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国际海关及跨境贸易区块链应用案例（英汉对照）

Application of Blockchain Technology in Customs & Cross-border Trade: Case Studies

Re-Code

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国际海关及跨境贸易区块链应用案例（英汉对照）

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The movement of goods and means of transport from, across or to, the European Union (EU) involves many actors in the supply chain who must exchange information and comply with several pieces of EU legislation and, in particular, with Customs, transport, environmental protection, safety, and security regulations. This renders the process of cross-border operations highly complex.

Over the past 20 years, digital technologies have reshaped the way industries and governments alike operate. International trade has been no exception, and the efficiency, reliability and cost-effectiveness of operations have been closely linked to the ongoing process of digitization.

At both national and European Community level, several initiatives have been targeting the digitization of reporting procedures in order to facilitate information exchange and foster better cooperation between competent authorities across different sectors. Among available technologies, blockchain technology is seen as especially promising, as it would enable the development of new paradigms for supply chain digitization, and opens up areas of potential change in the way in which citizens, economic operators and public authorities interact.

At its core, the blockchain is a decentralized, distributed ledger that stores information in blocks which are linked in a secure manner and disseminated through peer-to-peer technology to all the nodes, each of which contains a full copy of the information. The blockchain transactions are validated through a mechanism known as a consensus protocol, which is used to determine the blocks of data or transactions that will be successively added to the end of the chain as agreed among the stakeholders concerned.

Since early 2017, the Directorate-General for Taxation and Customs Union (DG TAXUD), responsible for shaping policies and developing operational systems for the European Customs Union in collaboration with EU Member States, has been engaged in an exploratory activity to study the potential applicability of blockchain technology in both the Customs and taxation domains. In the field of Customs, this exploration has focused on the "notarization service" whereby a blockchain platform could be used as a third party for holding information generated by supply chain stakeholders.

One document of particular interest is the ATA Carnet (ATA is an acronym of the

案例一
ATA 单证册电子化：区块链技术如何增强信任

货物和运输工具在欧洲联盟（欧盟）之间、之间或之间的运输涉及供应链中的许多参与者，这些参与者必须交换信息并遵守欧盟的几项立法，特别是海关、运输、环境保护、安全和安全法规。这使得跨国界行动的过程极为复杂。

在过去的 20 年里，数字技术已经改变了行业和政府的运作方式。国际贸易也不例外，业务的效率、可靠性和成本效益与正在进行的数字化进程密切相关。

在国家和欧洲共同体一级，有几项倡议的目标是使报告程序数字化，以便促进不同部门主管当局之间的信息交流和更好的合作。在现有技术中，区块链技术被认为是特别有前途的，因为它将使供应链数字化的新范式得以发展，并开辟了公民、经济经营者和管理当局互动方式可能发生变化的领域。

从根本上，区块链是一个分散的分布式分类账，它以块的形式存储信息，块之间以安全的方式链接，并通过点对点技术传播到所有节点，每个节点都包含信息的完整副本。区块链事务通过一种称为协商一致协议的机制进行验证，协商一致协议用于确定数据块或事务块，这些数据块或事务块将按照相关涉众的约定依次添加到链的末尾。

自 2017 年初以来，税收和海关同盟（DG TAXUD），负责制定欧盟成员国合作的政策和开发操作系统，一致在探索性研究区块链技术在海关和税务领域的适用性。在海关领域，此次探索的重点是“公证服务”，利用区块链平台作为第三方持有供应链利益相关者产生的信息。

特别令人感兴趣的一份文件是 ATA 单证册，这是一份在 87 个国家和地区使用的国际海关文件，通常主要允许大

French and English terms "Admission Temporaire/Temporary Admission"), an international Customs document used in 87 countries and territories that mainly permits the duty free temporary admission of most goods for up to one year normally. The ATA Carnet eliminates the need for a Customs declaration at border points and the lodging of a guarantee, bond or cash deposit in the country of temporary importation. It can be used for a trip covering more than one country and include numerous exits and re-entries in the country of origin during the period of validity of the document.

Each country in the system has a single guaranteeing body approved by national Customs authorities and the International Chamber of Commerce World Chambers Federation (ICC WCF). A national guaranteeing association (NGA) is entitled to issue Carnets and to authorize local chambers on the national territory to deliver them on its behalf. Processing fees apply as well as a surety bond which will be returned if the Carnet has been used correctly.

Discussions about the possibility of moving towards a paperless environment for ATA Carnets began several years ago between Customs administrations and ICC WCF, which manages the ATA Carnet system. The eATA project aims to digitize the temporary admission process by providing worldwide electronic data exchange between countries or Customs unions (ATA partners) using the document.

