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BLOCKCHAIN & DLT IN TRADE: WHERE DO WE STAND?

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This white paper was jointly produced by Deepesh Patel, Editorial Director, Trade Finance Global (TFG), and Emmanuelle Ganne, Senior Analyst at the World Trade Organization (WTO).

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Thanks to

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The global economy is going through unprecedented times. The COVID-19 pandemic has shaken the world, threatening the lives and livelihoods of millions of people in both developed and developing economies, with a particularly devastating impact on small businesses. World trade plummeted in the first half of the year, and despite signs of trade bouncing back, WTO estimates in October 2020 still forecast a 9.2 per cent decline in the volume of world merchandise trade for 2020.

But in every crisis lies opportunity. The current pandemic has accelerated digitalization in all sectors, including international trade, which remains plagued by labour- and paper-intensive processes that are the source of many frictions and inefficiencies. Of particular interest for trade digitalization are projects leveraging distributed ledger technology (DLT) – commonly referred to as Blockchain. The tamper-proof, decentralized and distributed nature of DLT makes it an attractive tool to break the silos that hinder international trade. Many projects that were still at an exploratory stage when the first “Blockchain and DLT in Trade” periodic table was launched a year ago have matured and reached the production stage. This is good news!

But technology is only a tool. The promising potential of DLT to facilitate international trade, from customs procedures to trade finance, will only be realized if regulation evolves to support the large-scale deployment of the technology and if a globally harmonized, digitized trade environment is put in place. This will require a global dialogue; a dialogue that involves all stakeholders, public and private. The ICC Digital Standards Initiative, which was recently launched with the support of Enterprise Singapore and the Asian Development

Bank and the participation of the World Trade Organization, will work towards this ambitious aim – directly addressing disruptions experienced during the COVID-19 crisis as a result of the reliance of trade flows on paper documentation. We invite all interested stakeholders from the private sector, but also governments and other international organizations to join us in this endeavour.

Let us seize the opportunity presented by the pandemic to accelerate trade digitalization efforts to reduce frictions from international trade for the benefit of all, in particular the smallest players. The present study offers a useful snapshot of the various DLT projects that aim at making trade more efficient and sheds light on this fast-changing landscape. Keeping track of such developments is key to helping inform discussions and action to make trade digitalization a reality.



A handwritten signature in black ink, appearing to read 'Xiaozhun Yi'.

XIAOZHUN YI
Deputy Director-General
World Trade Organization (WTO)



A handwritten signature in black ink, appearing to read 'John W.H. Denton'.

JOHN W.H. DENTON AO
Secretary General
International Chamber of Commerce (ICC)

2 INTRODUCTION

No doubt, the world looks a little different today than it did at the end of 2019 when we first published the Periodic Table of DLT in Trade. A natural year's worth of progression has been both accelerated and in some areas stunted by the forces of the COVID-19 pandemic, the widespread and long-lasting implications of which still remain unknown.

Nevertheless, with the unwavering arrow of time guiding our forward progression, we wanted to unveil a new and updated report on the landscape surrounding the use of distributed ledger technology (DLT) in international trade. The following pages will reexamine the projects we introduced in the first edition, and determine which have progressed and which have fallen off course. We will also be introducing several new initiatives that were not included in the previous edition. Overall, we have found that the industry has made steady progress towards trade digitalization, with the average project moving from a maturity stage of 2.3 out of 5, to 3.3.

It is important to note that this publication is merely a representation of the industry as we know it today. There are likely more projects that we are not aware of or do not have enough information on to include here. We invite anyone with knowledge on projects like these to reach out to us. We look forward to hearing about new and innovative solutions to the issues plaguing the industry.

We would especially like to thank Waqas Mirza and Alisa DiCaprio for their invaluable insights and guidance in putting together this publication, as well as our Editor and Lead Researcher, Carter Hoffman. As always, we would also like to thank everyone who took the time to provide information in one form or another as well as those who play an active role in shaping the future of international trade digitalization. The future state of this industry lies within reach. Let's find a way to grab hold and not let go.



A handwritten signature in blue ink.

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A handwritten signature in black ink.

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Note: The information provided in this publication is valid as of 1st October 2020.

TABLE OF ABBREVIATIONS

AWS	Amazon Web Services
AML	Anti-Money Laundering
API	Application Programming Interface
B2B	Business-to-Business
BPU	Bank Payment Undertaking
BL	Bill of Lading
BDTS	Blockchain Document Transaction System
C2C	Consumer-to-Consumer
DID	decentralized identifier
DLT	Distributed Ledger Technology
eBL	Electronic Bill of Lading
ERP	Enterprise Resource Planning
ESG	Environmental, Social, and Corporate Governance
ICF	Inventory Control and Finance
IoT	Internet of Things
KYC	Know Your Customer
LC	Letter of Credit
MLETR	Model Law on Electronic Transferable Records
MSME	Micro, Small, and Medium Enterprises
P2P	peer-to-peer
PoC	Proof of Concept
QLDB	Quantum Ledger Database
SaaS	Software as a Service
SCF	Supply Chain Finance
UNECE	United Nations Economic Commission for Europe

3 OVERVIEW

3.1 DLT USES IN TRADE

Distributed ledger technology (DLT)¹ in trade is usually used for two primary purposes: 1) track-and-trace, to enhance transparency on how goods are being processed and 2) the digitalization² of trade processes.

Track-and-trace itself has three main purposes. First, it can be used to increase transparency for customers and build trust. This is done by providing the customer with insight into DLT-verified records of the steps that a particular product took to reach their hands. Second, it can be used to prove the authenticity of particular products, combating the trade of counterfeit goods along the way. Third, it can be used by large corporations to quickly track and identify tainted products, allowing the corporations to identify potential hazards and resolve them quickly.

While the track-and-trace portion of DLT in trade is a fruitful and important aspect of the broader industry, it is not the focus of this publication. Instead this publication, similar to the previous edition, will be primarily focused on the digitalization side of DLT in trade, examining how it can be used in pursuit of the digitization of trade documentation, digitalization of trade processes, and the exchange of trade data.

¹The authors acknowledge that, from a technical standpoint, the terms 'DLT' and 'Blockchain' are not interchangeable. However, using them this way is the convention in a vast majority of the non-technical literature, project descriptions, and communities that exist today. To avoid unnecessary discrepancies, this paper will follow the convention of using the terms DLT and Blockchain interchangeably.

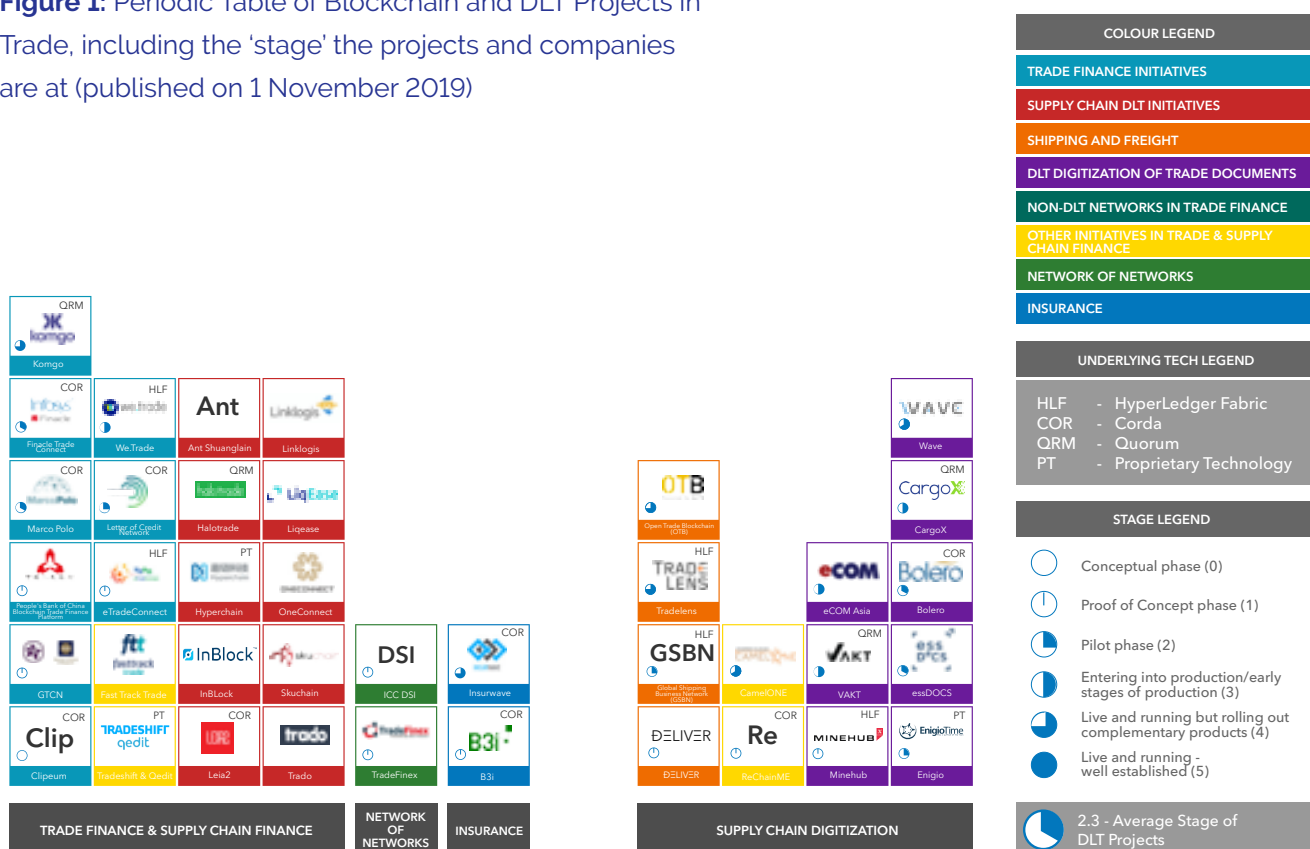
²There is an important distinction to make between the terms 'digitization' and 'digitalization'. Digitization is the process of converting information into a digital format, in which the information is organized into bits. Digitalization is the use of digital technologies to change a business model.

