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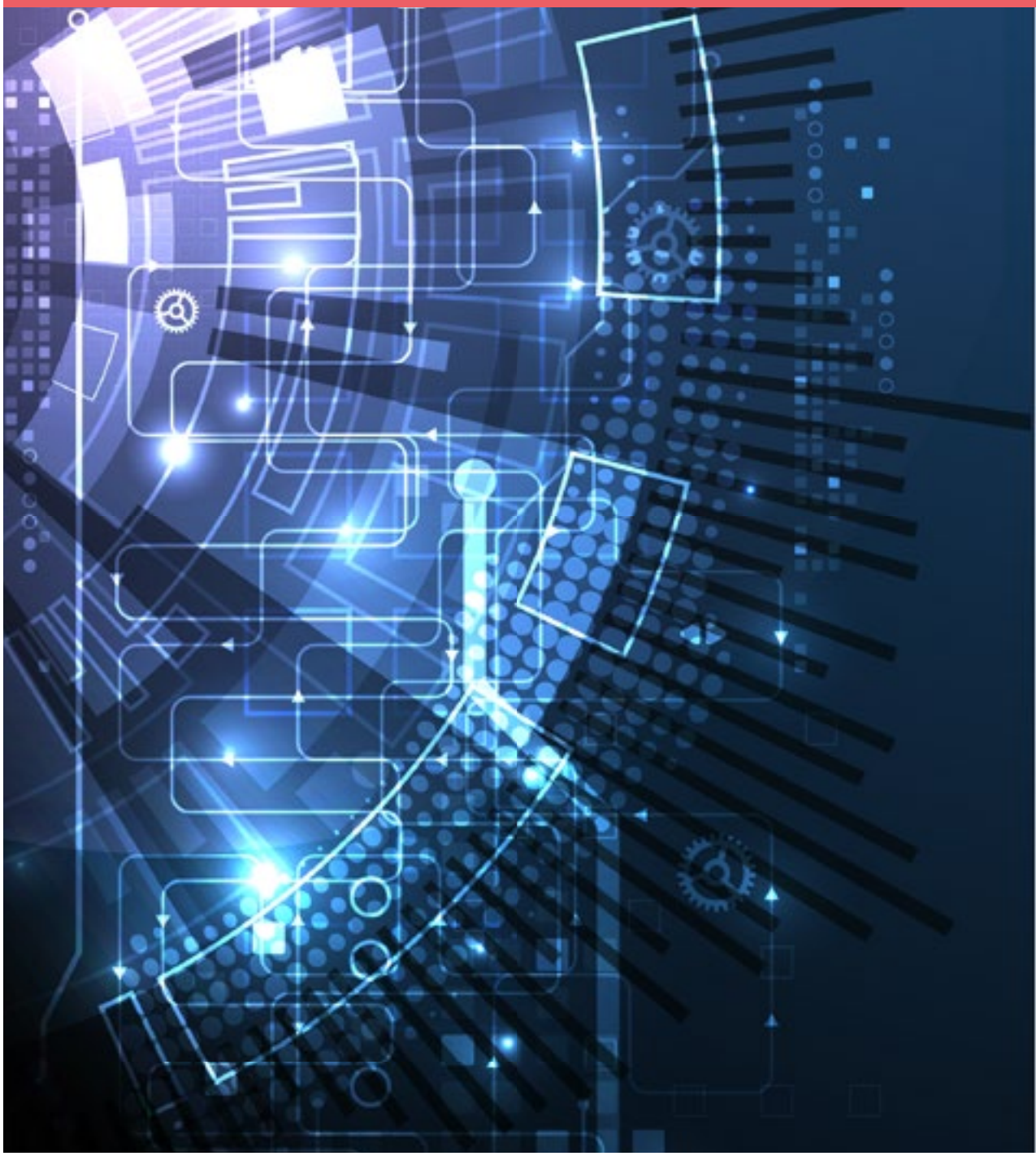


A | THE PROMISE OF TRADETECH AND THE TRANSFORMATION OF GLOBAL TRADE

The interplay of technologies and trade is not new. From the invention of steamships, which fuelled the first industrial revolution, to the popularization of the standard shipping container in the 1950s and the rise of the internet in the 1990s, technology has over the centuries profoundly changed the way people interact and trade, leading to a significant expansion, optimization and sophistication of global value chains.

