.1.2 | DLT AS A CATALYST FOR CHANGE AND INNOVATION

While its freestanding potential benefits seem clear, independent DLT applications are not in and of themselves a full solution. Rather, DLT serves as an enabler with benefits that must be viewed as part of a bigger picture. DLT has come into prominence amidst a wave of other technological advancements, like Internet of Things (IoT) and artificial intelligence (AI). Some experts argue that it is not necessarily DLT on its own that will create the biggest waves in the industry, but might be these other technologies instead. DLT, however, is accelerating the industry’s push for trade digitization and providing a perceivably secure means of deploying supporting digital innovations, which will facilitate a means of accessing these transformational technologies. In other words, DLT is the spark necessary to ignite the technological engine that could power radical change throughout the trade industry. Perhaps even more important than its function as a catalyst for digital change and innovation, is DLT’s ability to function as a catalyst for accelerating standardization efforts across the industry.

“The combination of DLT with other maturing technologies will allow entirely new, unprecedented products in trade finance”

Hans J. Huber, Trade Finance Innovation Project Manager, ICC DSI

Related Technologies

IoT: The networking capability that allows information to be sent to and received from objects and devices (such as fixtures and kitchen appliances) using the Internet.

Machine Learning: The process by which a computer is able to improve its own performance (as in analyzing image files) by continuously incorporating new data into an existing statistical model.

Artificial Intelligence: The capability of a machine to imitate intelligent human behavior.

Cloud Computing: The practice of relocating computing services, like storage of data or calculation power into decentralised data centers, providing unprecedented on demand performance flexibility.

API: Structured interfacing technology enabling effortless, real time, and secure data exchange between a multitude of different computer systems.

Big Data: Ability to tap into large and often unstructured data amounts, which have so far been unusable by applying advanced means of analytics.

Quantum Computing: A computer that takes advantage of the quantum properties of qubits to perform certain types of calculations extremely quickly compared to conventional computers.

7.1.3 | ACCELERATED STANDARDIZATION

One of the most profound opportunities that DLT holds is its ability to accelerate the standardization work that has been needed in the trade industry for many years. It is a commonly cited fact that the value of a DLT network is directly driven by the number of actors participating in that network. Based on this potential value derived from necessary collaboration, firms are becoming incentivised to join forces and work together. A prerequisite to experiencing these synergistic gains is the development of a common set of standards relating, not only to the technology being used, but also to key areas such as data models, semantics, and processes. Absent the gentle nudge of DLT-induced cooperative game theory payoff, efforts towards this standardization would be accelerating at a much slower pace, if at all. Aligning the industry along these common dimensions will be a fundamental efficiency driver and lead to increased cost savings. In short, DLT adds the external pressure necessary to encourage collaboration, which must be preceded by standardization and will be followed by widespread cost savings.

7.2 | A REALITY CHECK

While discussing the many opportunities that DLT has may inspire dreams of an Arcadian future, it is crucial to take a step away from utopia and understand the real problems and challenges that block the path ahead. Based on our survey results, the most pressing challenges facing the industry today surround technical issues like interoperability, and others like standardization, legal concerns, and privacy.

“There is a lot of Buzz which makes it hard to differentiate real use cases from buzz riders”

Adi Weinstein, Sales Operation Manager, Wave

7.2.1 | INTEROPERABILITY

Perhaps the most widely referenced technical challenge for the industry is to address that of interoperability. Based on our survey, 91 per cent of respondents say DLT faces an interoperability challenge, with 53 per cent of those indicating that it is a big challenge. In the DLT space, the term interoperability has become a catchall term to refer to several distinct challenges. Interoperability issues can arise at various levels: at the technology level from DLT to DLT (e.g. the ability of Hyperledger Fabric to interoperate with Corda), as well as at the level of data models, semantics and processes used in specific applications and platforms. The meaning of the phrase interoperability does not stop there. It can also be used to describe the ability of DLT to seamlessly integrate with other technological advancements such as IoT. This form of interoperability will be crucial for realizing the full potential of a digitized ecosystem. Yet another meaning for the term is the ability of DLT to integrate with legacy back office systems, like ERP systems. Without this, many firms will be less likely to fully adapt to a DLT network since it may radically disrupt their existing operating methods in a prohibitive manner.