3.2 WHAT'S DIFFERENT?

Since the original rendition of the 'Periodic table of DLT projects' was published in December 2019, a lot has changed for the industry. Some of the projects that were profiled in the original version have fallen aside and others have risen from the ashes to take their place. A few, like Contour (previously Voltron), have progressed from being a consortium to becoming an incorporated legal entity, enabling them to provide the full commercial services that they were previously unable to provide. Most of the projects, however, have made steady progression towards their goals of a digitalized industry.

The maturity indicator, represented by the circles shown in the bottom-left corner of each project on the Table, indicates the level to which each project has progressed at the time of writing, with 1 representing the proof of concept (PoC) stage and 5 representing live and running (well established). At the end of 2019, the average stage of maturity across all the projects was profiled to be 2.3 out of 5 (see Figure 1 below). Today, nearly a year later, the average maturity has risen to 3.3, placing them between the early stages of production and being live and running (see Section 4).

Figure 1: Periodic Table of Blockchain and DLT Projects in Trade, including the 'stage' the projects and companies are at (published on 1 November 2019)



Source: 'Blockchain & DLT Projects in Trade: A Reality Check', by ICC, TFG, WTO, 1 November 2019

3.3 CUSTOMS DEVELOPMENT TRAILING

The future of trade digitalization relies on interoperability and the development of end-to-end solutions. Any digital process will only be as strong as its least digitized link. For many international trade systems this means integrating customs. While several governments are testing or considering using DLT for their customs operations and single windows, most projects remain at a conceptual or piloting stage.

The most advanced project seems to be Cadena in Latin America,³ which serves the very specific purpose of mutual recognition of authorized economic operators.⁴ There have also been a handful of PoCs and pilot projects involving customs, such as the NAFTA/CAFTA proof of concept, run by the US Customs and Border Protection office,⁵ the EU DG Taxud ATA carnet PoC⁶ conducted with the International Chamber of Commerce (ICC), the Korean export clearance project⁷ and Shanghai's 'Single Window' project. However, many of these projects either seem to have made limited progress or have not made any indication of their progress available to the authors or the public – and are therefore not featured in this revised periodic table.

However, things are moving. Various customs authorities are now integrated with the TradeLens project and there are several other DLT digitization of trade documents projects that are integrated with customs, including Avanza Innovations, which has been integrated with Dubai Customs. While these are significant positive developments, it is not enough. If the industry wishes to continue extending the limits in terms of trade digitalization, they need to begin to see more movement along this front. As noted above, a digitalized trade process is only as strong as its least digitized link.

3.4 DLT SUPPLY CHAIN FINANCE INITIATIVES: A GROWING POPULARITY

In the original version of the "Periodic table of DLT projects", various supply chain finance (SCF) projects leveraging DLT were featured. The revised periodic table includes a SCF category but does not list specific projects. Indeed, the fast increasing number of DLT SCF initiatives makes it difficult to provide a comprehensive and up-to-date picture.

³ <https://blogs.iadb.org/integration-trade/en/blockchain-trade-safer/>

⁴ An authorized economic operator is defined by the World Customs Organization (WCO) as a party involved in the international movement of goods, in whatever function, that has been approved by, or on behalf of, a national customs administration, as complying with WCO or equivalent supply chain security standards. Criteria to qualify as an authorized operator shall be specified in a WCO members' law, regulations and procedures. Authorized operators include manufacturers, importers, exporters, brokers, carriers, consolidators, intermediaries, ports, airports, terminal operators, integrated operators, warehouses and distributors.

⁵ <https://www.cbp.gov/sites/default/files/assets/documents/2019-Oct/Final-NAFTA-CAFTA-Report.pdf>

⁶ <https://mag.wcoomd.org/magazine/wco-news-87/digitization-ata-carnets/>

⁷ <https://mag.wcoomd.org/magazine/wco-news-88/korea-pilots-blockchain-technology-as-it-prepares-for-the-future/>

This does not mean that DLT-based solutions for SCF are unimportant. On the contrary, DLT is vastly interesting for SCF, as it addresses a myriad of challenges faced, not the least of which is greater transparency of suppliers' operations.

Many SCF projects also go beyond merely SCF to address other issues. For example, HaloTrade has adopted a multi-faceted approach, tackling not only SCF but also issues related to sustainability. Linklogis, another SCF initiative, branches beyond the first tier of suppliers that SCF typically looks at and instead also seeks to target suppliers of the supplier in their model of deep-tier supply chain financing. China's cross-border trade finance platform, launched by the State Administration of Foreign Exchange in April 2019, extends to customs to facilitate export finance and accounts' receivables financing. Other SCF initiatives target specific geographic segments of the market, such as Factorin, which focuses on the Central and Eastern European Market.

3.5 STRUCTURE OF THE PERIODIC TABLE

The current rendition of the "Periodic table of DLT projects" has divided the projects into seven categories: supply chain finance, trade finance, know your customer (KYC), insurance, DLT digitization of trade documents, shipping and logistics / supply chain, and a miscellaneous category for projects that do not neatly fit into any of the other sections. These categories, while useful to easily grasp the differences between the various projects, induce a simplification that may not reflect the full complexity of each project. However, classifying projects in one or another category is not always a straightforward task.

Similar to the previous edition, each project is presented with its underlying technology as well as an evaluation of its current stage of maturity. As was always intended with the periodic table structure, this updated version, in contrast to the previous edition, helps to show the ever-evolving progress that has been made in the industry to date.

3.6 KYC PROJECTS

A section for KYC projects has been included in the periodic table. It is important to note that many initiatives that are classified as 'trade finance DLT initiatives' comprise a KYC element in their service suites. In the table, only those projects that explicitly have blockchain-powered KYC modules as a secondary function have been indicated. This decision has been made to simplify the already complex visualization of the project ecosystem. It is also important to note that there are a number of national KYC initiatives that have not been included in the periodic table. These initiatives include Nabu and Bahrain's Blockchain National eKYC Platform, the first national scale eKYC initiative in the Middle East and North Africa region.

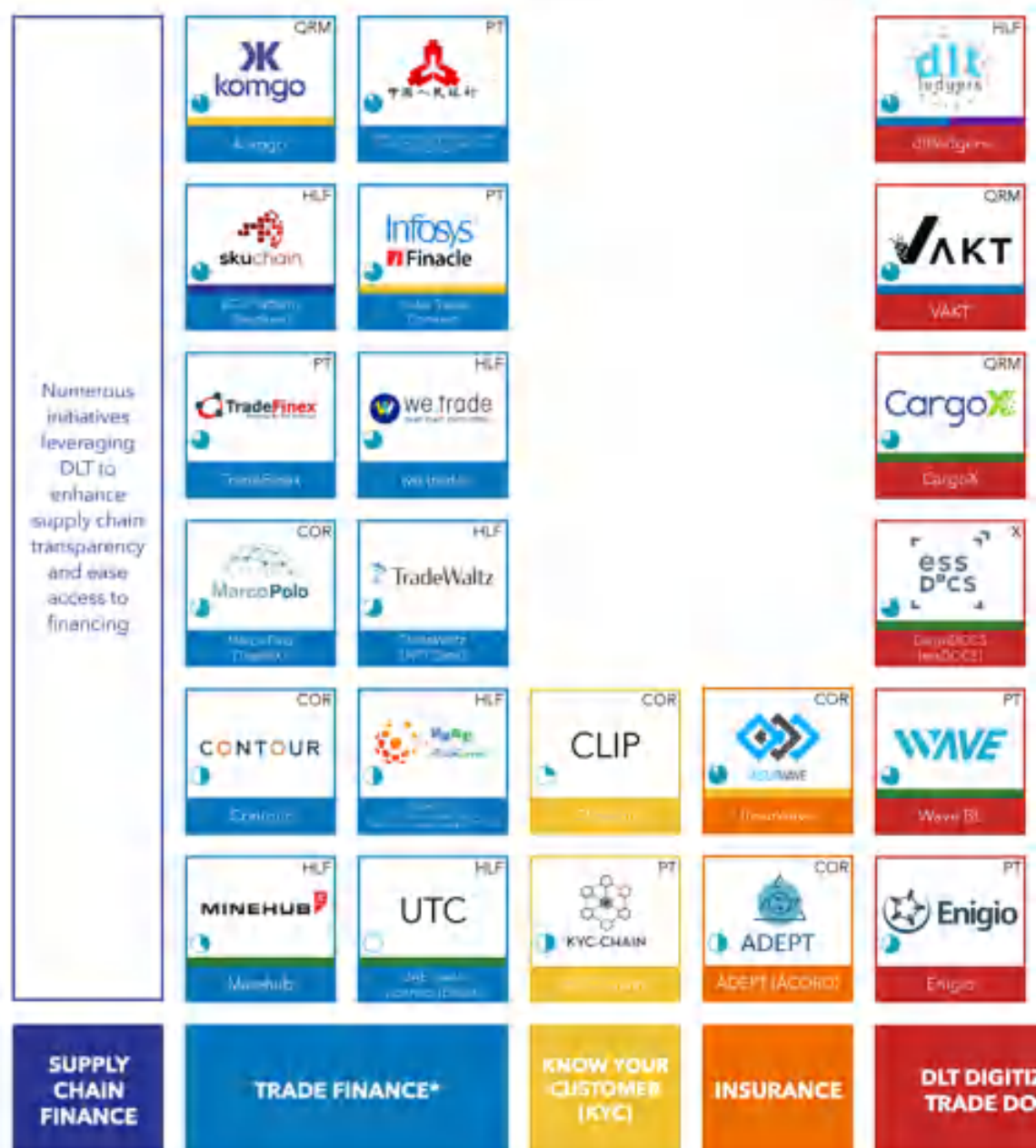
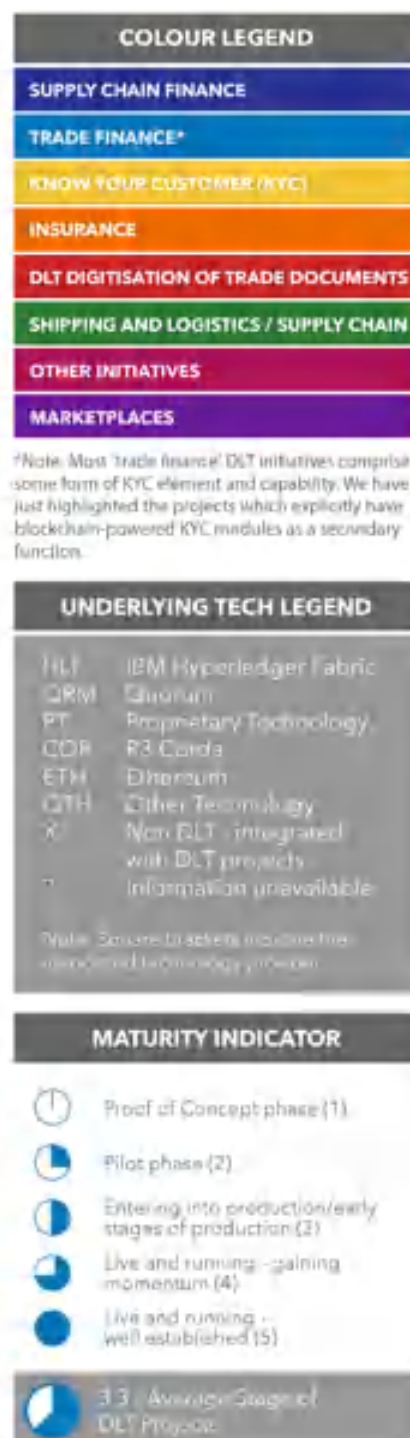


Figure 1: Periodic table of DLT projects split by grouping and across various categories, also highlighting the state of development and underlying technology. Correct as at 1st October 2020.