Technological advancements are enablers of change and key drivers of economies, and their impact on trade may well accelerate (see Box 1). To ensure that no-one is left behind, the further widening of the digital divide must be prevented, also in the trade space.

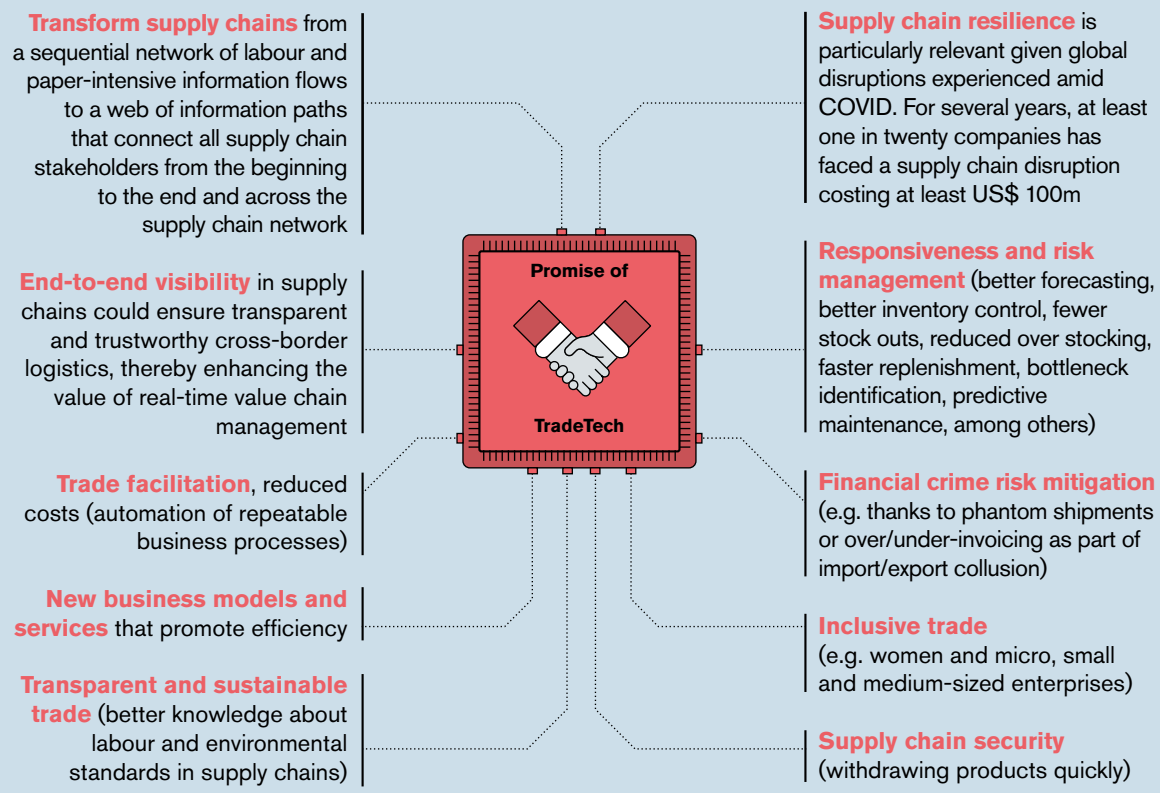
> **"TradeTech is the set of technologies and innovations that enable global trade to become more efficient, inclusive and sustainable."**