Why exactly is interoperability so important? The answer lies in understanding that any new project needs to reach a certain critical mass before its growth can be organic and not merely driven by early adopters and product champions. Without any interoperability, DLT platforms are forced to live in isolation, unable to fully access these network effects. Connecting networks and having them co-operate with each other can lead to real change for two reasons. First, it will help networks reach this critical mass where they can begin to experience organic growth. Second, it allows for a compounding of investments in the space as platforms and technology providers can pool their resources into tackling the challenges that arise. Furthermore, 65 per cent of survey respondents using or developing DLT admitted that choosing between various DLTs is a challenge that their organization has been facing. The ability of multiple DLT networks to interoperate, would serve to mitigate this challenge as operating on one network would progressively allow for transacting with parties on a differing network.

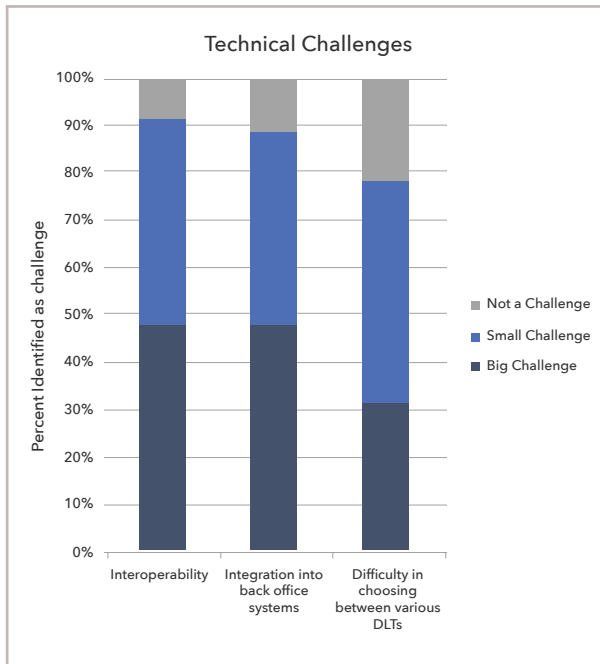


Figure 9: Technological challenges around Distributed Ledger Technology (Source: TFG, ICC and WTO Blockchain for Trade Survey, October 2019. Responses from corporates, banks, consultancies and vendors, n = 202)

In addition, 86 per cent of respondents using or developing DLT indicated integration into back office systems as a challenge their firm has faced. This suggests that new DLT networks should be made interoperable, not only with other networks and cutting-edge technology but also with legacy backend systems. Mohua Banerjee, a Senior Business Development Manager at Finacle Blockchain Solutions, points out that “a key requirement [for global scale and adoption] is to have a transitory phase, which straddles legacy and new systems, to enable adoption while delivering value to the participants.” Having interoperability of this kind will relieve some of the pressure for initial deployments to have applications better than existing technology as cited by some respondents. Interoperability of DLT technology in the international trade space is a significant challenge facing the industry today and is regarded by many as being a crucial next step for the industry to tackle.

“A lack of required network effects creates a reluctance to invest, which in turn creates a lack of required network effects. A circular problem.”

Hans J. Huber, Trade Finance Innovation Project Manager, ICC DSI

7.2.2 | STANDARDIZATION CHALLENGES

The international trade industry has long been plagued by the challenge of standardization. Developed over many centuries and through many independent geographical regions, the customs, terms, processes, definitions, and various other semantic measures naturally vary from place to place. Over time, as the world has become more globalized, this has become a greater and greater challenge. In a single port today, more often than not, there are vessels and goods that originated in every corner of the globe. This increased scale, without a degree of standardization, is a recipe for inefficiencies, particularly as the industry moves to become more digitized. It is no surprise that 47 per cent of respondents to our survey ranked the lack of standards as a big challenge that their industry is facing, in second position behind lack of legal clarity.

