

White Paper

# Trade Tech – A New Age for Trade and Supply Chain Finance

In collaboration with Bain & Company

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# Foreword

At the World Economic Forum Annual Meeting 2017 in Davos-Klosters, Switzerland, the Governors of the Supply Chain and Transportation community, and the Stewardship Board of the System Initiative on Shaping the Future of International Trade and Investment, suggested the Forum conduct research to better understand the impact of the Fourth Industrial Revolution on trade flows and supply chains. In particular, the research would identify how Fourth Industrial Revolution technologies can help facilitate trade in the future, when the world risks becoming even more fractured than it has been in the past.

International trade and global value chains have been critical for both the wealth of nations and the reduction of geopolitical tensions. The distribution of production around the world has fuelled globalization while gradually reducing the gap between developed and developing countries. International trade has made the world economically more balanced and inclusive. Yet, still more remains to be done, and the poorest nations continue to capture a very limited share of global trade. Participating in international markets and value chains requires reducing trade barriers and establishing seamless processes at the core of an effective and efficient cross-border ecosystem. Improving border processes and systems has become even more important because trade growth is slower compared to historical highs, thus limiting its potential contribution to jobs, opportunity and economic growth. Experiments have shown that the current situation at many borders could be vastly improved.

With the rise of technologies, such as the internet of things (IoT), blockchain and artificial intelligence, the means to facilitate international trade are growing, too. Digitalization and advanced technologies have the potential to significantly reduce processing times and the cost of cross-border movements of goods. Transforming paper-based documentation into electronic formats and applying smart tools and technologies help to reduce trade barriers, particularly for small businesses and companies in higher-risk developing countries. The single window has demonstrated the dramatic improvements that can be achieved through digitization. However, the real potential lies in the combination and interplay of various technologies: advanced analytics for better decision-making, the IoT for better supply chain visibility, and artificial intelligence for mitigating money-laundering and other risks.

Trade finance and supply chain finance are important enablers of international trade. However, financial instruments, such as letters of credit and guarantees, are particularly unattractive for small-ticket transactions because of the relatively high operational costs. Distributed ledger and other technological innovations promise groundbreaking advances in trade and supply chain finance by reducing costs and ease of use. Established vendors offer many off-the-shelf, innovative trade finance solutions: likewise, supply chain finance solutions from vendors are used by banks. In financing, third-party technology platforms and crowdfunding platforms have also recently emerged.

This White Paper – a joint initiative of the Supply Chain and Transportation industries and the System Initiative on Shaping the Future of International Trade and Investment – provides a first look at the narrow topic of trade and supply chain finance, as well as a snapshot of the status of technological developments, as the starting point for deeper and broader studies.

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# Background

Global economic growth hinges on efficient cross-border trade (Figure 1) and well-functioning supply chains. Trade allows countries to specialize in industries; it helps technologies and ideas to spread, and yields economies of scale. But a major impediment stands in the way of expanding trade and making it more efficient and safe: namely, paper-intensive, manual processes.