The EU is supporting the project as part of DG TAXUD's electronic Customs multiannual strategic plan. ICC WCF is currently implementing a system which replicates the paper ATA Carnet procedures using a digital solution called "Mercury II." The solution, based on "traditional" technology with a centralized database, is hosted by ICC in Paris, France, and will be mainly used to register the Carnets and their movements as they are certified by Customs offices along the goods' journey. In the second half of 2018, ICC will launch a pilot to test the application.

Steps of the digital process can be described as follows:

1) Using the "National Issuing and Claims Systems" (NICS) or Mercury II, a person orders a Carnet online, or, if a Carnet is already held, additional certificates if more trips are planned than originally anticipated.

2) The "holder" then downloads the Carnet into a safe wallet, stored in a smartphone, and can share it with his/her representative. The Carnet is encrypted and exchanged over secured communication channels.

多数货物免税临时入境，最长可达一年。临时进口证不需要在边境口岸报关，也不需要在临时进口国家提交担保、债券或现金存款。它可以用于允许货物在多个国家的流动，包括在文件有效期内在原产国的多次出口和重新入境。

该体系中的每个国家都有一个由国家海关当局和国际商会世界商会联合会（ICC WCF）批准的单一担保机构。一个国家担保协会（NGA）有权编制单证册，并授权国家领土上的地方商会代表其递送单证册。如使用正确，本处会退还处理费用及保证保证书。

几年前，海关当局与国际商会（负责管理 ATA 单证册系统）就实现 ATA 单证册无纸化的可能性展开了讨论。ATA 单证册电子化的项目旨在通过使用该文件在全球范围内提供国家或海关联盟（ATA 伙伴）之间的电子数据交换，实现临时入境流程的数字化。

欧盟支持该项目，作为欧盟海关总署电子海关多年度战略计划的一部分。ICC 目前正在实施一个系统，该系统使用一种名为“Mercury II”的数字解决方案来复制纸质 ATA Carnet 程序。该解决方案基于“传统”技术和集中式数据库，主要用于由海关在货物运输过程中认证单证册。2018 年下半年，ICC 将启动试点，对该应用进行测试。

数字化过程的步骤如下：

1）使用“国家签发和索赔系统”（NICS）或 Mercury II，一个人可以在网上订购一个单证册，或者，如果已经拥有一个单证册，如果计划进口货物比最初预期的要多，还可以订购额外的证书。

2）“持证人”将卡下载到一个安全的钱包中，储存在智能手机上，可以与他 / 她的代表分享。单证册通过安全的通信通道进行加密和交换。

3）持证人或其代表在过境时打开钱包，并向海关人员

3) When crossing a border, the holder, or his/her representative, unlocks the wallet and shows the QRcode to a Customs officer.

4) The Customs officer scans the QRcode, examines the general list of goods covered by the Carnet, and then reports whether the goods entered or exited the country under a temporary importation, transit or temporary exportation procedure.

5) The transaction is recorded and the holder or the representative receives a confirmation message through his/her smartphone.

6) Customs can issue claims through the system and manage them with the NGAs.

In June 2017, a partnership between DG TAXUD and ICC WCF was established whereby DG TAXUD launched a proof-of-concept (PoC) project to see whether Anchoringan application based on the blockchain could interface with ICC's Mercury II solution in order to add an extra layer of trust to the process.

Key requirements that would justify the use of blockchain technology are met: multiple stakeholders need to have access to the same data, and there is mistrust between those stakeholders in using each other's data.

The PoC project reached a successful conclusion in mid-2018, and has demonstrated that distributed ledger technology (the Ethereum test network in this case) could be used to ensure the integrity and traceability of Carnets and transactions on a private blockchain platform combined with periodic anchoring on a through an anchoring mechanism public blockchain, effectively achieving independent notarization as shown in Figure 2. The distinction between public and private blockchain is related to who is allowed to participate in the network, execute the "consensus protocol" and maintain the shared ledger.

Hash functions are a fundamental part of blockchain technology. In a blockchain, documents or data are hashed, which means that their content is summarized and represented as a unique 64-character string. The hashed value of the previous block is used to calculate the hashed value of the current block, thus creating a link between the blocks.