To assist in the quest for standardization, several initiatives have sprung up. Some, like the ISO/TC 307, the ITU Working Group, and ICC DSI are working specifically with relation to Blockchain technology, while others like the WCO and UN/CEFACT are focusing on the standardization of data models that are related to trade. While the number of initiatives working in this space is a great indication of the recognition of the problem, it does necessitate a need for inter-initiative harmonization. Several independently successful standardization efforts will do nothing more than create more sets of standards that must be selected between. When it comes to standardization, developing and maintaining a strong governance structure is key.

7.2.3 | GOVERNANCE CHALLENGES

Since DLT is not a technology that individual firms can valuably deploy on their own, it is crucial for multiple stakeholders to work together. As previously discussed, these cooperative payoffs are bringing key stakeholders into mutual discussions. While this is true, it does not make working and coordinating with lots of different stakeholders an easy process. The difficulty experienced by many firms has been to work with multiple actors who are at different levels in their innovation, digitization, and transformation processes. On top of this, many of the necessary stakeholders operate across different legal jurisdictions, emphasizing an additional challenge of jurisdictional standardization to add on to the substantial challenge of amending legal systems to accept trade digitization.

7.2.4 | LEGAL CHALLENGES

Navigating the legal environment seems to pose particular challenges for efforts towards trade digitization. One such challenge is the lack of recognition of e-signatures and e-documents. In many jurisdictions around the world the formal recognition of e-signatures on negotiable documents has yet to be solidified. This lack of formidable acceptance comes despite several historical efforts from the UN since the turn of the century. In 2001, the United Nations Commission of International Trade Law (UNCITRAL) adopted a model law on electronic signatures, however this has only been adopted in some 30 jurisdictions. Only 12 parties ratified the United Nations Convention on the Use of Electronic Communications in International Contracts (ECC) adopted in 2005 while only two have ratified the UNCITRAL Model Law on Electronic Transferable Records (MLETR) from 2017. The question of the recognition of e-signatures and e-documents is also being discussed in the context of the WTO e-commerce Joint Statement Initiative launched in December 2017.

Recognition of e-signatures and e-documents is, however, not sufficient. As noted by the English Law Commission, “the question of whether an e-signature is secure and reliable is a different matter from whether that signature is valid in law”. No DLT consensus algorithm, or any computer algorithm for that matter, is capable of determining whether a certain transaction has occurred as a result of a legally enforceable contract. There is nothing inherent about a DLT transaction that makes it legally binding. This fact draws a sharp divide between the legally agnostic DLT utopia envisioned by some hype-curve riding enthusiasts and DLT reality.

It is also important to discuss the security and reliability of an e-signature. The reliability of an e-signature is no greater than the reliability of a user’s cyber security practices. To further compound this, when operating in the inherently off-chain realm of international trade, it is important to realize that a DLT’s immutability does not equate to its veracity. Just because a DLT itself is “trustless”, does not mean that all parts of its larger ecosystem are. An ecosystem as a whole is only as reliable as its least reliable link.

All of this raises the legal question of what happens when a DLT record deviates from a traditional analysis of title ownership? This could occur if a consensus algorithm compliant transaction occurred relating to a contract that was later deemed to be void by law. Under this scenario, the legal title would remain with the original holder while the blockchain record would indicate that the new party holds title. Given the immutable nature of a DLT network, the only means of rectifying such a situation would be to append a new transaction reversing the original. Given the multi-jurisdictional nature of international trade, forcing such a remedy simply may not be possible. According to the ICC, TFG and WTO survey on DLT in trade, legal clarity over ownership and jurisdiction of data and transactions is a significant challenge. Nearly 95 per cent of survey respondents indicate that they believe it is a challenge, with 65 percent of those indicating that they believe it is a big challenge. While some permissioned networks have attempted to overcome