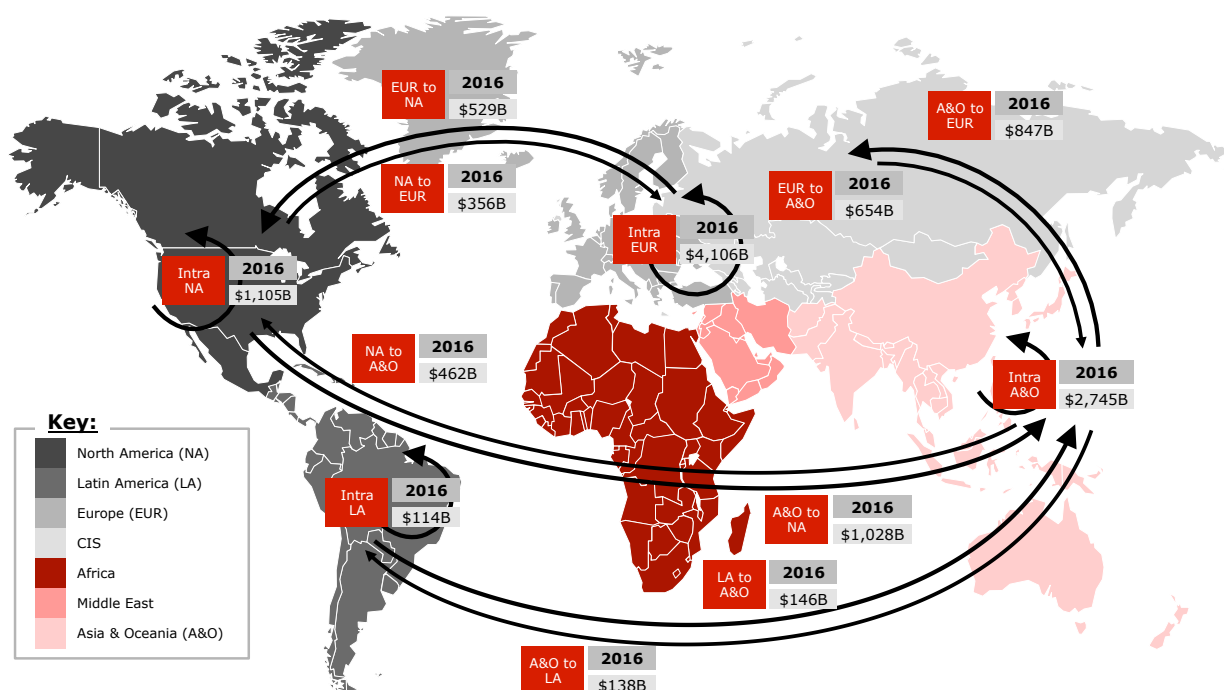
The digitalization of trade processes offers potentially huge benefits to support the massive flow of goods worldwide. For example, the United Nations Economic and Social Commission for Asia and the Pacific adopted the Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific in 2016 to advance regional coherence. The agreement is designed to encourage adoption of digital tools that will facilitate trade. Some estimates suggest full implementation could boost Asia-Pacific exports by as much as \$257 billion annually, while the time required to export could fall by 44%, according to the United Nations Economic Commission for Europe (UNECE).

What do traditional trade and supply chain processes look like in practice? IBM and Maersk recently ran a test shipment of flowers from Kenya to the port of Rotterdam,

The Netherlands, which resulted in a stack of nearly 200 communications documents – a big pile of paper accumulated along the way. The costs associated with such processing and administration of trade documents are estimated to be up to one-fifth of the physical transportation costs. Clearly, digitalizing the supply chain workflow would not only increase transaction efficiency. In addition, governments are seeking greater visibility into trade and supply chain documentation to counter smuggling and drug trafficking, for example. All these issues are converging to motivate digitalization of the supply chain, a process that has been slow to date.

Indeed, and as part of the World Economic Forum's work on enabling trade, Bain & Company estimated several years ago that if countries could reduce just two supply chain barriers – border administration and telecom/transport infrastructure – to half of global best-practice levels, global gross domestic product (GDP) could rise by nearly 5%, while trade could improve by almost 15%. By comparison, eliminating all import tariffs could increase global GDP just 0.7%, while boosting trade by 10%. The estimate still holds true today.

**Figure 1:** Global trade flows are large and increasing



Source: WTO world region export analysis, October 2017; Bain & Company analysis

In fact, the tide may have turned. Individual firms and governments are starting to digitalize and automate their trade and supply chain processes by deploying relatively new technologies. This includes distributed ledger technology, often referred to as blockchain, which is associated with the protocol for the digital currency bitcoin. Intergovernmental organizations, such as the United Nations and the World Trade Organization, have also been encouraging investment in new technologies to help promote economic development.

Many countries are developing single windows that serve as one simple point of entry for submitting regulatory documents and other supporting evidence when merchandise is imported or exported. Single window is an electronic process, usually through a web-based interface, in which trade and transport companies can provide standardized information and documents. Without such an option, companies must separately submit information and documentation to participating agencies, which typically operate different systems and procedures. Moreover, some countries still maintain manual systems. In Senegal, for instance, the electronic single window reduced border preclearance and clearance processing time by 90%, from an average of two weeks to just one day, according to *Paperless Trading: How Does It Impact the Trade System?*, a White Paper by the World Economic Forum and the UNECE. The cost of border processes has decreased by 60%, while the streamlined system has allowed the border agencies to reassign staff to other priority areas.