5 STANDARDIZATION INITIATIVES

A crucial step towards end-to-end trade digitalization is creating an ecosystem that allows for seamless exchanges of data between existing platforms. This requires developing and implementing globally accepted digital standards for trade. As these initiatives play a crucial role in shaping the landscape within which each DLT-in-trade project operates, standardization initiatives have been included in more detail in this updated version. To this end, these initiatives will be separated into standalone sections with a corresponding tables and each project will be examined more deeply.

In the broader trade area there are several initiatives all working towards creating a set of standards. Some of these are focused on particular sectors or geographies while others are more general. Some are being spearheaded by large international organizations, others by private companies. The following figure provides an at-a-glance look at some key initiatives in the space (see Figure 2 below). The pages that follow provide a quick look into each individual project.

Any discussion of standardization in a digitalized trade world would not be complete without mentioning the importance of regulatory work and of building a harmonized regulatory framework. A key actor in this respect is the United Nations Commission on International Trade Law (UNCITRAL). While this is not a standardization body, it plays a key role in working to build a harmonized international trade law framework to drive further progress.

Figure 2: Selected initiatives with a focus on creating standards relevant for trade digitalization



5.1 | SECTOR- OR PROCESS-FOCUSED INITIATIVES

Blockchain in Transport Alliance (BiTA)

Founded in August 2017, BiTA counts nearly 500 members primarily from the freight, transportation, logistics and affiliated industries in over 25 countries. BiTA is seeking to develop blockchain industry standards for the freight, transportation, logistics and affiliated industries, to educate its members and others on blockchain applications and solutions, and to encourage the use and adoption of new solutions.

The Digital Container Shipping Association (DCSA)

The DCSA is a nonprofit, independent organization established in 2019 by several of the largest container shipping companies. It seeks to promote interoperability in the container shipping industry by developing digital standards.

Mobility Open Blockchain Initiative (MOBI)

MOBI is a member-led consortium working to make transportation greener, more efficient, and more affordable using blockchain and related technologies. MOBI seeks to develop open standards for the automotive industry to support smart mobility blockchain adoption.

The Belt and Road Blockchain Consortium

The consortium is technically neutral. It develops buy-side business standards for electronic-ID-disputed resolution processes and standardized interoperable smart contract standards that increase trust and transparency in cross-border trade.

The World Customs Organizations (WCO)

The WCO has developed a data model that is used by customs and other cross-border regulatory agencies to exchange information related to cross-border transactions.

5.2 GENERAL TRADE-FOCUSED INITIATIVES

United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)

UN/CEFACT is a subsidiary, intergovernmental body of the United Nations Economic Commission for Europe (UNECE) which serves as a focal point within the United Nations Economic and Social Council for trade facilitation recommendations and electronic business standards. It has developed a Core Component Library (UN/CCL) and is behind the UN/EDIFACT standard. It has also developed various supply chain standards such as the cross-industry invoice standard, and is now working on various blockchain projects.

The ICC Digital Standards Initiative (DSI)

Launched in September 2020, the ICC DSI which is supported by Enterprise Singapore and the Asian Development Bank, aims to develop digital standards to establish a globally harmonized, digitized trade environment.

5.3 GENERAL PRIVATE SECTOR-LED INITIATIVES

The Enterprise Ethereum Alliance (EEA)

The EEA is a member-led industry organization whose objective is to drive the use of Ethereum blockchain technology as an open standard to empower enterprises.

GS1

GS1 develops and maintains global supply chain standards (the most well-known of which is the barcode). GS1's global standards for identification and structured data enable blockchain network users to scale enterprise adoption.

The Institute of Electrical and Electronics Engineers (IEEE)

IEEE is a technical professional organization that fosters technological innovation. In January 2018, it created a blockchain initiative to coordinate projects and activities related to blockchain. The IEEE has been actively pursuing blockchain standardization efforts through various activities in multiple industry sectors.

The World Wide Web Consortium (W3C)

W3C is a technical standards body for the open internet that played a crucial role in standardizing the functionality of web browsers. Various business community groups focused on blockchain were created over the past few years, including the Blockchain Community Group, the mission of which is to generate message format standards of blockchain based on ISO20022 and guidelines for usage of storage. Another group, the Blockchain Digital Assets Community Group, aims to discuss and eventually create and propose web specifications for creating and using digital assets on a blockchain. Finally, the TNS Blockchain Group aims to explore the use of digital names within existing web applications. W3C is working on a decentralized identifier (DID) standard supported by the Decentralized ID Foundation.

5.4 INTERNATIONAL STANDARDIZATION BODIES

International Telecommunications Union (ITU)

The ITU established a Focus Group on Application of Distributed Ledger Technology in May 2017 to identify and analyze DLT-based applications and services; draw up best practices and guidance which support the implementation of those applications and services on a global scale; and propose a way forward for related standardization work in ITU-T study groups. The focus group analyzed some 60 use cases and published a toolkit in 2019.

International Organization for Standardization (ISO)

ISO is a global network of national standards bodies. It established a technical committee on Blockchain and distributed ledger technologies (ISO TC/307) in 2016 to develop blockchain and DLT standards. As of September 2020, three standards had been developed and eight were in development. The Technical Committee counts 44 members and 13 observers.



5.5 NATIONAL OR REGIONAL INITIATIVES

British Standards Institution (BSI)

The BSI is the national UK body developing standards. The BSI is working on blockchain standards for the supply chain.

European Committee for Standardization (CEN) and European Committee for Electrotechnical Standardization (CENELEC)

The CEN and CENELEC are two European standardization organizations whose collaboration was consolidated at the start of 2010 by the creation of a common CEN-CENELEC Management Centre (CCMC) in Brussels. CEN and CENELEC recently established a new CEN-CENELEC Joint Technical Committee 'Blockchain and Distributed Ledger Technologies' (CEN-CLC/JTC 19), based on the recommendations presented in the CEN-CENELEC White Paper on 'Recommendations for Successful Adoption in Europe of Emerging Technical Standards on Distributed Ledger/Blockchain Technologies'. CEN-CLC/JTC 19, whose Secretariat is held by UNI, the Italian Standardization Body, will be responsible for the development and adoption of standards for blockchain and DLT, covering organizational frameworks and methodologies, processes and products evaluation schemes, distributed ledger guidelines, smart technologies, objects, distributed computing devices and data services. CEN-CLC/JTC 19 will identify international standards already available or under development and will work in close contact with ISO/TC 307 'Blockchain and distributed ledger technologies'. It also will focus on specific European legislative and policy requirements, in support of the development of the EU Digital Single Market.

China Electronic Standardization Institute (CESI)

Founded in July 1963, CESI is a nonprofit institution directly under the Ministry of Industry and Information Technology that is engaged in standardization, conformity assessment and measurement activities in the field of electronic information technologies. CESI is working on national standards for blockchain to drive adoption of decentralized technology in public and private sectors across various industries. Since 2017, CESI has been conducting a standard blockchain system function test to certify the top blockchain projects operating in China.

European Telecommunications Standards Institute (ETSI)

ETSI is a European Standardization Organization. In December 2018, ETSI launched the Industry Specification Group on Permissioned Distributed Ledger (ISG PDL) to analyze and provide the foundations to operate permissioned distributed ledgers to be deployed across various industries and governmental institutions.

European Blockchain Partnership (EBP) / European Blockchain Services Infrastructure (EBSI)

In April 2018, 21 EU member states and Norway agreed to sign a declaration creating the European Blockchain Partnership and to cooperate in the establishment of the European Blockchain Services Infrastructure (EBSI) that will support the delivery of cross-border digital public services using blockchain technology. The EBSI will be materialized as a network of distributed nodes across Europe (the blockchain), leveraging an increasing number of applications focused on specific use cases.

National Institute of Standards and Technology (NIST)

NIST was founded in 1901 and is now part of the US Department of Commerce. NIST published “A Taxonomic Approach to Understanding Emerging Blockchain Identity Management Systems” and it recently issued a draft publication (no. NISTIR 8301), ‘Blockchain Networks: Token Design and Management Overview’, which provides a high-level technical overview and conceptual framework of token designs and management methods.