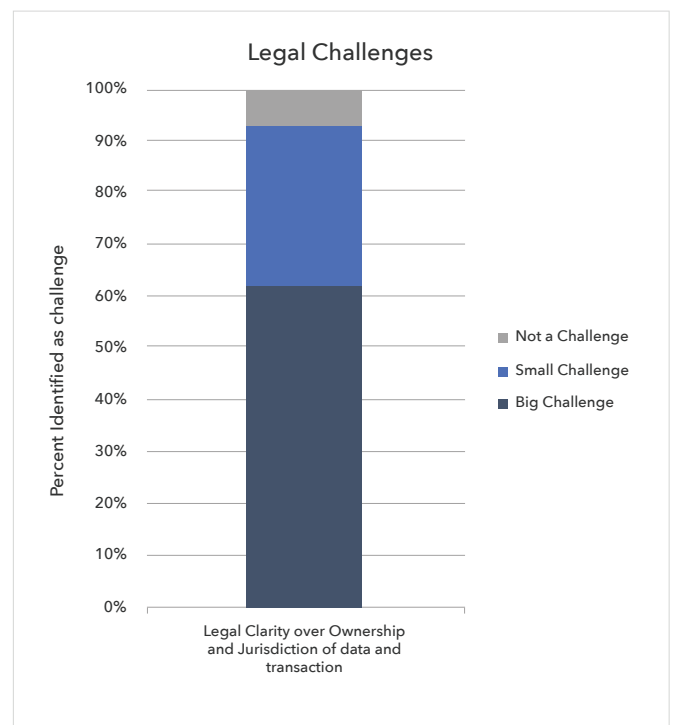


Figure 10: Legal Challenges around Distributed Ledger Technology (Source: ICC, TFG and WTO Blockchain for Trade Survey, October 2019. Responses from corporates, banks, consultancies and vendors, n = 202)

this by implementing rights for certain nodes to retroactively edit the contents of blocks, this seems to retract from the very value of a DLT network. This is because an attacker need only compromise one of these privileged nodes to alter the entire history of the ledger. Theoretically, this makes a DLT no more, and due to the opening of additional single points of failure, perhaps even less, secure than the incumbent centralized datastores it seeks to replace.

“Through a combination of unilateral and multilateral approaches, we believe the challenges in this sector may be addressed”

David McLoughlin, Commercial Lead, we.trade Innovation DAC

7.2.5 | PRIVACY CHALLENGES

The core functionality of a blockchain, its immutability, seems to contradict with much of the growing global privacy legislation of today, such as the European GDPR. Article 17 of the GDPR, the right to erasure, more commonly referred to as the right to be forgotten, states that a “data subject shall have the right to obtain from the controller the erasure of personal data concerning him or her without undue delay”. However, the immutable nature of DLT, and arguably the core of its value proposition, prevents data from being deleted. This very contradiction between the functionality of DLT and the legal requirements of many countries poses some concerns, but is an area being addressed.

The Commission Nationale de l’Informatique et des Libertés (CNIL), an independent French administrative regulatory body whose mission is to ensure that data privacy law is applied to the collection, storage, and use of personal data, has proposed some workarounds to this inconsistency. They advise that the processing and storing of data should be done off-chain, and that the data recorded on the blockchain itself should only be a commitment, a hash generated by a keyed-hash function or a ciphertext obtained through “state of the art” algorithms and keys. By doing this, (like for example Enigio’s trace:original), the data controller can make data practically inaccessible yet demonstrably verifiable, moving closer to the seemingly contradictory desired effects of data erasure and immutability.

In this same report, the CNIL acknowledges that “It is technically impossible to grant the request for rectification or for erasure made by a data subject when cleartext or hashed data is recorded on a blockchain.” This complements the Privacy by Design obligations under Article 25 of the GDPR since these concerns must be addressed during the initial design stage of a network in order to be compliant with the regulation.

With opportunities in mind and challenges addressed, we are free to look ahead to what the experts believe the future of the industry has in store. According to our survey the trade industry will see a gradual evolution, not a revolution leading to a web of connected ecosystems and consortia models that drive collective value.

7.3.1 | EVOLUTION NOT A REVOLUTION

In discussing how the DLT in trade landscape would alter in the years to come, many experts point to the idea that change will come rather slowly at first. “The change curve is expected to have an exponential shape, so a slow start, a turning point and a steep end” (Hans J. Huber, ICC DSI). This is due to the fact that, in the trade space, many of the changes that need to be made “will take time and effects are often interrelated in a limitational manner” (Hans J. Huber, ICC DSI). Changes as wide reaching as eliminating siloed systems, displacing paper-based administration, digitizing consumer and service provider processes, addressing legal and jurisdictional concerns are limited to the progress made in each of the others. At some time in the future, a tipping point will be reached in the development of each, reducing the restrictional interrelatedness and allowing much more rapid progression to occur. While it is difficult to determine precisely how sharp the uprise will be, or when it will occur, the ICC DSI expects “the turning point to occur in the next 4-7 years, if concerted efforts are being started now.”