Along the argument for efficiency – that is, the reduction of waste, fraud, delays and transportation costs, among others – would carry the day. Individual banks, for example, have each lost hundreds of millions of dollars in recent years because of metals trading scams that rely on fake paper warehouse receipts. But technology can address other concerns as well. The value of provenance is increasing for many industries. Food companies must ensure the origin of organic crops, more mining companies want to confirm fair-trade practices for their entire supply chain, and many retailers seek to track fair-trade and sustainable practices for the goods they sell. Three large banks have teamed up with supermarket chain Sainsbury's and consumer goods group Unilever to launch a distributed ledger system that rewards Malawian tea farmers who use sustainable methods with cheaper finance. The system collects data from the farmers based on social and environmental questions ranging from water usage to compliance with anti-slavery laws. This data will help Sainsbury's and Unilever to achieve their objective of ensuring their supply chain is socially and environmentally sustainable.

# Financing: Suffering under the paper monster

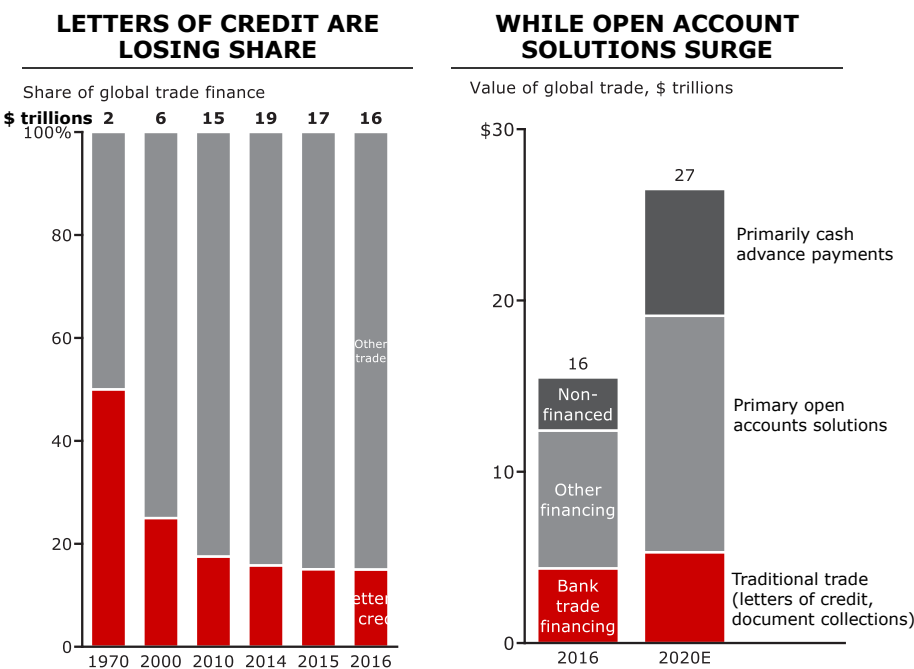
As one area of trade and supply chains, financing would reap huge benefits from emerging technologies. Globally, demand is strong for supply chain finance. Bain & Company estimates that demand is expanding by 5-15% a year in the Americas and Western Europe, and 10-25% in Asia, with food and retailing among the most active industries. Yet much of that demand remains unmet or underserved. The Asian Development Bank estimated a global trade finance gap of \$1.5 trillion in 2016, with most of the underserved businesses being in East Asia and the Pacific. The gap stems largely from hugely underserved small and medium-sized enterprises (SMEs), combined with the still massive volume of paper required for communication among customs brokers, freight forwarders, transportation carriers and myriad government agencies. Paper-based, manual processes, some created centuries ago, lead to complexity and delays, introduce errors and risks, and stand in the way of reliable, real-time information gathering and tracking required for credible financing decisions.

## Supply chain finance and trade finance defined

**Supply chain finance** allows businesses to lengthen their payment terms to their suppliers. Not a loan, it is rather an extension of the buyer's accounts payable. For suppliers, it represents a sale of their receivables. The buyer optimizes working capital, and the supplier generates additional operating cash flow.

**Trade finance** consists of products, such as letters of credit, to reduce transaction risk and finance working capital requirements. Simply put, an exporter requires an importer to prepay the shipped goods. The importer reduces risk by asking the exporter to document that the goods have been shipped. The importer's bank assists by issuing a letter of credit to the exporter (or to the exporter's bank), providing payment upon presentation of documents. Increasingly, though, trade occurs through open account transactions, where the goods are shipped and delivered before payment is due. That increases risk for the exporter, who now needs more financing of working capital.