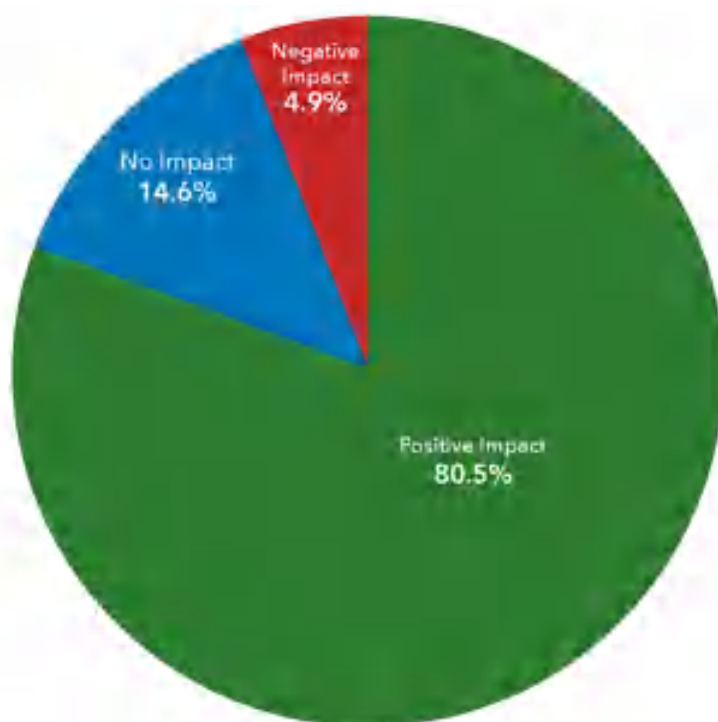


6 THE COVID-19 PANDEMIC: IMPACT ON DLT PROJECTS IN TRADE

COVID-19 has uprooted processes and established outlooks in many industries around the world. To gain a detailed understanding of the impact that the global pandemic has had on DLT projects in trade, the WTO and TFG conducted a supplementary survey of projects featured in the 2020 Periodic table update. The results of this survey are discussed in the following paragraphs and depicted in Figures 3 and 4.

As part of the survey, respondents were first asked how the COVID-19 pandemic has impacted their DLT plans and activities. In accordance with the ICC Global Survey on Trade Finance,⁸ the WTO-TFG supplementary survey indicates that the vast majority of firms have experienced a positive benefit to their DLT plans and activities as a result of the pandemic. Without the physical presence of staff, due to work-from-home orders in many nations around the world, banks and corporates have been forced to produce rapid digital solutions in order to remain operational. In many instances, according to a report by the ICC Digitalisation in Trade Finance Working Group titled 'Digital Rapid Response Taken by Banks Under COVID-19',⁹ this was best done by scaling up existing digital solutions. While many DLT solutions may not have been directly implemented as a result of COVID-19, the progress made on the implementations of supporting technologies has had clear positive implications.

Figure 3: How has the COVID-19 pandemic impacted your DLT plans and activities?



Note: Based on a survey of the 44 projects featured in this study

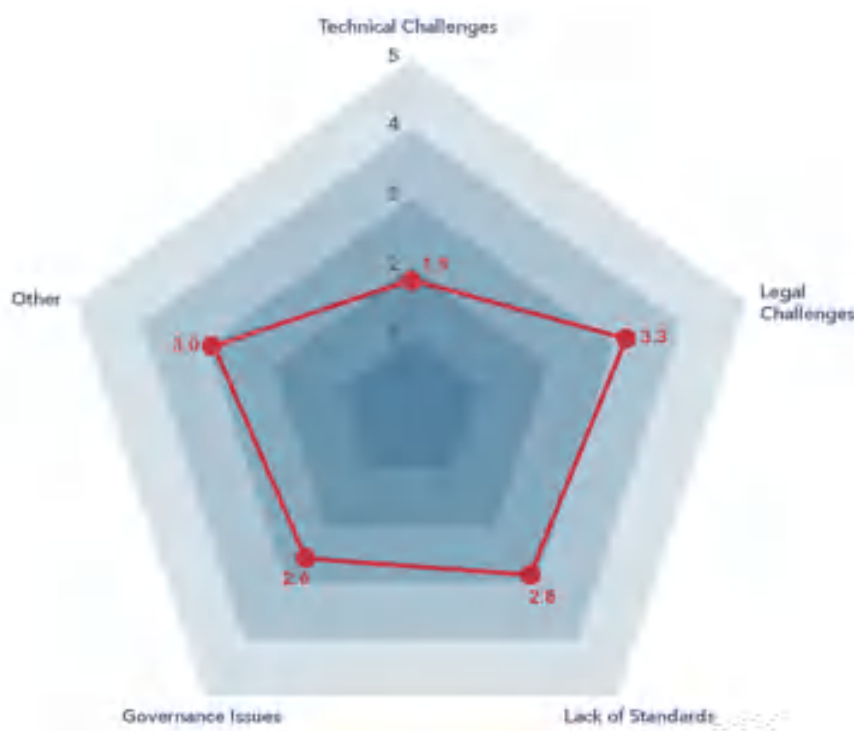
⁸ <https://library.iccwbo.org/content/tfb/pdf/2020iccglobaltradesurveyvweb.pdf>

⁹ <https://iccwbo.org/content/uploads/sites/3/2020/04/2020-icc-covid-response-banks-3.pdf>

The WTO-TFG supplementary survey on the impact of COVID-19 on DLT and trade also sought to understand the various challenges facing DLT firms as they try to scale up their solutions.

It is interesting to note that legal challenges were rated as posing a more pressing challenge than any of the other challenges. This suggests that the largest current challenge facing the deployment of DLT solutions across the industry relates heavily to lack of legal clarity and enabling regulatory framework that firms face. This idea is further supported by the results of the ICC Global Survey on Trade Finance. In a report based on the survey, the ICC noted that when facing the challenges of the COVID-19 pandemic, “most banks have not yet seen meaningful support from authorities to facilitate trade on digital terms”. If the industry is to transition successfully into a digitalized world powered, in part, by DLT, regulatory development needs to keep pace with technological advancement. Governmental authorities and policymakers around the world need to begin addressing the historic, and often wildly outdated, laws that are burdening those seeking to guide the industry into the future.

Figure 4: Perceived difficulty of challenges facing firms to scale up (1-5, with 1 being the least difficult and 5 being the most difficult)



Note: Based on a survey of the 44 projects featured in this study

7 APPENDIX OF PROJECTS

7.1 TRADE FINANCE

 COR Contour	 HLF EC3 Platform [Skuchain]	 HLF eTradeConnect [Hong Kong Trade Finance Platform Company Limited (HKTFPCL)]	 PT India Trade Connect
 QRM komgo	 COR Marco Polo [TradeIX]	 HLF Minehub	 PT People's Bank of China Blockchain Trade Finance Platform/ Bay Area Trade Finance Blockchain Platform
 PT TradeFinex	 HLF TradeWaltz [NTT Data]	 HLF UAE Trade Connect [Etislat]	 HLF we.trade

Contour, a recent rebrand of Voltron, is delivering a Corda-powered open industry platform to create, exchange, approve, and issue letters of credit. Following a production launch at the end of Q3 2020, each participant will be able to host their own node on the business network. The application will be a complete end-to-end workflow for letters of credit including co-drafting applications, issuance, amendments, presentation, connectivity to digital document providers, discrepancy resolution, and settlement. It will also be protected with bank compliant security measures.

The revenue model for Contour's permissioned platform has not been officially announced, but is anticipated to be based on monthly subscription fees and transaction fees based on volume, not value. The founding banks and principal participants include Bangkok Bank, BNP Paribas, CTBC, Citi, ING, HSBC, SEB, and Standard Chartered.

In the future, Contour plans to roll out a guarantees solution, which will be expanded to cover both standby letters of credit and guarantees in its production launch. They are also looking to create a solution for documentary collections utilizing digital documents rather than paper.

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. According to a spokesperson from R3 in response to this publication, "a state is an immutable object representing a fact known by one or more Corda nodes at a specific point in time".¹⁰ 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 the 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.

In October 2020, R3 announced the acquisition of eTitle to launch Corda eBL. Corda eBL is a legal and technology toolkit that enables companies to embed negotiable title document functionality within their own applications. The toolkit, which is extensible beyond their starting point of eBLs to other negotiable title documents, will be natively embedded into Corda.

¹⁰ Corda Documentation: <https://docs.corda.net/docs/corda-os/4.6/key-concepts-states.html>

7.1.2 | EC3 Platform [Skuchain]



Skuchain's EC3 (Empowered Collaborative Commerce Cloud) is a blockchain-based platform that provides an end-to-end solution for supply chains and trade finance. The platform has several core applications, including EDIBUS, ICF, and a Transaction Manager. EDIBUS allows enterprises to share electronic data interchange documents, Excel spreadsheets, CSV files and the like with their supply chain ecosystem members, while maintaining field-level control over data privacy. ICF (Inventory Control & Finance) allows enterprises to use the Distributed Ledger Payment Commitment, a global standard for a payment commitment on a blockchain network, to obtain supply chain finance. The Transaction Manager makes use of smart contracts that Skuchain calls Brackets. These Brackets are used to digitize assorted traditional trade finance documents like letters of credit and make them accessible through the blockchain.

EC3 customers are able to freely write their own business flows for a transaction and connect with bank back offices at relevant points in a transaction. That kind of flexibility allows for expanded financing options like deep-tier financing or inventory financing. They have also made use of an instrument called a distributed ledger payment commitments (DLPC) as an alternative to the letter of credit.

Skuchain currently works with several large enterprises and their bank partners in the mining and minerals, electronics, automotive and apparel industries. These firms pay subscription and transaction fees to use EC3, and have led Skuchain to currently operate into the Africa, Asia, Europe, South America, and the United States, but the platform is by no means restricted by geography. One particular draw for EC3 is that, while it is based on Hyperledger Fabric, it is fully interoperable with networks built on Corda and is also able to port onto those built with Ethereum.

HYPERLEDGER FABRIC

Hyperledger Fabric, an open-source blockchain infrastructure governed by the Linux foundation, facilitates a multichannel 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.



7.1.3| eTradeConnect [Hong Kong Trade Finance Platform Company Limited (HKTFPCL)]



eTradeConnect is a trade finance consortium based in Hong Kong, China and operated by the Hong Kong Trade Finance Platform Company Limited. The DLT-based platform currently offers products and processes to members, including purchase order and invoice creation, pre-shipment trade finance and post-shipment trade finance on open account trade, duplicated financing checks, and payment status updates. In the near future, eTradeConnect plans to release cross-chain technology that will allow for connectivity amongst different DLT trade platforms.

Current participants in the platform include: Australia and New Zealand Banking Group Limited; Bank of China (Hong Kong) Limited; Bank of East Asia Limited, DBS (Hong Kong) Limited; Hang Seng Bank Limited; Hongkong and Shanghai Banking Corporation Limited; Standard Chartered Bank (Hong Kong) Limited; Agricultural Bank of China Ltd., Hong Kong, China Branch; BNP Paribas, Hong Kong, China Branch; Industrial and Commercial Bank of China (Asia); Shanghai Commercial Bank Limited; and Bank of Communications Co., Ltd., Hong Kong, China Branch.