Under the PoC project, a hash of the actual data related to the Carnet or a transaction is stored on the blockchain, guaranteeing the true version of a document at any given time and providing a digital fingerprint of a document or transaction. Obtained by an algorithm which prevents reverse engineering of the original document from the

出示编码。

4）海关人员扫描代码，检查《货物通关单》所列货物的总清单，然后声明货物是否按照临时进口、过境或临时出口程序进出境。

5）交易被记录下来，持证人或代表通过智能手机收到确认信息。

6）海关可以通过系统提起索赔，并与 NGAs 进行管理。

2017 年 6 月，DG TAXUD 与 ICC WCF 建立了伙伴关系，DG TAXUD 启动了一个概念验证（PoC）项目，以了解基于区块链的应用程序是否可以与 ICC 的 Mercury II 解决方案相结合，从而为该过程增加一层额外的信任。

可以证明使用区块链技术合理性的关键需求得到了满足：多个涉众需要访问相同的数据，而这些涉众之间在使用彼此的数据时存在不信任。

PoC 项目在 2018 年中期达到一个成功的结论，并表明，分布式分类技术可以通过区块链平台用来确保公正和事务的完整性和单证册和业务可追溯性，有效地实现独立的公证。公共区块链和私有区块链之间的区别在与谁被允许参与网络、执行“一致协议”和维护共享分类帐有关。

哈希函数是区块链技术的基础部分。在区块链中，文档或数据被散列，这意味着它们的内容被总结并表示为一个惟一的 64 个字符的字符串。前一个块的散列值用于计算当前块的散列值，从而在块之间创建链接。

在 PoC 项目下，与单证册或事务相关的实际数据散列存储在区块链上，保证任何时间的文档的真实性，并提供文档或事务的数字指纹。通过一种防止从指纹对原始文档进行反向工程的算法得到的散列，可以确保即使文档中有一个符号的更改，也会导致完全不同的指纹。

区块链测试网络，建成的 PoC 项目只存储的散列单证

fingerprint, the hash ensures that even a single comma change in a document would result in a totally different fingerprint.

The blockchain test network that was built as part of the PoC project stores only the hash of the Carnets or transactions plus a few metadata, thus allowing automated consistency checks of ATA Carnet movements to be carried out (as shown in Figure 4). Ethereum smart contract blockchain technology was used to make such checks possible in this business context.

The combination of private and public blockchains for the notarization process allows the benefit of a private blockchain (in particular to lower the costs of writing information on the blockchain) to be maximized whilst benefitting from the strength of a public blockchain (such as Bitcoin), which has a very large number of nodes. Writing on the public blockchain has a cost – as a result, during the PoC project only periodic anchoring on the public blockchain of the latest hash stored on the private blockchain took place (only hash of information is stored on the public blockchain, hence there are no data confidentiality issues). This was a win-win scenario with an optimal approach that benefitted from harnessing the public blockchain at a reasonable cost.

Although DG TAXUD does not intend to make the PoC project operational, lessons learned during the project will benefit the stakeholders who are involved in the digitization of the ATA Carnet procedure. Several Customs authorities interested in the digitization of the ATA Carnet procedure expressed a lack of trust in a solution such as Mercury during meetings of the WCO eATA Steering Committee and the project shows that the use of blockchain technology could offer a potential solution, including the strengthening of stakeholders' trust in the system.

册或事务的数据，从而使自动实现单证册的一致性检查。Ethereum 智能合同区块链技术被用于检查一致性。

私人和公共的组合区块链公证过程允许私人区块链的利益（尤其是降低写作的成本信息区块链）最大化同时受益于有大量的节点的公共区块链的强度（如比特币）。公共区块链具有成本——因此，在 PoC 项目中公共区块链只周期性的瞄准最新的私有区块链散列存储（只有散列的信息存储在公共区块链，因此没有数据保密问题）。这是一个双赢的局面，最优的方法是利用公共区块链以控制成本。

虽然 DG TAXUD 不打算让 PoC 项目运作，但在项目中获得的经验教训将使参与 ATA 单证册程序数字化的利益攸关方受益。世界海关组织 eATA 指导委员会会议期间，几个对 ATA 单证册数字化感兴趣的海关当局表达缺乏信任的解决方案，项目显示区块链技术的使用可以提供一个潜在的解决方案，包括系统中加强利益相关者的信任。

CADENA, a blockchain enabled solution for the implementation of Mutual Recognition Arrangements/Agreements

The Inter-American Development Bank (IADB) has been supporting the development of a blockchain solution to enable automated, secure and efficient information sharing on Authorized Economic Operators (AEOs) among the Customs administrations of Mexico, Peru and Costa Rica to ensure the efficient implementation of Mutual Recognition Arrangements/Agreements (MRAs).

CADENA enables Customs administrations, which engage in an MRA, to share a single view of the status of an AEO certificate in real time while ensuring that the highest standards of security, traceability, and confidentiality are applied to the data. It also enables the private sector to access information about its certificate, increasing trust and transparency and, ultimately, the active participation of the private sector.