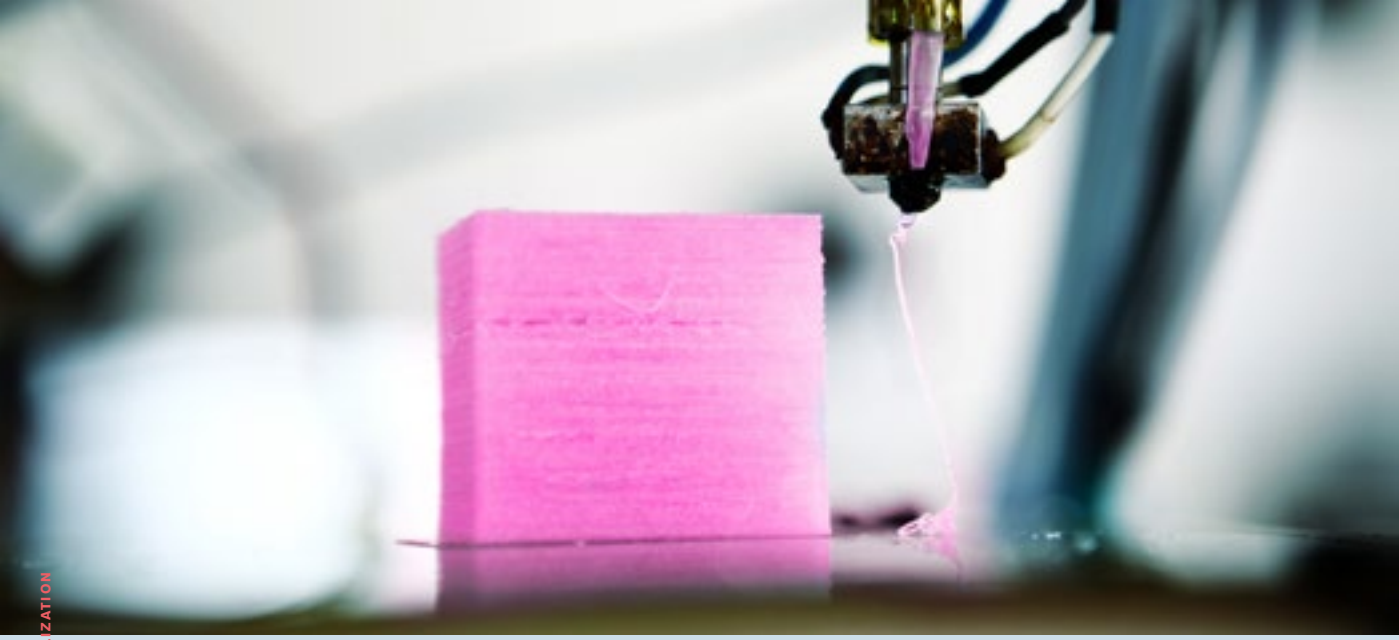
WTO members recognize in the Preamble to the Agreement Establishing the World Trade Organization that:

> "their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development".

This publication explores how trade agreements could be a viable channel to advance the adoption of digital technologies and applications.

FIGURE 1
THE PROMISE OF TRADETECH





BOX 1

2030 – A TRADE ODYSSEY

A 3D-printed shoes company decides to export its products and finds a client with which it signs a contract electronically. To comply with local regulations, the company decides to use an online platform which automatically provides legal answers based on trade parameters entered. The platform is connected to paperless customs systems, with decentralized sharing of information. Thus the company can submit trade documents for compliance purposes in one electronic single window connected to and fully interoperable with electronic national single windows (NSWs).

Thanks to global alignment of digital identity credentials for trade and decentralized identity, the company can share its e-credentials safely and quickly with all trading partners and authorities, without having to re-submit information, while still retaining full control over how, when and with whom this information can be shared.

Back at the factory, 3D-printed shoes roll off the assembly line and are picked up by a robotic handler to be boxed and loaded onto freight containers. Autonomous forklifts load the containers onto self-driving trucks, which take them to the port, which a fleet of cargo drones then load onto an autonomous ship.