Figure 2: Trade finance has been moving to open account solutions



Source: World Bank; ICC Global Survey Rethinking Trade and Finance (annual reports 2010-2015); MISYS Financing Future Supply Chains

Banks have tried for decades to reduce inefficiencies by transforming trade and supply chain finance. The typical cost-to-income ratio in traditional trade finance is 50-60%, meaning that more than half of the price charged to clients for trade finance needs to cover operational expenses even before covering the costs of risk, liquidity and capital. Letters of credit and guarantees are particularly unattractive for small-ticket transactions and SMEs because of the relatively high operational costs.

The cost factor, along with rising trust between buyers and suppliers in established supply chains and e-commerce channels, has prompted a number of companies to shift from traditional trade to trade facilitation and working capital finance solutions through open account trading (Figure 2). In open account transactions, goods are shipped and delivered before payment is due, usually in 30 to 90 days. However, many companies still require traditional trade solutions, particularly small businesses and companies in higher-risk developing countries.

Structural inefficiencies in supply chains, which are fragmented in nature, and the continued heavy reliance on paper have prevented a broad transformation. Many corporate participants have been unwilling to invest in integrating with freight forwarders, government bodies and document preparers, and many banks have been reluctant to invest as long as corporate adoption remains low. So, although trade is getting more efficient for large multinationals and companies in developed countries, small companies in poorer countries are paying a high price.

# Distributed ledger technology: Breaking the logjam

Traditional trade and supply chain flows involve many types of loosely connected participants, which makes reconciling and verifying information painful. Distributed ledgers, by contrast, operate as secure, shared databases, where each participant has a copy of the stored data. When a transfer of funds or information about a shipment is recorded, it is validated, made transparent and available to all participants collectively, and updated across the network almost immediately. Only certified parties can initiate transactions by using encrypted digital signatures (Figure 3), which underpin “smart contracts”, a digital protocol that verifies and enforces a contract without third parties. The system’s design itself guarantees one shared version of the truth; moreover, it is faster, cheaper and safer than manual systems.

Thus, distributed ledger technology is well suited to eliminating some inefficiencies in trade and supply chains through the following features:

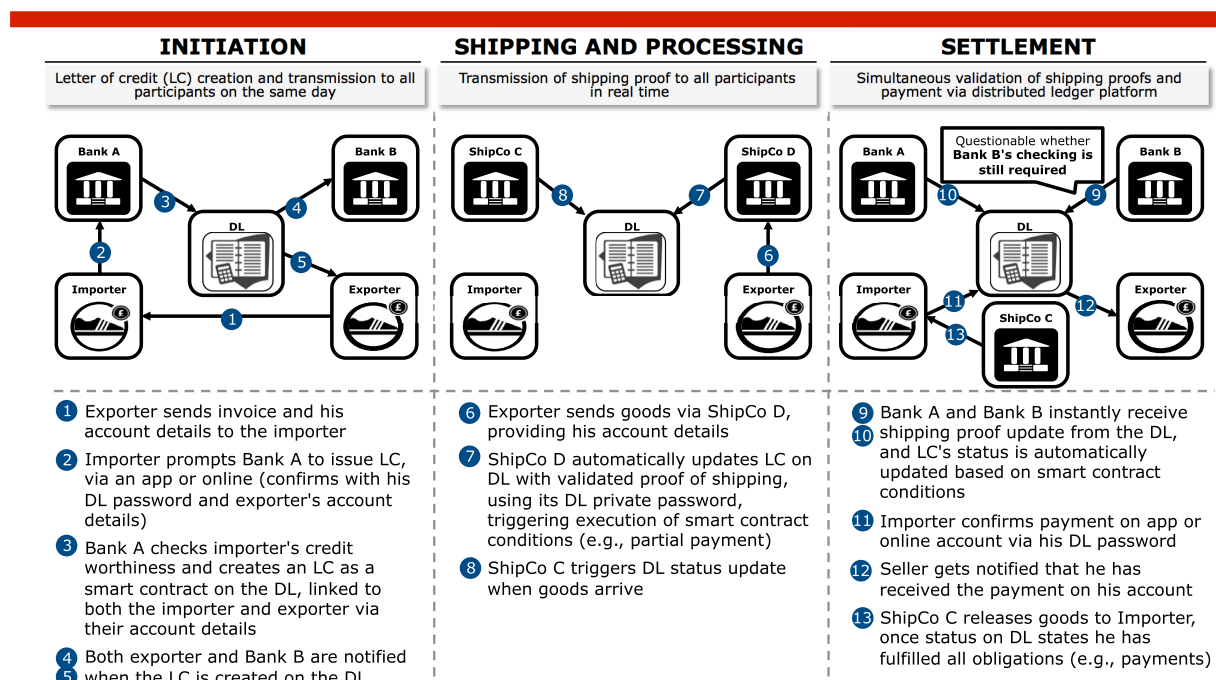
- Faster credit risk assessment from the transaction history
- Minimized human error in document checks
- Instant verification and reconciliation of records
- Automatic execution of workflow steps through smart contracts