The future looking results collected in our industry survey indicate a similar sentiment. When asked about their outlook for the widespread adoption of DLT within the trade finance space, only 42 per cent indicated a positive outlook in five years time but that number jumps to 73 per cent when the time horizon is expanded to ten years. Both the quantitative and qualitative results support the notion of a gradual DLT evolution.

“It will be an evolution, not a revolution”

Jacco de Jong, Global Head of Sales, Bolero International

7.3.2 | A WEB OF CONNECTED ECOSYSTEMS

While several experts pointed to a future web of connected ecosystems, the vision of their exact composition varied. It seems likely that “Consortia and ecosystems will cohabit as isolated solutions to specific markets or industries” (Pierre Sien, Euler Hermes). Some form of interconnectedness between these cohabitating networks is a near standard claim, although the manner of interconnectedness varies. Relating to this realm, some experts believe that the industry “is likely to be technology-agnostic and that ecosystems and standards will evolve to be able to send and receive information to any platform across a shared set of protocols” (Daniel Wilson, Maersk GTD). Other views contain less technical interoperability optimism. Pierre Sien from Euler Hermes says that “new challenges will be in interconnecting those ecosystems. Trusted third parties will still exist and they will become central to ecosystems that look forward to opening to other ecosystems”. Whether technical interoperability challenges can be overcome, or trusted oracles will become a necessity for facilitating interconnectedness, it seems likely that in the future the DLT in trade space will consist of an ecosystem of interconnected networks.

“Trade Finance will hopefully be a web of connected, aligned, and value-creating ecosystems that allow existing customers of financing to receive better products at more competitive pricing”

Daniel Wilson, Head of Strategy and Operations, Maersk GTD.

7.3.3 | VALUE-CREATING GOVERNANCE MODELS

An aspect of the DLT environment that is often overlooked in the mainstream media, is the business models of the consortia that are forming, and how care must be taken when designing these to create value for all parties involved. Bringing a multitude of firms together into a consortium has the potential to create many positive benefits for the industry as a whole and for the individual participant firms well in excess of the consortia setup and maintenance costs. In order to ensure the continued strength of the consortia that currently exist, and to promote the creation of new, innovative consortia, certain considerations must be made. Most notably, these consortia must establish ways of ensuring that the collective benefits that are generated by this model are allocated in a fair and equitable way. According to cooperative game theory, developing and implementing a gains allocation model will provide participating organizations with financial clarity while simultaneously reducing the fear that other firms may be benefitting parasitically off their dedicated investments. This transparency will help to enhance the trust and stability that will encourage individual firm’s willingness to disclose sensitive information to other consortium members. This mutual divulgence of information will strengthen a consortium from the inside out, and drive an increase in commitment. Not operating in this cooperatively beneficial manner would leave a consortium weak, resentful, and vulnerable to secretive self-destruction.

7.3.4 | INDUSTRY OUTLOOK

An examination of the data collected by the TFG, ICC, and WTO survey on DLT in trade revealed some insights into the perceptions held about the future of the industry. First, there seems to be a collectively positive perception of the state of the industry at the 5-, 10-, 30-, and 50-year outlooks. The 10-year industry outlook holds the most positive sentiment with a modest decline then happening through the 30 and 50 year views. This seems to indicate that the state of the technology and its widespread adoption will grow over the next 10 years. Beyond this time frame it seems as though the perception is that DLT's prevalence in the industry will gradually decrease. Perhaps this will be in light of the development of newer technology that could render DLT obsolete. While these predictions do offer some insight, it is important to recognize the immense difficulty that exists in predicting what the next 50 years will hold.