Meanwhile, customs clearances and payments have already been completed digitally and shared with all stakeholders involved. The company receives an e-bill of lading, which it converts into multiple shares (i.e. tokens) to finance its trade operation. The ship sets sail on an optimal route selected by artificial intelligence (AI), while providing real-time data of the containers and cargo, such as maritime from location, deck temperature and estimated arrival dates, to manufacturers, trading partners and end-users, all connected to a decentralized platform.

When the ship arrives at the destination, cargo drones unload the containers onto self-driving trucks, which deliver the cargo to a central warehouse where another fleet of drones take the containers to local distribution centres. They are unpacked by robotic handlers, which dispatch individual boxes to the end-user with delivery drones. During this entire journey, participants at the newly established Supply Chain Exchange could finance and trade different parts of this process as commodities.

Each pair of 3D-printed shoes is assigned an identity key, which enables end-users to retrieve the history of the shoes, where they came from, how they were made and traded and finally delivered.

The scenario may sound far into the future, but it is already reasonably close. Just as the shipping container changed world trade almost 70 years ago and enabled globalization, technologies such as fifth-generation cellular networks (5G), AI and blockchain and distributed ledger technology (DLT) could increase supply chain collaboration, changing the landscape of global production and trade over the next few decades.

TradeTech refers to the set of technologies and innovations that enable global trade to become more efficient, inclusive and sustainable (see World Economic Forum, 2020a, and Figure 1) and serves the following functions:

- It helps smooth trade facilitation.
- It creates new trade opportunities.
- It contributes to efficiency gains that could result in more inclusive and sustainable outcomes, from the inclusion of small businesses thanks to reduced entry costs to shipping companies cutting carbon emissions resulting from route optimization.
- It fosters transparent and trustworthy cross-border logistics through end-to-end visibility, which enhances the value of real-time value chain management.
- It strengthens supply chain security through better risk management practices thanks to data analysis.
- It provides resilience to supply chain disruptions, such as during the COVID-19 pandemic.

Evidence suggests that reducing supply chain barriers to trade could increase gross domestic product up to six times more than removing tariffs (World Economic Forum *et al.*, 2013). Trade and investment can contribute to the achievement of the Sustainable Development Goals (in particular SDG 9) by promoting inclusive and sustainable industrialization, increasing access to financial services and markets through integration in global value chains, and supporting domestic technology development and industrial diversification, to name a few.

While the term TradeTech covers a whole range of digital technologies and applications, this publication focuses on AI, blockchain and DLT and the internet of things (IoT). Of particular interest is the potential of these technologies to enhance transparency, efficiency and responsiveness of supply chains (see Box 2).

These technologies are often used in combination, for instance writing data collected through IoT devices onto a blockchain guarantees the integrity of the data on the chain, and AI can be designed to learn from abundant IoT data to make forecasts. Results are fed back into the forecasting algorithm to improve the model, so that over time the system becomes better at making more accurate predictions.

These technologies form a new class of targeted, user optimized and customized services (World Economic Forum, 2020a). For instance, the internet is an emerging logistics and supply chain management

BOX 2

TRADE APPLICATIONS OF AI, BLOCKCHAIN AND DLT AND IoT

Artificial intelligence

Thanks to evolving computing power and ever-growing big data, AI promises to provide access to predictive analytics (i.e. what will happen in the future) and prescriptive analytics (i.e. how to do better in the future), meaningful insights not otherwise possible. These insights can have multiple trade applications from predictive maintenance of equipment to routing optimization and risk management. For instance, AI can contribute to financial crime risk mitigation. Customs also use AI to predict and identify risks, thereby allocating their resources where there is more value added.