Almost 80 countries have developed AEO programmes worldwide, and some of them have signed or are in the process of signing MRAs. To date, a record number of 60 MRAs have been signed and up to 40 more are currently being negotiated.

Besides "traditional " bilateral agreements, multilateral or plurilateral agreements have also emerged. The most recent MRA of this nature was concluded in 2018 by the Customs administrations of Colombia, Chile, Mexico and Peru, the four countries which form the Pacific Alliance trade bloc, the most recent regional integration initiative in Latin America.

In the Latin American and Caribbean region, three more multilateral MRAs are being negotiated among Central American countries (Costa Rica, El Salvador, Guatemala and Panama, with Honduras as an observer), the Andean Community countries (Bolivia, Colombia, Ecuador and Peru), and the countries of the Mercosur trade bloc (Argentina, Brazil, Paraguay and Uruguay). In other regions of the world, countries are also actively engaged in AEO regional initiatives (the East African Community, for example) and/ or negotiating multilateral MRAs (the Greater Tumen Initiative, in Northeast Asia).

Challenges

The deployment of AEO programmes and the propagation of MRAs around the

案例二
CADENA
——AEO 互认协议的区块链解决方案

美洲开发银行（美洲开发银行）一直支持制定一项区块链解决方案，使墨西哥、秘鲁和哥斯达黎加的海关当局能够自动、安全和有效地分享关于经授权的经济经营者（AEO）的资料，以确保有效地执行相互承认安排 / 协定（MRA）。

CADENA 使参与 MRA 的海关管理部门能够实时共享 AEO 证书状态的单一视图，同时确保对数据应用最高标准的安全性、可跟踪性和保密性。它还使私营部门能够获得有关其证书的信息，增加信任和透明度，并最终使私营部门积极参与。

全球近 80 个国家实施了 AEO 方案，其中一些国家已经签署或正在签署 MRAs。到目前为止，已经签署了创纪录的 60 项协议，目前正在谈判的核协议多达 40 项。

除了“传统的”双边协定，多边或诸边协定也出现了。2018 年，由哥伦比亚、智利、墨西哥和秘鲁四个太平洋联盟贸易集团成员国海关当局签署了最新的 MRA 协议，这是拉美地区最新的区域一体化倡议。

在拉丁美洲和加勒比海地区，有三个正在协商多边的 MRA：中美洲国家（哥斯达黎加、萨尔瓦多、危地马拉、巴拿马、洪都拉斯作为观察员），安第斯共同体国家（玻利维亚、哥伦比亚、厄瓜多尔和秘鲁），和南方共同市场贸易集团的国家（阿根廷、巴西、巴拉圭和乌拉圭）。在世界其他地区，各国也积极参与 AEO 区域倡议（例如东非共同体）和 / 或多边 MRAs 谈判（东北亚的大图们江倡议）。

挑战

AEO 方案的部署和 MRAs 在世界各地的扩散是积极的发

world are positive developments as they contribute to securing the international trade supply chain, whilst enhancing trade facilitation. However, can MRAs be effectively implemented and offer traders the benefits they were promised?

In theory, when Customs administrations sign an MRA, AEO certified companies receive benefits in all the countries which are parties to the MRA. These benefits are listed in the MRA and can take the form of a reduction in physical and documentary Customs inspections as the Customs risk management system of a Customs administration recognizes the shipment as AEO certified from another Customs administration or that it should be given priority treatment if it is selected for inspection. These measures, which are not exhaustive, have a positive impact on commercial profits as they reduce the time and costs needed to complete a transaction.

In practice, however, implementing such measures in a secure manner is still problematic – a situation which limits the capacity to provide benefits in a secure and timely manner. The MRAs are premised on the principle of seamless exchange of information on AEO certified companies among the countries participating in the MRA, in order for them to be able to identify each other's AEO certified companies and extend mutually agreed benefits.

To inform each other, designated Customs officers in each administration send, by email, an excel file containing the data elements that the countries agreed to exchange on their respective AEOs. Customs administrations engaged in an MRA also determine the period during which data should be exchanged, which is usually monthly. These data elements are incorporated by each of the officers into their risk management system so that import operations associated with a foreign AEO from a country with which an MRA has been signed are graded more trustworthy in the Customs risk management system.

There are, at this time, very few mechanisms enabling the conduct of an automated, secure and real time exchange of data on AEO certificates. Although some initiatives have been undertaken to automate the exchange of AEO master data, many countries still use emails.