- Instant, secure and low-cost exchange of data

Distributed ledger technology may not be necessary or the best choice in certain situations. Some digital platforms already work well with a central ledger and central authority; these include Tradeshift, a cloud-based network connecting buyers and suppliers. Increasingly, though, the technology is proving its potential as a reliable means of unleashing faster, more efficient and less costly trade. Banco Bilbao Vizcaya Argentaria (BBVA) has applied a distributed ledger system to reduce the time for submitting, verifying and authorizing an international trade transaction from over a week to just 2.5 hours. The pilot was run on a transaction in which Spain-based FRIME bought 25 tons of frozen tuna from Pinsa Congelados of Mexico; payment was made using a letter of credit issued by BBVA in Spain and processed by Bancomer in Mexico.

If trade transactions shorten from a week to a couple of hours, resulting in a sharp drop in lead times, then the effects on inventory costs, indirect labour and transportation costs are easily imagined. Bain & Company estimates that distributed ledger technology, if adopted the right way by all participants in the trade ecosystem, could reduce trade finance operating costs by 50-70% and improve turnaround

**Figure 3:** Distributed ledger-based letters of credit could yield cost savings and lead to real-time document checking



Note: Account details refer to Distributed Ledger user's public key and password refers to DL user's private key  
Source: Bain & Company



times three- to fourfold, depending on the trade finance product involved. (Wait times for documents, for example, can be reduced far more than wait times for approval of a credit increase.)

Distributed ledgers will help to truly revolutionize trade when applied in conjunction with other technologies. These include advanced analytics to enhance decision-making, the internet of things (IoT) to improve the flow of goods, artificial intelligence (AI) to strengthen anti-money-laundering and other risk management controls, and virtual assistants (software agents that perform tasks for an individual or business) to automate client service. Abundant off-the-shelf, technology-driven trade finance solutions exist from established vendors, such as BankTrade, Finastra and Surecomp. Likewise, banks are using supply chain finance solutions offered by vendors, including Intellect and Premium Technologies. Third-party technology platforms, such as PrimeRevenue, GT Nexus and Tungsten, as well as crowdfunding platforms, have also emerged to facilitate supply chain finance (Figure 4).

These technologies can amplify the benefits of distributed ledger technology in several ways:

- **Tokenization** – The replacement of sensitive data with a non-sensitive equivalent symbol to ensure security enables the creation of a digital identity for goods in transactions, such as labelling goods for supply chain transparency and traceability.

- **Smart contracts** – These verify and execute contracts automatically, which synchronizes delivery and payment of goods or services.
- **IoT devices** – Communications between a network of these devices can be built on distributed ledger technology to reduce the need for central control and the risk of data tampering.
- **AI tools** – Distributed ledgers' ability to maintain privacy and integrity of data promotes data exchange, which will help encourage development of AI tools that could, for instance, predict a company's working capital requirements.
- **Application programming interfaces (APIs)** – By governing how one application can communicate and interact with another, these sets of requirements allow communication between applications and distributed ledgers.

A recent application combining several technologies was used by the Australian cotton trader Brighann Cotton Marketing for a shipment of 88 bales of cotton from Texas (USA) to the Chinese port of Qingdao. The shipment represents the first time two separate banks – in this case, the Commonwealth Bank of Australia and Wells Fargo – have used a combination of distributed ledger, smart contracts and the IoT to facilitate a trade transaction. IoT sensors allowed the banks to monitor the shipment's route, triggering the smart contract to release payment for the cotton once it crossed a predefined location.