Built using the Hyperledger Fabric framework, eTradeConnect's permissioned network was built in partnership with Ping An Technology (Shenzhen) Co., Ltd and Shanghai OneConnect Financial Technology Co., Ltd.

7.1.4 | India Trade Connect [Infosys Finacle]

India Trade Connect is a DLT-based trade finance initiative that supports a comprehensive set of end-to-end trade and supply chain business functions including open account, letters of credit, bank guarantees, bill collections, consumer-to-consumer (C2C) and business-to-business (B2B) transactions, bill discounting, reverse factoring, and invoice financing.

The permissioned platform, developed by technology agnostic Finacle Trade Connect and certified to work on all leading DLT vendors like R3 Corda, Hyperledger and Ethereum, operates using a competitive fee model aligned to the volume of transactions.

Finacle Trade Connect is pre-integrated with partners like essDOCS and Traydstream to approve eTitle documents for the trade cycle and automate document checking and validation for trade finance and supply chain finance cycles. It is also in the process of being integrated with VISA B2B Connect to provide B2B payments processing and settlement.

Having launched operations in India, with aims of achieving a global footprint, India Trade Connect comprises some of the leading banks in India, including ICICI Bank, Axis Bank, Standard Chartered Bank, YES Bank, Ratnakar Bank Limited, Bank of Baroda, Federal Bank, IDFC First Bank, Canara Bank, Kotak Mahindra Bank, Indusind Bank, South Indian Bank, and State Bank of India.

Finacle, the primary technology partner for India Trade Connect also has a solution for KYC called Finacle Identity Connect. This is a blockchain-based solution that simplifies the KYC process requirements of banks. It helps digitalize KYC processes, enable self-identity, validate national identity, and ensure a unified repository of information.

7.1.5 | komgo



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, Total Trading, SGS, ConsenSys, and Jupiter Opportunity Fund. More than 150 companies are currently using the platform.

komgo offers three 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 and 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.

In particular, the letter of credit and standby letter of credit product is very mature, with over 20000 LCs issued and a six-year track record. These volumes are continuing to ramp up as large corporates and banks sign up.

komgo, which is built on the permissioned Quorum framework, has global operations with headquarters in Geneva and Singapore and plans to open a US-based office in 2021. They generate revenue through subscription fees and professional services charges for activities like integration.

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 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 those contracts. This is determined either by the contract being public or by the node being party to a private contract. This means that a node that is not party to a specific private contract will simply 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.

7.1.6 | Marco Polo [TradeIX]



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. Currently, this includes receivables finance and payment commitments, with and without financing, as well as payables finance - with the aim of including a payments product in the near future. It also provides secure, distributed data storage and bookkeeping, identity management, and asset verification among other features. Application programming interfaces (APIs) and legacy system compatibility allow banks to easily integrate to their corporate clients with their enterprise resource planning (ERP) systems via the Marco Polo 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, over 35 financial institutions and other participants such as Accenture, Microsoft, Mastercard, and Pole Star have joined the network.

Marco Polo operates on a license and transaction fee model and is gearing up to launch its supply chain finance products in 2020.

7.1.7 | Minehub



Minehub is designed to be the digital supply chain platform for the mining and metals industry. The platform supports the end-to-end coordination of post-trade settlement processes for physical commodity transactions, including contracting, logistics, specifications, finance and document management.

MineHub is built on HLF 2.2. The initial focus is on enabling digital trade between the primary actors – sellers, buyers and lenders – but the roadmap for 2021 includes support for inspectors, insurers and agents.

Minehub has been running six projects in raw materials, including iron ore, copper concentrate and scrap metal, involving multinational corporations as well as micro, small and medium-sized enterprises (MSMEs) in all continents.

Minehub's worldwide operations will generate revenue through a two-tiered model. A utility layer for operations teams will be accessible to all for a low-cost subscription fee, while premium services will be available for more value-based pricing.

7.1.8 | People's Bank of China Blockchain Trade Finance Platform / Bay Area Trade Finance Blockchain Platform



Originally unveiled as the Bay Area Trade Finance Blockchain Platform before broadening its geographical scope, the People's Bank of China Blockchain Trade Finance Platform is a collection of four blockchain applications: account receivables financing, bill rediscount, tax filing, and international trade information collection. Forty-eight banks now participate in the China-focused platform. The representative banks include the Industrial and Commercial Bank of China, the Bank of China, and the China Construction Bank. Besides major participating banks, Beijing Financial Assets Exchange has also joined the network.

The platform's underlying DLT technology was independently developed by the Digital Currency Institute of the People's Bank of China. At present, they are working on a cross-platform project with the Hong Kong Monetary Authority's eTradeConnect. eTradeConnect in turn has a relationship with the we.trade network (see Section 7.1.12), contributing to the development of a more global reach for the platform and its members.

The permissioned platform's non-profit business model allows it to focus on providing the most readily needed features and applications to the firms that most need them. While it targets MSMEs, the solution isn't purely about trade finance. It also covers supply chain accounts receivables, rediscounting by the central bank, automated tax filing, and supervision of international trades.

7.1.9 | TradeFinex



TradeFinex can be described as a hybrid blockchain and network-of-networks. Underpinned by XinFin Network's XDC protocol, TradeFinex connects multiple platforms by operating as a blockchain agnostic middleware. They are already live with an agnostic integration for MSME originators, connecting them with decentralized liquidity pools through the proprietary tokenization protocol for meeting MSME funding requirements.

The globally reaching network operates as both permissioned and permissionless: permissionless for public verification, but permissioned for selective data sharing. This hybrid approach allows TradeFinex to provide its participating members with reporting features of accredited investors by their virtual assets net worth as well as the ability to tokenize offline obligations from originators.

The current participants, Validus (Singapore MAS regulated), Enigio, Ramco (Singapore), ITFA, and WOA, pay network utility fees to gain access to the platform.

In the future TradeFinex plans to launch a liquidity aggregator service using on-chain tokens.

7.1.10 | TradeWaltz [NTT Data]



TradeWaltz is a new platform built by NTT DATA that will enable all participants in the highly complicated international trade ecosystem to share information and deliver value to all users. TradeWaltz's ambition is to create an information platform that makes international trade secure by sharing electronic documents with guaranteed authenticity of each transaction and providing reliable information that people can easily and safely access whenever necessary.

As of March 2020, the participants in TradeWaltz included: MUFG Bank, Ltd., Sumitomo Mitsui Banking Corporation, Mizuho Bank, Ltd., Tokio Marine & Nichido Fire Insurance Co., Ltd., Sompo Japan Nipponkoa Insurance Inc., Mitsui Sumitomo Insurance Company, Limited, Sumitomo Corporation, Mitsubishi Corporation, Sojitz Corporation, Toyota Tsusho Corporation, Marubeni Corporation, ITOCHU Corporation, Kanematsu Corporation, Mitsui & Co., Ltd., Kawasaki Kisen Kaisha, Ltd., Nippon Express Co., Ltd., Nippon Yusen Kabushiki Kaisha, and Ocean Network Express Pte. Ltd.

7.1.11 | UAE Trade Connect [Etislat]

Expected to launch in December 2020, UAE Trade Connect (UTC) is a permissioned DLT platform, developed by Avanza Innovations on the Hyperledger Fabric framework. To date, the PoC and pilot tests have attracted eight banks which will participate in the production launch. These banks are First Abu Dhabi Bank (FAB), Emirates NBD, Mashreq Bank, Commercial Bank International (CBI), National Bank of Fujairah (NBF), Abu Dhabi Islamic Bank (ADIB), Commercial Bank of Dubai (CBD), and Rak Bank. UTC will be operated and governed by Etisalat, the UAE's national telecommunications company, which will act as a neutral, state-owned entity to grow the platform by adding new banks and launching new use cases.

UAE Trade Connect addresses several issues with duplicate and fraudulent invoice financing that have posed considerable problems for banks in the industry. The industry-wide solution aims to check for duplicate and fraudulent invoices submitted by banks using the blockchain network.

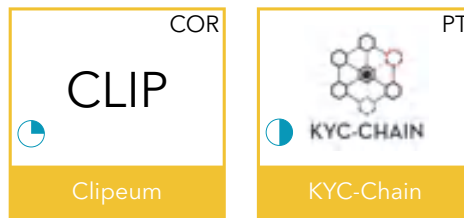
UTC converts physical data into digital data, using optical character recognition and DLT. Many of the manual controls currently adopted by banks will be able to be performed by solution-using machine-learning technology. A security-first design means that banks' confidential information will remain protected throughout the solution as their data will not be shared with any other bank in the chain, allowing both banks and their clients to interact in a trusted marketplace. It will generate revenue by charging banks for each transaction that they verify.

we.trade is a European-based trade finance consortium with plans to expand globally in 2021. Through a licence fee and transaction fee model, we.trade currently has a number of products that are live, including: auto-settlement, i.e. automation of payment based on pre-agreed conditions; bank payment undertaking (BPU), i.e. confirmation that the buyer's bank will make a payment to the seller; BPU financing, i.e. a financing option for the seller based on the BPU; and invoice financing, i.e. a financing option for the seller based on a single sales invoice.

we.trade's future product deployments will include enterprise resource planning (ERP) connectivity, API readiness (for 3rd party and back office integration), additional payment triggers, and the addition of partial/multi payments, enhanced client directory, and insurance and logistics services.

Working with IBM to deploy the permissioned network on the Hyperledger Fabric framework, we.trade has attracted a number of shareholders and other member organizations. These include: CaixaBank, Deutsche Bank, ERSTE Group, HSBC, KBC, Rabobank, Société Générale, UniCredit, Nordea, Santander, UBS and IBM as shareholders, as well as UniCredit Germany, Eurobank (Greece), CSOB (Czech Republic), KB (Czech Republic), CSAS (Czech Republic), and CBC (Belgium) as member organizations.





7.2.1 | Clipeum

Clipeum is a European consortium of banks, insurance companies, and asset managers, including Société Générale, Natixis, Commerzbank, Euler Hermes, Tikehau Capital, and R3. They are striving to solve many industry inefficiencies and other challenges through the creation of an open-source financial ecosystem for cooperation in terms of collection and pooling of KYC-related documents.