Blockchain and distributed ledger technology

Blockchain and DLT can create an incontrovertible and indelible record of supply chain transactions, from the purchase of raw materials to the sale and delivery of the final product. Used as a tool to guarantee the origins, processing conditions (including conformity with labour and environmental standards), and journeys of globally traded goods, such as fair-trade coffee, sustainable lumber and fish, blockchain and DLT can help trade to become more sustainable and inclusive. It can shorten the time required for verifying and processing documents and can help to reduce document-based fraud. Blockchain and DLT can also accelerate and secure payments through automation, which will enable money and documents to move across borders simultaneously for the first time, and contribute to the mitigation of payment risks associated with open account trade finance.

Internet of things

Central to digital supply chain implementation is IoT. At the heart of which are ubiquitous sensors, which measure and transmit data in real-time via the internet, capturing almost anything that can be quantitatively measured, such as temperature and humidity, location information in warehouses and supply depots, and transit tracking of trucks, containers and deliveries. This information can assist in making operating decisions, troubleshooting, emergency alerts and predictive management, among others.

concept that draws on different technologies, AI and blockchain and DLT to optimize logistics and management processes to make supply chains more efficient and sustainable. Through the internet, resources can be pooled in open, shared networks, connecting existing (company) networks.

"Since 2010, regional trade agreements have increasingly integrated e-commerce and digital trade provisions."

B | KEY ROLE OF TRADE AGREEMENTS

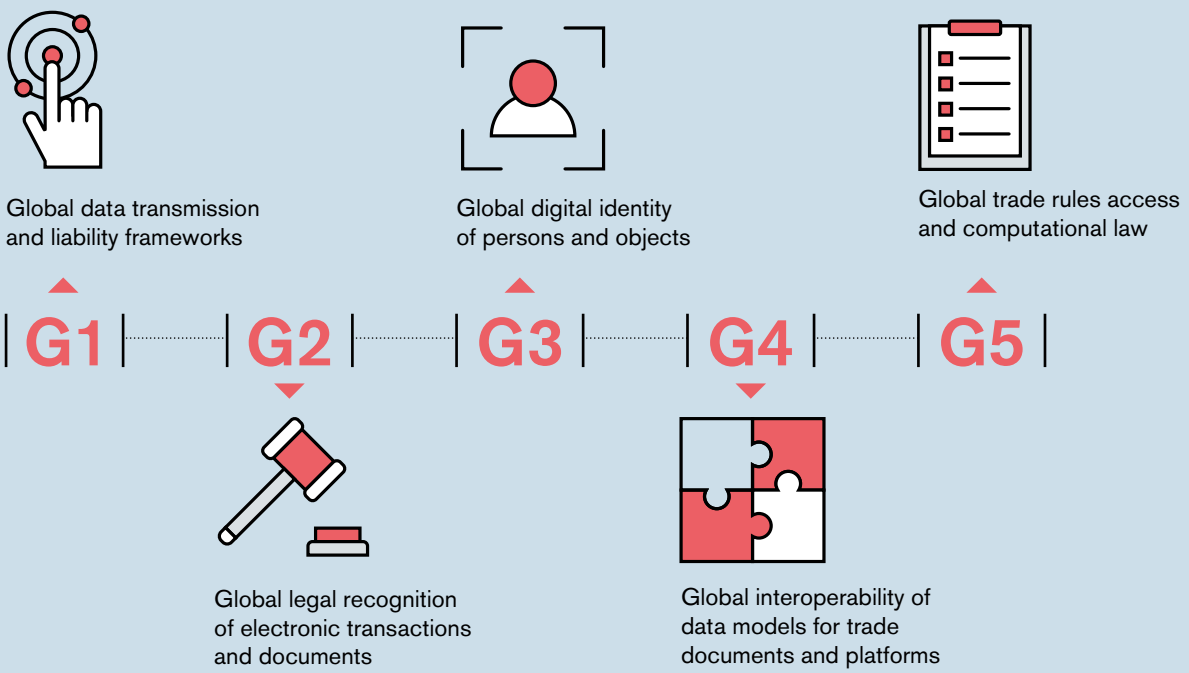
Leveraging technologies for trade requires more than technological innovation. The major challenge might actually be international policy coordination and coherence. The right ecosystem needs to be put in place to drive global adoption and scalability. Trade agreements can play a key role in this regard.