It is also interesting to note the difference in perceptions of the technology over time between firms using or developing DLT and firms not using or developing DLT. At each of the four time spans, firms not currently using or developing DLT have a statistically significantly lower perception of its widespread adoption in the future. There could be several varying explanations for this. One possible explanation is that firms possessing a preconceived pessimistic outlook for the technology were less likely to have begun developing or using the technology. This would have created a naturally positive bias when segmenting out those firms that are using or developing. Another explanation could be that firms using or developing the technology have a greater insight into the industry than those who are not actively involved. This would allow them to be more aware of the acute happenings in the field, such as when progress has been made to overcome a once insurmountable challenge. Insider knowledge of this sort could also be used to explain the statistical differences noted above.

Another insight can be gained when looking at the perceptions of challenges facing DLT between these firms types. Firms using or developing DLT perceive regulatory, compliance, and legal challenges, as well as technology challenges as having a significantly smaller magnitude. Similarly, amongst firms using or developing DLT, there is a slight negative correlation between the current state of development for that firm, and their perception of both regulatory and technology challenges. This means that the further along in the implementation stage a firm is, the less prominent they view the challenges of the industry. This could be because firms actively involved in the space are constantly aware of when an advancement has been made to overcome a past challenge and are thus better attuned to the exact current state of the industry. However, these same data, as they merely represent a gauge of perception, could be construed to mean that firms using or developing DLT are inherently subjected to a natural bias that is causing them to view these challenges through magnitude-mitigating rose-coloured glasses.

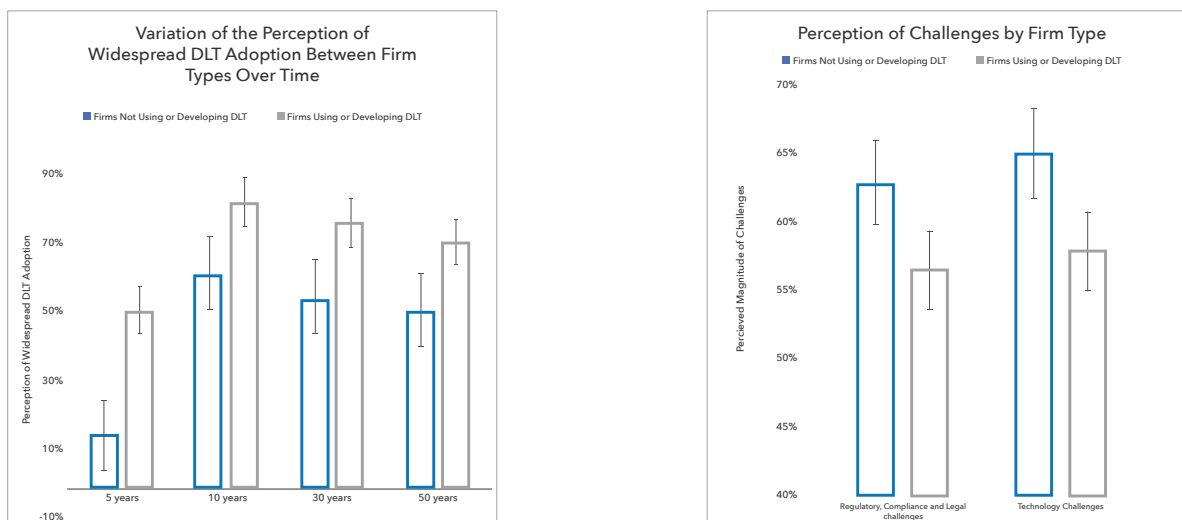


Figure 11 and 12: Perceptions of widespread DLT adoption between different types of firms, as well as the key challenges by firm type (Source: ICC, TFG and WTO Blockchain for Trade Survey, October 2019. Responses from corporates, banks, consultancies and vendors, n = 202, lines indicate standard deviation)

8 CONCLUSION

A new wave of industry change is coming for the world of international trade. DLT and non-DLT projects alike are springing up to leverage new and exciting technologies to help bring trade into the digital era. Projects, initiatives, and consortia from all aspects of the industry from financing, to shipping, to insurance are generating innovative approaches to the challenges at hand. These projects are disrupting many of the old ways of operating by bringing new ones to the table.