The platform provides an information-sharing multi-financial-institution platform to help accelerate the end-to-end KYC on-boarding, but it is focused solely on documentation collection, not the rest of the process, like screening or approval. Banks will still conduct their own independent KYC verifications but Clipeum will enhance the process by providing easy integration via its APIs.

Through these APIs, corporate treasurers manage access rights to their firm's data. This means that when a bank requests access to a specific set of documents, the treasurer can grant the permissions it sees fit to the requested documents. At any time, a treasurer wishing to terminate a business relationship with a particular financial institution can decide to revoke access to its information and thus close the flow of information from its data room towards that particular bank.

The platform, which is built on R3 Corda, is free for corporate data providers and will be accessible to the financial institutions that consume the data for a fixed license fee plus a variable cost linked to the volume of data consumption.

7.2.2 | KYC-Chain

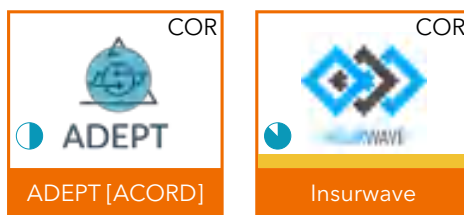


KYC-Chain is a DLT-based workflow solution designed to streamline the KYC onboarding process by verifying customer identities and managing the entire customer lifecycle. The solution suite, born out of frustration with the existing KYC process, includes sanctions screening, identity verification, optical character recognition extraction tools, API integrations, and more.

Their fully customizable toolkit allows users to create turnkey solutions that meet the specific legal needs of different jurisdictions and regulatory environments. This same adaptability is also expected to allow KYC-Chain to remain highly relevant even as the legal, compliance, and regulatory environments inevitably change.

To date, the company has completed over 500,000 successful on-boardings spanning 240 countries and territories.

7.3 | INSURANCE



7.3.1 | ADEPT [ACORD]



ADEPT stands for ACORD Data Exchange Platform & Translator. It is a platform for real-time data exchange, translation, and transformation, linking trading partners, and providing data structure, validation, and reconciliation. Built by ACORD Solutions Group on top of DLT infrastructure, ADEPT enables effective and secure information exchange, comparison and validation across the entire insurance value chain.

Using a subscription-based SaaS business model, ADEPT has been able to attract participation from a variety of leading carriers and brokers. The solution, which aims to be global and which is likely to be live by the end of 2020, has plans to implement multiple insurance processes on the same platform, starting, for example, with premium accounting reconciliation and reinsurance placing/accounting/claims.

7.3.2 | Insurwave

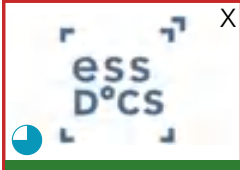
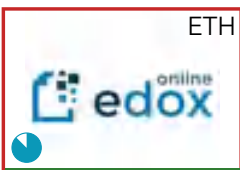
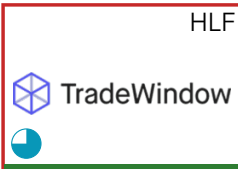


Insurwave is a software as a service (SaaS) private blockchain that connects insurance clients with the insurance market in an efficient, private, and data-rich manner. The company seeks to address the challenges that exist in the complex marine insurance ecosystem, which naturally consists of multiple parties, high transaction volumes, and significant levels of reconciliation. Insurwave uses cloud and cryptography technologies to reduce the distance between corporate risk and insurance capital. The Insurwave solution improves risk assessment and service proposition and reduces costs through the automation or removal of various processes surrounding a sale.

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 Ernst & Young and technology firm GuardTime. There are currently over 20 clients on the Insurwave platform, including Moller, Maersk, Gard Insurance, and Willis Towers Watson.

The permissioned platform is geographically focused on Asia Pacific, Europe, and North America and will generate revenue through an annual licence fee as well as charge per use fees. Recently, Insurwave has launched a solution for parametric insurance products and integrated links to KYC and anti-money laundering (AML) through the platform.

7.4 DLT DIGITIZATION OF TRADE DOCUMENTS

ETH/HLF  CamelOne [VCargoCloud]	X  CargoDOCS [essDOCS]	QRM  CargoX	HLF  dltledgers
OTH  eCOM Asia Ltd	ETH  edoxOnline	PT  Enigio	X  Galileo [Bolero]
HLF  TradeWindow	PT  Trusple	QRM  VAKT	PT  Wave BL

7.4.1 | CamelONE [VCargo Cloud]



CamelONE is a platform that integrates and connects all stakeholders in the supply chain. The initiative, spearheaded by Singapore-based vCargo Cloud seeks to digitalize the entire end-to-end process for trade and supply chains 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 vertical markets.

The platform is currently integrated with Singapore Customs and Singapore International Chamber of Commerce, as well as a collection of logistics companies, banks, importers, and exporters. Generating revenue on a transaction fee model, CamelONE has plans to launch services for customs declaration, licenses, permits, and commercial and shipping documents.

7.4.2 | CargoDocs [essDOCS]



CargoDocs uses an immutable ledger based on Amazon Quantum Ledger Database (AWS QLDB). Amazon QLDB provides a transparent, immutable, and cryptographically verifiable transaction log to CargoDocs. It tracks each and every application data change relating to final documents and title and maintains a complete and verifiable history of changes over time. While not strictly speaking a blockchain or DLT, Amazon QLDB does act as a ledger database purpose-built for customers who need to maintain a complete and verifiable history of data changes in an application that they own.

The CargoDocs solution has been integrated across several key DLT partner solutions, particularly to provide critical electronic bill of lading capabilities for banks and corporates. Partner integrations include Contour's blockchain letter of credit platform, MineHub, VAKT, Finacle Trade Connect, and include blockchains based on Ethereum/Quorum, IBM Hyperledger Fabric, and R3 Corda.

While CargoDocs does not currently support applications for KYC or AML, they are exploring options of tying the solution to partners who would be offering DLT for KYC and AML.

CargoDocs charges transaction fees for the use of its solutions either annually, quarterly or monthly. One-off implementation fees may also apply, depending on the customization and scope required.

7.4.3 | CargoX



CargoX is an independent supplier of an on-chain bill of lading (BL) powered by the Ethereum network. They have created a Blockchain Document Transaction System (BDTS) open-source protocol to tokenize, encrypt, and transfer the BL, 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 globally focused organization generates revenue through a transaction business model for MSME participants and a subscription-based model for corporates. They plan to roll out a BDTS for industry vertical markets like production or energy trading in the near future and have their sights set on a possible KYC solution by 2021.

7.4.4 | dltledgers



dltledgers is a trade execution platform that enables customers to digitalize their trade execution processes by digitizing contracts and documents. The platform is available to anyone buying or selling physical goods across borders, such as commodity traders and large manufacturers, as well as to trade finance providers like banks. Banks are generally either direct customers, participating in or running their own networks by subscribing to a node, or they participate in another customers' trades as trade finance partners, in which case they would only have restricted platform access.

Currently the platform intends to provide services to digitize cross-border trade processes, provenance and sustainability, accounts-payable financing, accounts-receivable financing, distributor network digitalization, supplier-financing networks, and supply chain visibility.

As a direct competitor of komgo, we.trade and Marco Polo, the permissioned Hyperledger Fabric-based network will operate by charging subscription fees as well as transaction fees. Its current primary realm of operations is based in Asia Pacific and the Middle East, but also includes active trade flows among 28 countries on four continents.

7.4.5 | eCOM Asia Ltd



eCOM Asia is a B2B data integration company providing digital transformation and data integration across all supply chain participants. eCOM's solutions enable trade and finance facilitation across the entire supply chain. The company generates revenues through a combination of subscription fees, read-write volume charges, and financing loan amount commissions.

Its DLT-based eCOM Registry™ solution provides a trusted data network for the secure sharing and exchange of trusted data, while maintaining ownership and control, and enabling eKYC in financial service initiatives. The eCOM Registry™ solution is being used for: cross-border trade connectivity between Singapore and China; a trading and finance platform for a large Chinese food importer; and a MSME trade finance solution for the Hong Kong, China Port community.

The cross-border trade connectivity between Singapore and China allows for the bi-directional exchange of customs import and export declarations. Moving into the second phase of this project, the aim is to implement trusted data through their eCOM Registry™ solution for customs declarations and supporting trade documents like the BL or certificate of origin.

Being the trading and finance platform for one of China's largest food importers allows the eCOM Registry™ Asia to use their own liquidity to finance Chinese distributors using preferential financing rates outside of China. They offer 90 per cent funding from order to shipment to China, with the balance paid by the distributor when they collect the product. eCOM's DLT solution provides tracking, visibility and trust across the export-import trade documents so they can manage the financing process and risk.

The Hong Kong, China Port community MSME trade finance solution starts with trusted trade data enablement. Import and export trade data have been integrated into the eCOM Registry™ from over 3,100 organizations which have shared over 320,000 documents. These trusted trade documents can be shared with banks to facilitate MSME trade finance. The solution is targeting the Hong Kong, China Port community's US\$ 40 billion MSME trade finance gap.



7.4.6 | edoxOnline



edoxOnline is a post trade execution platform for the digitization of international trade documents that links and interconnects all the different parties of the international trade transaction to streamline the documents issuance process, mitigating errors and speeding up drafting and final documents issuance.

Its ecosystem includes worldwide exporters, importers and trading companies from multinational companies and MSMEs, chambers of commerce, official authorities, vessel owners, carriers, maritime agents, customs agents, forwarders, supervision and fumigation companies, and different types of vendors. The company is currently working on connectivity with the international trade finance field (banks and capital funds).

Based on the Ethereum network, the permissionless platform issues and handles electronic bills of lading (eBLs) and other documents as needed, such as origin certificates (eOC), adding an extra layer of security and enabling real-time collaboration.

The platform has already interfaced with different systems, including official authorities in Argentina, Brazil, and the United States, and is currently open to be interconnected as needed.

edoxOnline generates revenue from subscription fees charged for the use of its SaaS platform.

7.4.7 | Enigio



The Enigio product, 'trace:original', is a transferable digital original document. trace:original uses DLT technology as one of several components, where the DLT serves as a notary service for issued documents. This allows Enigio to provide verification of original documents without storing any business or personal data.