This raises several problems:

• *The current method to exchange data entails risks. When you send an email, the message leaves your email provider's server and travels across the Internet. You have no idea how many servers the message will pass through between the moment you*

展，因为它们有助于确保国际贸易供应链的安全，同时促进贸易便利化。然而，MRAs 能否有效实施，并为贸易商提供承诺的好处？

在所有参与 MRA 的国家，经 AEO 认证的公司都能享受到 MRA 的好处。MRA 和列出这些好处可以减少海关风险管理系统确定的物理形式和文件形式的海关检查，或另一个海关当局对 AEO 认证货物的优先查验处置。这些措施并非详尽无遗，但对商业利润有积极影响，因为它们减少了完成一笔交易所需的时间和成本。

然而，实际上，以安全的方式执行这些措施仍然是有问题的——这种情况限制了以安全和及时的方式提供优惠的能力。“互认协议”的前提是，参与“互认协议”的国家之间应就互认协议对认证公司的信息进行无缝交换，以便相互识别对方的认证公司，并提供双方同意的优惠。

为了相互通知，每一届政府的指定海关官员都通过电子邮件发送一份 excel 文件，其中包含各国同意交换的 AEOs 数据元素。参与 MRA 的海关管理部门还决定数据交换的时间，通常是每月一次。这些数据元素被每个海关人员纳入他们的风险管理系统，以便在海关风险管理系统中将签署 MRA 的 AEO 相关的进口操作评估为可信。

目前，很少有机制支持在 AEO 证书方面进行自动、安全、实时的数据交换。虽然已经采取了一些主动行动，使 AEO 主要数据元素的自动化交换，但许多国家仍然使用电子邮件。

这就产生了几个问题：

• 目前的数据交换方法存在风险。当您发送电子邮件时，邮件将离开您的电子邮件提供商的服务器，并在网络上传播。您不知道从您发送消息到接收方实际接收到消息之间将通过多少服务器，而且您也不知道谁可以访问这些服务器。虽然您可以加密您的电子邮件服务器连接并使用加密协议

send it and the moment the recipient actually receives it, and you don't know who has access to those servers. While you can encrypt your email server connection and use encryption protocols to send it, it's not always possible to ensure that the recipient has the same set of security practices in place. In other words, you might have securely sent your documents, but that does not mean they were delivered securely. The AEO programme is all about the security of the supply chain. Records and data related to these companies should be exchanged risk free.

• As data is not exchanged in real time, but monthly or periodically, benefits cannot be granted immediately. Firms can lose profits during a monthly cycle depending on when they are granted AEO certification and when the exchange of data is conducted between Customs administrations participating in the MRA.

• The ability to react to a suspension, cancellation or withdrawal of an AEO status is reduced for the same reason given above. There could be a delay between the actual cancellation of the AEO certificate and the actual communication advising the other Customs administration of the development. In this case, this situation poses a security risk since the firm has ceased to be reliable and trusted, but will still be treated as if it was. This may have a negative effect on trust and security in the supply chain, which is shared by the countries participating in the MRA.

Blockchain as a solution

To solve these issues and set up a secure data exchange mechanism, AEO programme officers and information technology (IT) specialists from Mexico, Peru and Costa Rica Customs have been working together with Microsoft and the IADB to develop the business functionalities and the technological architecture of an application called CADENA, which is based on blockchain technology. Currently, the three Customs administrations are in the validation phase and the solution is being tested before going into production.

A blockchain solution offers concrete advantages for the management of the AEO certification process and the implementation of MRAs, making it possible to record and share transactions, according to an agreed protocol among a group of parties, with each transaction being secured and protected by an immutable audit trail.

CADENA enables Customs administrations, which engage in an MRA, to share a single view of the status of an AEO certificate in real time while ensuring that the highest standards of security, traceability, and confidentiality are applied to the data. CADENA also enables the private sector to access information about its certificate, increasing trust

发送它，但并不总是能够确保收件人具有相同的安全实践。换句话说，您可能已经安全地发送了文档，但这并不意味着它们已经安全地交付了。AEO 计划的重点是供应链的安全。与这些公司有关的记录和数据应无风险地交换。

• 由于数据不是实时交换的，而是每月或定期交换的，因此不能立即授予便利或优惠。公司可能在一个月的周期内亏损，这取决于它们何时获得 AEO 认证，以及参与 MRA 的海关当局何时交换数据。

由于上述相同的原因，对 AEO 状态的暂停、取消或撤消作出反应的能力也会降低。实际取消 AEO 证书与实际通知其他海关当局有关开发的通信之间可能存在延迟。在这种情况下，这种情况构成了安全风险，因为该公司已不再可靠和可信，但仍将被视为可靠和可信。这可能对参与 MRA 的国家共享的供应链中的信任和安全产生负面影响。