Figure 4: New technologies enable the digitalization of trade

New technologies	Pre-transaction		Transaction processing			After transaction	
	Product selection	Data entry	Workflow management	Document check	Compliance check	Problem resolution	Client mgmt. information system
Optical character recognition (OCR)		Text recognition from trade documents to minimize data entry		Check for completeness of documents based on transaction/product type	Scrape documents for AML keyword hit		
Artificial intelligence (AI)	Intelligent and personalized marketing: Offer new product sales or client promotions based on insights on clients' needs and behaviors	Populate fields with text extracted from documents (integrate OCR with transaction process)		Validate/remediate data with cross-references, machine learning	Contextual filtering: Identify suspicious or unusual activity and block suspicious transactions based on predictive indicators	Intelligent problem resolution: Track individual error rates and flag users in need of remediation	
Advanced analytics (AA)		Enhanced KYC (e.g., web scrape)	Efficient process and productivity monitoring, and predictive analytics to detect patterns				Reports enable enhanced operational and strategic decisions
Robotic process automation (RPA)			Bridge data flow and communication: Integrate data from different systems into single interface				
Internet of things (IoT)			Ease of tracking goods and documents; dynamic pricing and financing triggered by shipment events; automated payments release based on "smart contracts"			Track document locations: Track goods (location, volume, quality)	
Distributed ledger technology (DLT)	Create smart letter of credit as smart contract on distributed ledger - auto notifications	Replace documentation, checks, data entry, validation, with single digital record	Real-time verification and reconciliation; workflow executed as per smart contract conditions; replace payment and funds transfer with cryptocurrency				

Note: Know Your Client (KYC)  
Source: Bain & Company

# Benefits for governments

Governments at all levels also drown in paperwork and should accelerate adoption of digital technologies for trade processes, which will help companies, especially small businesses, become more competitive exporters. Some governments are taking the lead in this regard. To reduce fraud and errors, the *de facto* central banks of Hong Kong and Singapore recently announced plans to link trade finance platforms they are developing with distributed ledger technology. Linking the two platforms is part of a broader plan between the Hong Kong Monetary Authority and the Monetary Authority of Singapore to collaborate on distributed ledger and other financial technology.

Besides digitizing their own documentation, governments will draw benefits from digitally linking regulators – in agricultural departments, central banks, port authorities and other agencies – so that, for instance, one digital signature works for all of them. Even within the European Union, countries and government departments have yet to harmonize their documents. They should include distributed ledger technology as part of any relevant, forward-looking regulatory considerations, such as cross-border food imports. With some governments already starting to make these moves, the laggards will become increasingly disadvantaged.

# The untapped value of underlying data

The potential for greater efficiencies and an improved customer experience afforded by distributed ledger and other technologies have prompted many large banks and corporate enterprises to launch proof-of-concept and test-case scenarios, with full commercial take-up expected in many cases within three to five years.

To be sure, this evolution will likely not unfold the way many banks envisioned it would a decade ago, when they were at the centre of supply chain finance. Currently, substantial value lies in the underlying data on trade and shipping flows, and corporations, third-party platforms and online marketplaces are developing data for their own purposes. By accumulating data on counterparties' history of payment or delivery, and on their reliability of paying and other characteristics, companies owning the data sharply reduce the risk (and thereby the cost) of extending finance to participants. Reliable, copious data lead to better decisions with lower risk for a much larger pool of customers. In return, companies will need to reassure customers that their data are secure at every point along the supply chain, and will not be misused.

# Different paths for different stakeholders

How are the early stages of distributed ledger and other new technologies playing out? The answer varies depending on the stakeholder:

**Banks** are exploring several options to replace paper with digital approaches, ranging from partnerships with platform providers and accounting firms to using APIs to ensure their customers are connected with other key providers. Most banks have made trade and supply chain finance a high priority for specific trade corridors or supply chains, with some joining consortiums such as Batavia, launched by UBS and IBM, or R3, which has attracted more than 100 financial entities. In Europe, seven of the continent's largest banks have formed we.trade, a consortium for building and operating a trade finance platform targeting SMEs and using IBM technology. Other banks have partnered with financial technology firms, as Barclays has done with Israeli start-up Wave.

**Large corporations** are digitalizing their extended supply chains and, in some cases, directly investing in their own technology platforms to provide financing to suppliers and others along the chain. For companies such as Carrefour, Cargill and Toyota, these moves are not intended to become business lines, but to improve the operation of existing supply chains by automating manual processes.