Enigio is not a consortium but rather helps customers create freely transferable and negotiable digital original documents. To date, its major participant is the ITFA Fintech Committee, which includes Crown Agents Bank, London Forfaiting, Lloyds Bank, Sumitomo Mitsui Banking Corporation, Finastra, China Systems, Sullivan & Worcester, and Trade Advisory Network.

Having developed the proprietary technology in-house, Enigio's trace:original remains profitable by charging a monthly subscription fee for users. Once digital original documents have been issued, the documents are freely transferable to and between anyone without fees or agreements.

7.4.8 | Galileo [Bolero]

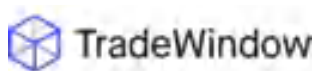


Bolero is a non-DLT messaging-based platform which allows for secure communication between various trade parties like shipping carriers, corporate clients, and banks. Every party on the Bolero network can send and receive trade transactions using the Bolero messaging protocols. The company has also been fundamental in spearheading the development and striving for the adoption of eBLs. 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 and has been working consistently with it. Bolero's technology is blockchain-agnostic and their aim is to interoperate between different DLT platforms as well as non-DLT 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 Contour (then known as 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.

7.4.9 | TradeWindow



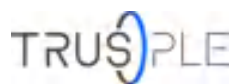
Established in December 2018, TradeWindow is the developer of Cube, a digital platform for trade administration that provides a 'single source of truth' from which exporters, importers and freight forwarders can share supply chain data and shipping documentation with permissioned partners. Cube's capabilities cover export documentation, compliance, risk management, track-and-trace, and trade finance. Underpinned by DLT, Cube provides an immutable audit trail which enables high-trust B2B and business-to-government data exchange.

Operating in the Asia-Pacific region, the current business model generates revenue through a combination of monthly subscription and transactional fees. TradeWindow has amassed 770 customers, including many of Australasia's leading brands in the primary and manufacturing sectors.

With a view to facilitating end-to-end digital trade, Cube is built on API architecture, enabling interoperability with regional and sector-specific applications and platforms starting with the Pan-Asian E-commerce Alliance (PAA), SWIFT and CGI. Positioned as a neutral platform, TradeWindow has attracted an ecosystem of supply chain participants including ASB Bank, Commonwealth Bank of Australia, Western Union, Mastercard, Swire Shipping, Trade-Van (Chinese Taipei), Ports of Auckland, and TradeTrust (IMDA).

TradeWindow's new product releases include a trade finance market place and an eBL. TradeWindow's eBL solution records a tokenized physical BL document and generates a digital twin which can be issued, transferred and submitted.

7.4.10| Trusple



Trusple is an international trade and financial service platform powered by AntChain, Ant Group's blockchain-based technology solutions, designed to build trust and support MSMEs in cross-border trade. Based on the concept of "Trust made simple," Trusple works by generating a smart contract once a buyer and seller create a purchase order on the platform. The order and related shipping and payment terms are also written into the contract. Payments are automatically triggered and processed when all necessary, relevant, and procedural conditions are met. This automated process digitalizes the traditionally manual and paper-based international trade value chain, and at the same time, ensures that the information is tamper-proof.

Further, successful transactions on Trusple's permissioned network enable MSMEs to build their creditworthiness on AntChain, making it easier for them to obtain financing services from financial institutions.

Launched at the end of September, 2020 by Ant Group and built on their proprietary DLT AntChain, Trusple has partnered with various leading international financial institutions. The first group of partners is BNP Paribas, Citibank, DBS Bank, Deutsche Bank, and Standard Chartered Bank.

7.4.11| VAKT



VAKT, powered by Quorum, is a post-trade platform designed for the commodity industry currently active in oil markets. As a post-trade platform, VAKT allows the various parties – traders, terminals, inspection companies, brokers, port agents and trade finance banks – to exchange data and documents securely and seamlessly, directly from and to their internal systems. The VAKT platform manages physical transactions covering deal recaps, trade confirmations, logistics around delivery, settlements and invoicing, eliminating reconciliation and paper-based processes. Built using blockchain technology, it provides a single source of truth for buyers, sellers and ecosystem participants that is safeguarded with an immutable, distributed audit trail.

The formation of VAKT in December 2017 constitutes a collaboration between market participants: BP, Equinor, Gunvor, Koch Supply & Trading, Mercuria and Shell; and three banks: ABN Amro, ING and Société Générale. Over the course of 2018 and 2019, VAKT welcomed Chevron, Reliance Industries, Total and Saudi Aramco Energy Ventures as shareholders with the same vision of solving industry-wide problems in post-trade processing for commodities.

7.4.12| Wave BL



Wave is a secure all-in-one communication protocol designed to meet the special needs of the B2B community. The B2B distributed ledger application provides users with the ability to issue, exchange, and digitally sign documents, including eBLs, in an encrypted, direct, peer-to-peer transmission. The Wave blockchain ledger allows the chain of possession and chain of title associated with these documents to be managed without the need for a central registry, and without the service provider becoming a principal to any of the transactions conducted by the users.

Since it was founded in 2015, Wave has completed the world's first live document exchange pilot using the application in 2016 together with Barclays Bank, Ornuu, and more. Since then, Wave has managed to complete the first document exchange 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 has been rolled out with Zim shipping Line and has completed further pilots with 67 banks, five carriers, and hundreds of corporations. Wave's current revenue model varies between subscription fees and pay-as-you-go services.

7.5 SHIPPING AND LOGISTICS / SUPPLY CHAIN



7.5.1 | Aero Blockchain Alliance - SITA



SITA's Aero Blockchain Alliance aims to develop the adoption of DLT on identified key business pain-points in the air travel industry. Currently, they aggregate each electronic data interchange event and transaction all the way from shippers through freight forwarders, airlines, and ground handlers, to the consignees at destination. They also enhance current cargo messages with Internet of Things (IoT) sensors for advanced tracking of shipment and unit load devices. They provide full visibility to all stakeholders and reach consensus of records. Important transport documents such as the airway bill are also digitized through the platform. In a second phase, SITA intends to automate a series of key processes like invoicing and settlement.

The permissioned platform, which was built by SkyRepublic, will generate revenue through a one-off fee per project.

7.5.2 | Calista



CALISTA is a global supply chain orchestration platform that enables the orchestration of logistics, compliance, and finance activities across the ecosystem. The solution provides document verification, track-and-trace, and US automated export services, among others.

The globally ambitious service generates revenue through a series of fee models, including subscription fees, node partner fees, license fees, and transaction fees. At present, the following entities participate in the platform: Astana International Financial Centre (AIFC), Trade-Van, China-ASEAN Information Harbor Co., Ltd (CAIH), Commodities Intelligence Centre Pte Ltd (CIC), PT Electronic Data Interchange Indonesia (EDII), Suzhou Industrial Park (SIP), Thai International Freight Forwarders Association (TIFFA), Hydroresource LLC and Ministry of Trade and Industry.

7.5.3 | China-Europe E-Single

The "China-Europe E-Single Link" (中欧 e 单 通) platform was officially launched on 23 October 2019. Its purpose is to integrate several administrative services in order to constitute a "single window" for companies carrying out international trade activities. This should also make it possible to facilitate intermodality and the traceability of logistics activities, thus enabling MSMEs, in particular, to monitor their logistics supply chains. It is presented as part of the "New Silk Roads" initiative.

The main partners of the platform are the operator of the international (land) port of Chengdu and the provincial (Sichuan) branch of ICBC bank. According to the deputy director of the free trade office of Sichuan province, the activities of the Chengdu office of China Railway Group have been integrated into this platform and this would have made it possible to respond to the logistical constraints that paralyzed Chinese supply chains during the COVID-19 pandemic.

The platform should be operational, but little information has been published online since its official creation. For now, this would primarily be a way for ICBC to support its international clients and consolidate their data in terms of finance and supply chain. No foreign company seems to participate in this platform.

7.5.4 | DELIVER



DELIVER is a neutral, open platform with a decentralized architecture that seeks to optimize the physical, financial and related information flows within international trade. The platform supports a number of functions across networks, including asset registration, notarization, ownership, and verification. In this sense, an asset can be a document, event, geolocation, or anything else required in a trade transaction that needs any level of trust. 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.

The platform has global ambitions but is initially focusing on the trade lanes between the Republic of Korea, the Netherlands and Singapore. To this end, it has attracted ABN AMRO Bank NV, Port of Rotterdam Authority, and

Samsung SDS as shareholders as well as a collection of importers, exporters, shippers, buyers, and providers of supply chain solutions as participants.

Operating as a permissioned network, DELIVER's revenue-generation model is focused around subscription and transaction fees. Furthermore, while DELIVER does not explicitly provide KYC and AML solutions, all of the required documentation can be published in the registry meaning that it could be used for these processes.

We understand that the DELIVER project is currently undergoing a strategic review.

7.5.5 | DP World [Avanza Innovations]



DP World, a multinational logistics company based in Dubai, is working with a group of public and private entities in the United Arab Emirates. Their permissioned blockchain platform aims to build a universal platform to enable global trade. DP World will work with importers, freight forwarders and financial institutions, expanding to port communities to promote adoption.

DP World's goals are twofold. First, collaborating with UAE entities for the two selected use cases: 1) new free-zone customer registrations – enabling the registration, licences and memberships of new traders to be held on a single platform; and 2) digitizing exit/entry certificates required at ports of exit/entry into the country, export authorizations to load cargo into ships, and certificates of origin. Second, DP World aims to create a permissioned blockchain for beneficiary cargo owners and their trade-logistics business partners to promote data-sharing and process integration. The goals were to improve trust among trade logistics community members, reduce logistics lead time by eliminating waste in requesting and validating data, and enable smart trade through digitization and data-driven decision-making.

7.5.6 | Global Shipping Business Network [Cargo Smart]

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. 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 diverts the transaction data to the appropriate parties based on the pre-defined data governance rules.

Currently the GSBN is being pilot-tested as a goods shipping documentation solution by its nine founding members. These members are: CMA CGM, Cosco Shipping Lines Co., Ltd., Cosco Shipping Ports Limited, Shanghai International Port (Group) Co. Ltd, Hapag-Lloyd AG, Hutchinson Ports Development Ltd, Orient Overseas Container Line Ltd, PSA i-Tech Pte. Ltd, and Qingdao Port International Co. Ltd.