Legal frameworks have always had a hard time keeping up with the pace of technological development, and so have trade agreements. TradeTech issues are relatively new in trade agreements, compared to more traditional trade topics such as tariffs and non-tariff measures (NTMs). As trade agreements are generally technology neutral, many existing trade rules apply to digital trade. Yet, developing explicit rules may be needed for legal clarification on how they apply in the digital field.

In supporting global and inclusive TradeTech adoption, trade agreements can:

i. prevent governments from introducing discriminatory measures favouring local providers or measures that are unnecessarily trade restrictive;
ii. ensure the transparency of regulatory requirements and procedures for facilitating market access by foreign companies;
iii. prevent a fragmented technological environment by encouraging international regulatory cooperation and promoting regulatory harmonization and coherence;

FIGURE 2
THE 5 Gs OF TRADETECH



iv. enhance market access through commitments, such as the WTO's Information Technology Agreement (ITA), whereby participating governments agreed to eliminate tariffs and NTMs applicable to IT products;

v. facilitate foreign direct investment, such as investments in information and communications technology (ICT) to fortify TradeTech adoption.

Since 2010, regional trade agreements (RTAs) have increasingly integrated e-commerce and digital trade provisions. Recent RTAs, such as the United States–Mexico–Canada Agreement, cover a wider range of e-commerce issues than previously, including a chapter on e-commerce and digital trade. Governments have introduced digital-only trade agreements, such as the Singapore–Australia Digital Economy Agreement (SADEA) and the Digital Economy Partnership Agreement[1] (DEPA) between Chile, New Zealand and Singapore, which address a wide range of digital trade issues, which are welcome first steps in this regard. Furthermore, more than 85 WTO members also participate in the Joint Initiative on E-commerce. However, as discussed in this publication, there remain many unseized opportunities.

C | THE 5 Gs OF TRADETECH

According to public and private-sector experts, five building blocks (referred to in this publication as the 5 Gs of TradeTech) play a critical role in supporting trade digitalization and wide-scale adoption of TradeTech. The implementation of the 5 Gs depends on the legal and technological context of each member and are therefore not ranked (see Figure 2).

Although some of the 5 Gs are commonly covered by trade agreements, unseized opportunities remain in connectivity, data sharing and e-signatures. These issues and opportunities are indicated with the following icon.

Other 5 Gs are either not discussed in trade agreements or only in a few recent agreements, and include electronic transferable records, automated contracts, digital tokens, interoperability of data models, and digital identity of legal and physical persons and of physical and digital goods. These new areas are symbolized by the following icon.

These new policy frontiers can help to bring trade to a new speed and work for all.

Global data transmission and liability frameworks

End-to-end trade digitalization requires global access to reliable, affordable and fast connections as well as a legal framework enabling data transmission across borders in a trusted manner. Advanced technologies such as AI, blockchain and DLT and

IoT require the development of information and communications technology (ICT) infrastructure and wireless technologies to enable continuous connectivity. Closing the digital divide in terms of access, bandwidth and skills is more urgent than ever.

In addition to access to digital infrastructure, information, which can be personal, sensitive or confidential, needs to flow across borders while preserving the rights of individuals (e.g. privacy), companies (e.g. business confidential information) and governmental entities (e.g. data requests for law enforcement or regulatory purposes).

However, these cross-border flows of content are hindered by several factors, including regulatory fragmentation across jurisdictions and sometimes even across different agencies within the same territory, a lack of cybersecurity cooperation and private-sector practices by some entities to lock in data that could be shared with other companies with due respect to business confidential information. Global trade digitalization may require the development of new liability frameworks. Such initiatives should be coordinated globally to avoid regulatory fragmentation, trade barriers and consumer distrust.