**Accounting, enterprise resource planning and other large information-technology (IT) infrastructure providers** are building the data platforms for supply chains to provide corporate customers with rich data that help to inform better financing decisions. Partnerships focused on supply chain financing have formed between banks and accounting software providers. Although the software firms have access to the data, they are less likely to offer direct financing because it is not their primary business, and because they lack the expertise or balance sheet appetite.

**Specialized platform providers**, such as Tradeshift and PrimeRevenue, are building ways to connect the ecosystem, especially by connecting buyers and sellers for trade, and cross-selling financing on top of the connections. PrimeRevenue, for instance, manages invoices and connects more than 50 lenders to more than 20,000 clients, with more than \$100 billion in transactions in 2016.

**E-commerce marketplaces**, such as Alibaba and Amazon, already have fairly digitalized supply chains, and are using the rich data on small merchants to directly finance them. Amazon has a major lending operation to small merchants, who use the money to expand their inventory or discount items on Amazon.com. Transaction processing companies PayPal and Square offer similar credit options using data from their payments businesses, helping small merchants that could have trouble securing working capital and other loans from banks.

**Logistics, transport and freight forwarding companies** are investing in digitalizing their operations and partnering with distributed ledger infrastructure providers to experiment with test cases. One major Asian logistics firm, for example, accumulates data related to customers' finances, much of which is required by customs officials and insurance carriers. The firm is considering how to use that data in ways its customers would value.

**Governments** are pushing to digitally connect the trade ecosystem. Initiatives such as the Singapore National Trade Platform, Dubai Blockchain and Trade Receivables e-Discounting System in India aim to bring together the major stakeholders. Particularly in the Asia-Pacific region, governments see expanded trade and seamless supply chains as a way of attracting investment in manufacturing that will create jobs. They welcome technologies that will optimize customs procedures, reduce corruption in ports and other chokepoints, and funnel trade flows through a single digital platform.

So far, these efforts have proceeded in largely piecemeal fashion among individual companies, countries or groups of banks. Widespread adoption of distributed ledger technology hinges on overcoming three main challenges:

- **Costs** – Use cases will require justification based on costs and benefits. Participants will have different goals, yet some of them must bear an outsize share of the investment costs to build a wider ecosystem that produces benefits.
- **Technology** – As distributed ledger systems scale up, security and other risks associated with automating transactions and managing confidential information across distributed databases will arise. Some of these systems will be private or semi-private (within a specific supply chain or between individual banks), operated in a closed group of trusted parties. Others are being developed through smart contracts using traded utility coins, such as Ethereum. Solutions using publicly traded utility tokens must continue to improve their security and their energy efficiency in processing transactions.
- **Ecosystem** – Making trade and supply chains more efficient requires coordinated change across the ecosystem of buyers, sellers, shippers, governments and banks. All participants must adopt the new technologies to realize the full potential of benefits. Initially, technologies will develop irregularly, with certain supply chains or trading partners achieving early benefits, and certain country corridors moving faster than others. Over time, standards should harmonize somewhat, and different platforms and technologies should become more interoperable. Common regulation, industry-aligned common standards and a common platform are prerequisites for a network to acquire as many participants as possible.

# Mastering the change: No-regret action

The race is on for all participants involved in the physical and financial supply chain. Companies can make the following no-regret moves over the next couple of years to position themselves for long-term success:

- **Upgrade core legacy IT systems**, shifting to a modular, adaptable architecture that uses middleware and APIs
- **Invest selectively in new technologies**, such as AI and robotic process automation, to harness digitalization's near-term benefits
- **Define a distributed ledger and advanced technology roadmap**, and prioritize use cases for proof of concept, specific business models and cost-benefit cases
- **Explore strategic partnerships** with other ecosystem participants
- **Design a next-stage operating model**, including new governance and ways of working, which will allow the organization to better adapt to new technologies

By accelerating their efforts to digitalize and change processes accordingly, companies, financial institutions and public or quasi-public bodies raise their odds of benefiting from the traceability of goods and efficiencies in supply chains. Those that delay these moves could be caught out with undifferentiated propositions and inefficient supply chains – to the detriment of the highly interconnected global economy.

# Key Contributors

Special thanks are extended to the following authors:

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