As the GSBN Joint Venture formation is currently undergoing legal and regulatory approval, they are unable to disclose further information such as their revenue model or plans for future product deployments.

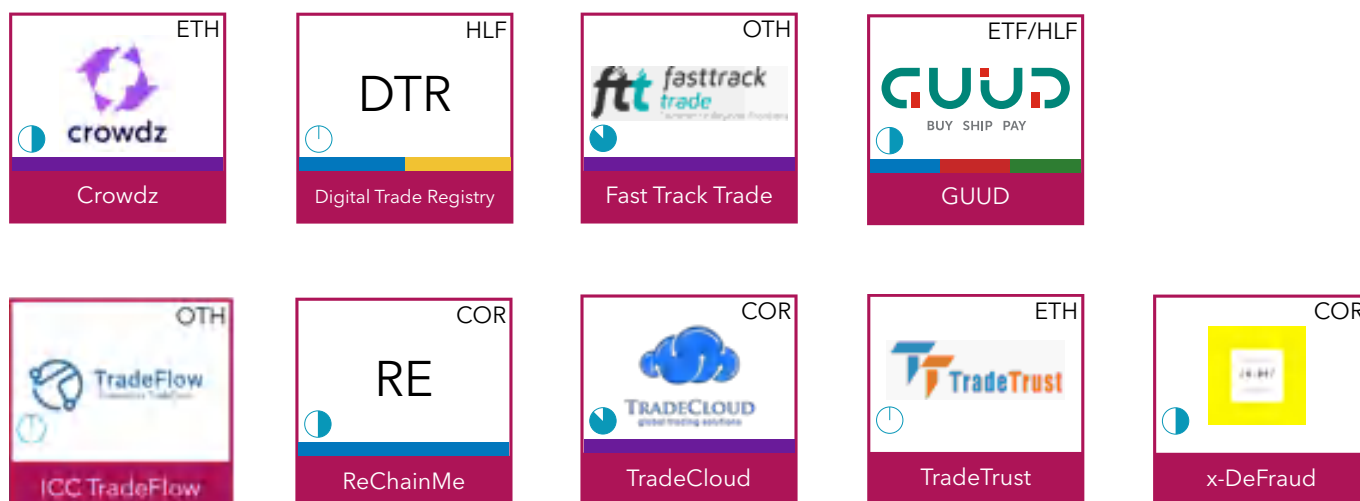
TradeLens, a collaboration between IBM and Maersk, is a trade platform for the supply chain, connecting the entire supply chain ecosystem. The platform is designed to facilitate the sharing of end-to-end supply chain shipping information and documentation across the large number of diverse and interdependent 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 develops applications that leverage the TradeLens platform. These are sold as SaaS offerings to an ecosystem of over 200 members. 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. The two products on the market today are Tradelens Core and TradeLens eBL. TradeLens will work to support third-party applications as well, participating in a value-sharing arrangement.

TradeLens uses blockchain technology for several reasons. First, it is a way of managing identity in an immutable way. Entities that are onboarded to the platform have their identities added to the blockchain, meaning that parties know with whom they're dealing. Second, it is used to make documents and other commercially sensitive information immutable. TradeLens does this by putting a 'hash' of the original document (stored on the Cloud) on the blockchain. Third, TradeLens uses blockchain for business workflows using smart contracts. This is to allow for business process automation, and increased trust in those processes. Finally, blockchain underpins the eBL offering, ensuring that proper and immutable recording of title possession is maintained, and that a full audit trail of the issuance, transfers, and surrender is available to permissioned parties.



7.6 OTHER INITIATIVES (INCLUDING MARKETPLACES)



7.6.1 | CrowdZ



Crowdz is a FinTech company working to simplify B2B payments with a platform that makes sending, paying, and selling invoices much easier for MSMEs. They accomplish this by utilizing Ethereum-based smart contracts to record invoices and supporting documents on the blockchain. By also integrating with smaller accounting platforms, this helps small businesses to manage their cash flows in a secure and immutable manner.

The platform, based in Europe, North America and the United Kingdom, will generate revenue through subscription fees and finance fees. While not currently live, the platform has already garnered participation from companies like Terraneo International, Rebel Travel, Nursh Dash, Clive Coffee, and Trafalgar Marquee.

7.6.2 | The Digital Trade Registry

The Digital Trade Registry is an initiative led by Singaporean banks which are addressing issues around duplicate financing frauds, supported by government bodies including Enterprise Singapore, Monetary Authority of Singapore and The Association of Banks Singapore. The working group is led by Standard Chartered Bank and DBS Bank, and involves ABN Amro Bank, Lloyds Bank, ANZ Bank, ICICI Bank, OCBC Bank, Natixis Bank, UOB Bank, Deutsche Bank, CIMB, and Rabobank.

The Digital Trade Registry, which runs on the dltledgers blockchain platform (see Section 7.4.4), will enable each bank to validate whether or not another financial institution has already submitted a particular title instrument for financing purposes, without violating client confidentiality and compliance rules, while still reducing the risk to the finance provider.

It is based on a governance rule book established by the bank-led working group, and allows for real-time matching of title documents including BLs, letters of indemnity, and charter party bills of lading. The system

works by comparing encrypted data points across multiple blockchain nodes using a query-based, runtime search algorithm. In other words, data can be matched across each bank's ledger, without ever leaving their location. Whenever there is a match, the relevant parties will be alerted. Developed on Hyperledger Fabric and hosted in Microsoft's cloud service, Azure, the platform can detect fraud in parallel financing, sequential financing, and a number of related scenarios.

7.6.3 | Fast Track Trade



Fast Track Trade is a mobile first web service providing a one stop marketplace for MSMEs to fully digitize their local and international commerce.

The platform first automates simple, seamless and secure workflows to identify, order/invoice, pay and request financing on line. Fast Track Trade also secures transactions with the DLT network developed and maintained by Chainzy, a UK-based company.

To date, Fast Track Trade has increased its B2B service offering with 10 regulated trade financiers covering seven countries in Asia and three in Africa, and the participation of key digital players in international payments, logistics, telecom, legal, human resources and B2B services.

The permissioned platform will operate primarily in Asia and Africa.

7.6.4 | GUUD



GUUD is a technology platform which aims to simplify the inherent complexities in the global trade processes and to reimagine them in order to drive greater efficiency and inclusivity in the digital world. Its launch in late September 2020 was supported by a series of local partners and government agencies including Enterprise Singapore, Infocomm and the Media Development Authority (IMDA), Singapore Customs (NTP Office), and Singapore Cooperation Enterprise (SCE). GUUD is managed by vCargo Cloud Pte Ltd.

Following the UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT) buy-ship-pay model, the GUUD platform aims to empower MSMEs to become players in global trade by connecting them to customs departments for import or export permits processing, shipping and logistics providers for arranging transportation of goods, and financial institutions like banks for trade finance.

Steered by the UN's Sustainable Development Goals, the permissioned platform, underpinned by Ethereum and Hyperledger Fabric, is determined to deliver on its vision of "trading for good". To finance this vision and generate revenue, it will make use of license and transaction fees.

7.6.5 | ICC Tradeflow



ICC Tradeflow is a blockchain solution designed to allow enterprises to move away from cumbersome and inefficient manual systems and towards a powerful new interoperable digital framework. The project is a collaborative effort between the ICC, blockchain provider Perlin, DBS Bank, Trafigura, Infocomm Media Development Authority (IMDA), and Enterprise Singapore.

The platform will work by allowing businesses to visually map out trade flows, issue instructions to partners, and analyse trade actions in real time. On the platform, businesses can upload, verify, and modify trade documents, as well as act upon instructions from trading partners. Other components of the platform include a trade clock to keep progress of a particular transaction, as well as anti-fraud protections for shipping and documentation.

7.6.6 | 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 the supply chain, resulting in greater transparency, speed and accountability. The aim of the project is to create a single truth and trusted view across all members to optimize the supply chain process. The platform generates revenue through subscription and transaction fees.

In June 2019, Landmark Group and HSBC completed a first-of-its-kind transaction that connected ReChainME and Voltron (now Contour), 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, China 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.

7.6.7 | TradeCloud



TradeCloud is a web-based portal, underpinned by R3 Corda's DLT infrastructure, where producers, consumers and traders can meet to exchange information, negotiate contracts and conclude business. By building a community and connecting the industry, TradeCloud aspires to reduce costs and improve margins for the commodity industry. The permissioned platform charges subscription fees to buyers and sellers while leaving all other services free of charge to other stakeholders.

Through its vision for a commodities-web, TradeCloud provides users with the ability to generate proposals and contracts automatically, monitor replies to bids, securely share documents with external parties, and search for deals in the market.

7.6.8 | TradeTrust



TradeTrust describes itself as a digital utility comprising a set of globally-accepted standards and frameworks that connect governments and businesses to a public blockchain to enable trusted interoperability and exchanges of electronic trade documents across digital platforms. It provides open-source software to enable the digital verification of documents. Currently it makes use of a Model Law on Electronic Transferable Records (MLETR)-compliant¹¹ title transfer, document authentication, document provenance, and selective disclosure, with plans to soon unveil an identity resolution service.

The international framework built on the public Ethereum network is in various stages of adoption by entities such as Trafigura, DBS, Standard Chartered Bank, United Overseas Bank, PSA International, BlockLab, Port of Rotterdam, DLTledgers, Hashkey Group, JEDTrade, Trade Window, Tramés, Veritag, and Pacific International Line.

7.6.9 | x-DeFraud



x-Defraud, by Kratos Innovation Labs, is a permissioned blockchain based platform built on the Corda blockchain framework designed to help mitigate the ever-present risk of fraud in the trade finance industry. It accomplishes this aim by storing all the supporting documents in a trading cycle on a distributed ledger system, using predefined algorithms all flowing into the system are cross-checked to flag any attempts at duplicate financing or other fraudulent activities.

While currently in the minimum viable product stage, the geographically unrestricted platform aims to use DLT extensively for food supply chain management and trade finance. It is intended that it will generate revenue through a pay-per-access model, where users pay a marginal fee to look up invoices on the network.

¹¹The UNCITRAL MLETR is a uniform model law that aims to enable the legal use of electronic transferable records both domestically and across borders.





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