Global legal recognition of electronic transactions and documents

End-to-end trade digitalization requires a legal framework supporting the cross-border legal recognition of electronic trade documents and transactions. The large number of documents involved in international trade places a heavy burden on businesses seeking to trade internationally, in particular small business. Due to burdensome documentary processes, it can take days to transfer and process trade documents. TradeTech offers new opportunities to facilitate trade processes and automate trade transactions to increase efficiency and operational cost savings while enhancing the security and integrity of information.

For governments, transaction and document digitization can also contribute to better revenue collection. However, the cross-border use of electronic transactions and documents is limited. Some governments have not yet recognized the legal validity and enforceability of electronic means when used in trade transactions. Those who have recognized them do not necessarily share mutually recognized criteria, with the risk of creating silos where the legal validity and enforceability are recognized in a limited geographical area.

> **"Five building blocks (the 5 Gs of TradeTech) play a critical role in supporting trade digitalization and wide-scale adoption of TradeTech."**

A global approach is needed to support wide-scale digitalization.

Global digital identity of persons and objects

End-to-end trade digitalization requires a global approach to digital identities of natural and legal persons as well as of physical and digital objects sending or receiving electronic information to avoid creating digital identity silos. Verifying a legal or natural person's identity is critical to undertake trade transactions and share documents with that person. Similarly, the ability to identify a product, container, consignment or shipment is fundamental to trace its history and location and to obtain useful knowledge about the products being transported (e.g. when, where, what, why and how).

The increasing number of digital identity systems for companies and objects contribute to transparency and predictability of and trust in supply chains. However, just as different documentation requirements and forms in the physical world hinder trade, the multiplication of incompatible digital identifiers creates silos and high frictional costs. Greater attention should be paid to ensuring greater consistency among identification systems and mutual recognition; otherwise, the risk is that physical fragmentation simply becomes digital fragmentation.

Global interoperability of data models for trade documents and platforms

End-to-end trade digitalization requires common definitions and structures of data to understand information exchanged across borders in the same way and to ensure interoperability between platforms. Trade documents are increasingly becoming digital, but digitizing trade documents is just the first step. The real revolution is to move from documents to data. A number of documents are required to perform cross-border trade activities and to achieve end-to-end visibility, including, *inter alia*, certificates of origin, packing lists, bills of lading, insurance policies, commercial invoices, bills of exchange and letters of credit. Trading partners wanting to exchange data need to understand the information in the same way. Both the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and the World Customs Organization (WCO) have developed semantic libraries ("what means what"). Priority now needs to focus on promoting a much wider use of these semantic libraries to reach a critical mass of users and on developing global data models (the syntax) and globally agreed methods for communicating and sharing data across heterogeneous systems such as application programming interfaces (APIs) and the exchange between systems of information about the syntaxes (data formats) being used[2]. Many initiatives are underway, but they often evolve in silo, thereby undermining standardization efforts and in turn the exchange of electronic trade information.

Global trade rules access and computational law

End-to-end trade digitalization supported by computationally expressed trade rules would boost trade efficiency and inclusivity. With continual economic integration, the rules that apply in cross-border contexts are becoming more numerous, technical in nature, complicated to understand and difficult to implement. Fundamentally, many small businesses remain unable to identify and comply with market access rules – both tariff and NTMs – or to utilize preferences, the result of lengthy trade negotiations that were intended to enhance enterprise internationalization and competitiveness. Legal innovations are seeking to clarify and streamline trade compliance through automation. However, these initiatives are developed in silos, and thus are not generally available to other systems, including within the same government or for external entities that may benefit from access. Without international cooperation, the future for computationally expressed trade rules could be limited.

ENDNOTES

1. To the extent that RTAs go beyond commitments made in the WTO, they can complement the multilateral trading system. These RTAs must be notified to the WTO. Arguably, "digital-only" trade agreements are not RTAs per se, given they are not notified and do not necessarily contain preferential trade measures beyond WTO rules. For simplicity, this publication refers to them as RTAs.
2. Syntax relates to the structure of the language, that is, the rules for writing in a programming language. It has nothing to do with the meaning of the statement.