区块链作为一个解决方案

解决这些问题需要建立一个安全的数据交换机制，来自墨西哥、秘鲁和哥斯达黎加海关的 AEO 项目人员和信息技术（IT）专家已经与微软和 IADB 合作开发具备业务功能和技术架构的应用程序，该程序被称为基于区块链技术的 CADENA,。目前，这三个海关部门都处于验证阶段，解决方案正在测试中，然后才能投入使用。

区块链解决方案为 AEO 认证过程的管理和 MRAs 的实现提供了具体的好处，使记录和共享事务成为可能，根据一组参与方之间达成的协议，每个事务都受到不可变的审计跟踪的保护。

CADENA 使 MRA 一方海关分享单一视图状态的实时 AEO 认证同时确保最高标准的数据安全、可追溯性和机密性。CADENA 还使私营部门能够获得有关其证书的信息，增加信

and transparency and, ultimately, the active participation of the private sector. Further, it facilitates automated validation of AEOs under an MRA, using smart contracts.

The key imperative in an MRA process is to assign a unique number to each AEO that can be used across the supply chain and which is recognized by all the MRA's partners. CADENA makes use of WCO standards and the globally unique Trader Identification Number (TIN) format, and its underlying AEO master data which provides a complete set of information relating to the AEO.

Preliminary results obtained during the validation phase point to important benefits for Customs administrations, which will translate into advantages and/or benefits for the private sector as follows:

• *CADENA brings efficiency and effectiveness to MRA management. Customs administrations now have a digitalized, automated, secured, reliable mechanism for sharing information on AEO certificates.*

• *CADENA guarantees the integrity of the data and enables access to the data to be managed by granting different roles and permissions to users.*

• *CADENA guarantees traders that they will be able to enjoy MRA benefits from the moment they receive their certification.*

• *CADENA promotes transparency by allowing firms to access information related to their certificate, as well as the list of other AEO certified companies in the countries which are part of the MRA.*

• *CADENA strengthens the overall security of supply chains by ensuring that information on suspensions and cancellations executed by a Customs administration and withdrawals by companies is registered and shared in real time.*

The road ahead

CADENA was developed thanks to the innovative drive of the Mexico, Peru and Costa Rica Customs administrations, supported by the IADB and Microsoft. It illustrates how a transformative technology can help to improve Customs and border management.

Although it addresses a specific challenge, namely MRA implementation, CADENA

任和透明度，并最终使私营部门积极参与。此外，它还使用智能契约促进了 MRA 下 AEOs 的自动化验证。

MRA 流程中的关键任务是为每个 AEO 分配一个唯一的编号，该编号可以跨供应链使用，并且可以被 MRA 的所有合作伙伴识别。CADENA 利用世界海关组织标准和全球唯一的贸易商识别号码（TIN），及其基础的 AEO 主数据，提供了一套完整的有关 AEO 的信息。

在验证阶段取得的初步结果显示，海关当局可从中获得重要效益，这些效益可转化为私营机构的优势和 / 或利益，详情如下：

• CADENA 为 MRA 管理带来了效率和有效性。海关现已建立了数字化、自动化、安全可靠的 AEO 证书信息共享机制。

• CADENA 保证数据的完整性，并允许通过向用户授予不同的角色和权限来管理对数据的访问。

• CADENA 向贸易商保证，从他们获得认证的那一刻起，他们就能享受 MRA 的好处。

• CADENA 通过允许公司访问与其证书相关的信息，以及 MRA 成员国的其他 AEO 认证公司的名单，提高了透明度。

• CADENA 加强了供应链的整体安全，确保海关部门执行的暂停和取消以及撤销的信息得到实时备注和共享。

前方的道路

CADENA 的开发得益于墨西哥、秘鲁和哥斯达黎加海关当局在 IADB 和微软支持下的创新举措。它说明了一项革命性的技术如何有助于改善海关和边境管理。

虽然它解决了一个具体的挑战，即 MRA 的实现，CADENA 在概念验证阶段展示了它可以有许多其他功能，现在正在

demonstrated during the proof of concept phase that is could have many other functionalities which are now being considered for further development.

Among other things, it could be expanded to automate and manage the whole AEO certification process, promoting both efficiency and auditing traceability. It could also be integrated with other Customs systems, such as risk management applications, thereby alleviating a range of inefficiencies while spurring change and modernization within Customs.

CADENA can be scaled for other countries to join and can also interoperate with other blockchains and entities, making it possible to leverage the single version of truth about AEO certified operators for insurance, tax and trade finance purposes, for example.