The survey we conducted and the analysis of its results have provided new insights into the perceptions held by the various players in the space and the differences amongst them. Examining the opportunities in combination with the challenges has allowed us to remove the rose-coloured glasses and view the industry in its unfiltered current state. With the views of a wide-ranging group of stakeholders in mind we will be better placed to steer the DLT-fueled global trading vessel in the right direction, meeting and surpassing each milestone along the way. If we all join forces to successfully address the various challenges that are currently slowing down the spread of blockchain and limiting its impact on trade, from technical aspects, to standardization, legal and privacy issues and governance, the future promises to be bright for all parties involved in the international trade space, from farmer, to shipper, to financier, to port operator, and even to the trendy hipsters waiting for a slice of avocado toast.

9 ABBREVIATIONS

AI:	Artificial Intelligence
AML:	Anti-money Laundering
API:	Application Programming Interface
DLT:	Distributed Ledger Technology
ERP:	Enterprise Resource Planning
IoT:	Internet of Things
KYC:	Know-your-Customer
LC:	Letter of Credit



ABOUT THE INTERNATIONAL CHAMBER OF COMMERCE (ICC)

The International Chamber of Commerce (ICC) is the world's largest business organization representing more than 45 million companies in over 100 countries. ICC's core mission is to make business work for everyone, every day, everywhere. Through a unique mix of advocacy, solutions and standard setting, we promote international trade, responsible business conduct and a global approach to regulation, in addition to providing market-leading dispute resolution services. Our members include many of the world's leading companies, SMEs, business associations and local chambers of commerce.



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The World Trade Organization (WTO) is an international organization that deals with the global rules of trade between nations. The WTO administers agreements, negotiated and signed by its members, which provide the legal ground rules for international commerce. The WTO's purpose is to help trade flow as freely as possible for the economic development and the welfare of its members' citizens. The WTO is serviced by a secretariat which provides expert, impartial and independent support to member governments, including research, analysis and statistical information related to the role and development of trade in the global economy.

ABOUT THE AUTHORS



DEEPESH PATEL

Editorial Director,
Trade Finance Global (TFG)

Deepesh Patel is Director of Partnerships & Marketing at Trade Finance Global (TFG). In this role, Deepesh leads efforts in developing TFG's brand, relationships and strategic direction in key markets, including the UK, US, Singapore, Dubai and Hong Kong. This includes TFG's fintech platform and blockchain projects. Deepesh regularly chairs and speaks at international industry events including at the World Trade Organization Public Forum, The Telegraph's Future of Trade & Export, BCR Consortia, TXF Geneva, Excred Commodities, as well as FCI and ITFA's Annual Conference.

He is a regular contributor to specialist trade journals and is Editor of the publication 'Trade Finance Talks'. In addition to his work at TFG, he is a strategic advisor for WOA, a board member of ITFA's Emerging Leaders Committee, and sits on the Fintech Working Group of the Standardised Trust.

Prior to TFG, Deepesh worked at Travelex where he was responsible for the cards business and the Travelex Money app in Europe, NAM, UK and Brazil.

Email: deepesh.patel@tradefinanceglobal.com



EMMANUELLE GANNE

Senior Analyst,
Economic Research and Statistics Division,
World Trade Organization (WTO)

Emmanuelle Ganne is Senior Analyst in the Economic Research and Statistics Division of the World Trade Organization (WTO) where she leads WTO work on Blockchain. She is the author of a recently published book entitled "Can Blockchain Revolutionize International Trade?" and is a regular speaker at blockchain events. Ms. Ganne is a member of the government advisory board of the International Association of Trusted Blockchain Applications (INATBA). Ms. Ganne also leads WTO work on micro, small and medium-sized enterprises.

Prior to this, she various positions at the WTO, including as Counselor to Director-General Pascal Lamy, and in the Accessions Division where she assessed trade policies of governments wishing to join the WTO and advised them on how to improve their business environment. From 2015 to 2017, she held the position of Vice-President and Managing Director for Europe at the Allam Advisory Group (AAG), a team of former C-level executives and senior diplomats that specializes in helping businesses expand their operations globally. Ms. Ganne is a 2009 Yale World Fellow.

Email: emmanuelle.ganne@wto.org