These are just some of the new and exciting additional functionalities that could be added to the solution. Based on the blockchain technology, CADENA aligns smartly with the principles of the AEO programme. Both were brought to life as innovations in the 21st century, and are addressing the much-needed component of trust in the international trade supply chain.

考虑进一步的发展。

此外，还可以将其扩展为整个 AEO 认证过程自动化和管理，从而提高效率和审计可跟踪性。它还可以与其他海关系统，例如风险管理应用程序相结合，从而减轻一系列效率低下的问题，同时促进海关内部的变革和现代化。

CADENA 可以扩展到其他国家加入，并且可以与其他区块链和实体进行互操作，例如，可以利用 AEO 认证运营商的单一版本来实现保险、税务和贸易融资等方面的目的。

这些只是可以添加到解决方案中的一些令人兴奋的新功能。在区块链技术的基础上，CADENA 与 AEO 方案的原则保持了良好的一致性。它们都是作为 21 世纪的创新而诞生的，都是解决国际贸易供应链中亟需的信任的组成部分。

TradeLens uses blockchain to help Customs authorities facilitate trade and increase compliance

"Did you pack this bag yourself?" It's a question many of us are used to being asked when checking in at an airport. For a shipping container, the situation is more complex. Most organizations never communicate directly with the party that stuffed the container. Underpinned by blockchain technology, the TradeLens platform lays the foundation for global, digital supply chains. It connects all parties in the supply chain to drive true information sharing, foster collaboration and trust, and spur industrywide innovation. Governments who embrace the opportunities offered by TradeLens place themselves in an ideal position to contribute positively towards a new era of global trade that is both frictionless and compliant.

Data inconsistencies are rife in international trade

A buyer cannot be certain what is in the container until it arrives and is unpacked. An ocean carrier never sees the contents of a container and relies on documentation provided by the shipper or forwarder. Customs authorities can struggle to determine the buyer for certain imports. A study found that a single shipment of avocados from Kenya to the Netherlands involved 30 different organizations, over 100 people, and 200 individual information exchanges. Each information exchange risks the introduction of data inconsistencies. TradeLens reduces these uncertainties and inconsistencies by providing authorized parties with access to the original data; in this case, the actual information provided by the organization that stuffed the container in Kenya.

One million shipping events are added to TradeLens every day

TradeLens is a collaboration between Maersk and IBM. It is a global, blockchain powered platform that follows the flow of cargo from source to destination, and connects the various parties involved in a shipment. It is also an open, neutral platform that enables all organizations involved in an international shipment to simply and securely exchange shipment events and documents in real time, increasing the visibility that shippers have about the status, location, and contents of their consignment. In addition, platform participants can create additional apps that leverage the platform’s ecosystem and make them available through the TradeLens

案例三
TradeLens 利用区块链协助海关当局促进贸易便利化和提升合规程度

“这个行李是你自己打包的吗？”我们很多人在机场办理登机手续时都会被问到这个问题。对于一个海运集装箱，情况更为复杂。大多数组织从不直接与装箱的一方通信。在区块链技术的支持下，TradeLens 平台为全球数字供应链奠定了基础。它连接了供应链上的所有各方，以推动真正的信息共享，促进合作和信任，并刺激全行业的创新。各国政府可以利用 TradeLens 使自己处于一种理想的地位，以便为一个无摩擦和合规的全球贸易新时代作出积极贡献。

数据的不一致性在国际贸易中很普遍

买方不能确定集装箱里装的是什么，直到集装箱到达并被打开。海运承运人从不查看集装箱的内容，而是依赖于托运人或货代提供的文件。海关当局很难确定某些进口商品的买家。一项研究发现，从肯尼亚到荷兰的一船牛油果涉及 30 个不同的机构、100 多人和 200 个个人信息交换。每一次信息交换都可能带来数据不一致的风险。贸易商通过向授权方提供原始数据，减少了这些不确定性和不一致性；在本例中，原始信息是在肯尼亚装港的实际信息。

TradeLens 每天添加 100 万个发货信息

TradeLens 是马士基与 IBM 的合作项目。它是一个全球性的、以区块链为解决方案的平台，跟踪货物从源头到目的地的流动，并连接与发货相关的各方。它也是一个开放、中立的平台，使所有参与国际货运的组织能够简单而安全地实时交换货运信息和文件，从而提高托运人对其托运货

marketplace.

This year, a 'limited availability' release of the platform was launched; a significant step in its evolution. It has already secured commitments to track approximately 20% of global ocean container traffic. With more than 90 organizations having agreed to participate on the platform, including three shipping lines – Pacific International Lines (PIL), Hamburg Süd and Maersk Line – and the Customs authorities in Australia, the Netherlands, Peru, Saudi Arabia and Singapore, Tradelens' data is growing at a rate of close to one million events per day.

A global data pipeline

TradeLens realizes the 'data pipeline' concept developed by respected career Customs officers, Frank Heijmann and David Hesketh, and others, which was explored in various European Union (EU) research projects, such as ITaide, Cassandra, and Integrity. Collaboration on TradeLens started in June 2016 and was known as Global Trade Digitization (GTD). The platform was used by CORE, an EU funded security project that included the Customs Administration of the Netherlands, US Customs and Border Protection, and the US Department of Homeland Security's Science and Technology Directorate.

Blockchain changes the game

Blockchain enables participants to trust TradeLens' data, safe in the knowledge that it is impossible for any single organization or individual to alter the information on the platform's blockchain network. The blockchain technology used by TradeLens shares some characteristics with the anonymous blockchain that underpins Bitcoin. However, in many important ways, it is different. Six features of the blockchain used by TradeLens are particularly crucial to its success:

• ***Shared replicated ledger****: Each organization that participates directly in the blockchain network operates a blockchain node. These nodes each maintain a copy of the blockchain. When data is added to the blockchain each node's copy is automatically updated.*

• ***Immutability****: The blockchain network is append-only. Once data is published to the blockchain it cannot be changed. If there was an error in the data, then a new version must be added, with both old and new visible in the blockchain.*

物的状态、位置和内容的可见性。此外，平台参与者可以利用平台的生态系统创建更多的应用程序，并通过 TradeLens 向市场提供这些应用程序。

今年，该平台进入“有限的可用性”模式，这是其发展的重要一步。该公司已经承诺跟踪全球约 20% 的海运集装箱运输。有超过 90 个组织同意参与平台，包括三个航运公司——太平洋国际航线，汉堡和马士基航运，以及海关澳大利亚、荷兰、秘鲁、沙特阿拉伯、新加坡海关，Tradelens 的数据增长的速度为每天接近一百万个。

全球数据管道

TradeLens 实现了“数据管道”概念，并在多个欧盟研究项目中进行了探索。该平台由欧盟资助的安全项目 CORE 使用，该项目包括荷兰海关总署（Customs Administration of The Netherlands）、美国海关和边境保护局（US Customs and Border Protection）以及美国国土安全部（Department of Homeland security）的科技理事会（Science and Technology Directorate）。

区块链改变了游戏规则

区块链使参与者能够信任贸易商的数据，并且知道任何单个组织或个人都不可能更改区块链网络上的信息。TradeLens 使用的区块链技术与支撑比特币的匿名区块链有一些共同特点。然而，在许多重要的方面，它们是不同的。TradeLens 使用的区块链的六个特点对其成功尤为重要：

- 共享复制分类帐：每个直接参与区块链网络的组织都运行一个区块链节点。这些节点各自维护一个区块链副本。当数据被添加到区块链时，每个节点的副本都会自动更新。
- 不变性：区块链网络只追加。数据一旦发布到区块链，

• ***Permissioned****: The parties can be identified and only the parties participating in a specific shipment can view, submit or approve related data. This is very different from the blockchain network that lies at the heart of Bitcoin where all parties are completely anonymous.*

• ***Channels****: Divides the blockchain network into separate sub-networks. Data in any given channel is only distributed to nodes that are part of that channel.*

• ***Selective endorsement****: The reason that the TradeLens network will never suffer from the power consumption requirements that plague Bitcoin. Bitcoin must verify transactions whilst maintaining anonymity and uses a proof-of-work mechanism to do this. It is this proof-of-work mechanism that is the source of Bitcoin's huge power requirements. TradeLens members are not anonymous, so a much more efficient selective endorsement approach can be used to verify transactions.*

• ***Smart contracts****: Pieces of software code embedded in the blockchain network. They encode the business rules for a particular transaction and can be used to implement automated processes that span national and organizational boundaries.*

The benefits of platforms like TradeLens are wide-ranging.

Private sector visibility

In many countries, it is still difficult for a trader to find a consolidated cross-agency view of the release status of a shipment. By publishing key events and information to TradeLens, Customs and other government agencies can improve the visibility that traders have about the status of their shipments. This helps the private sector to better plan its activities, saving both time and money.

Truth is upstream at the source

Today, the primary player in most Customs procedures is the importer. They, or their agent, are responsible for filing a Customs declaration. They use the information provided by the exporter to do this, but generally have no opportunity to verify the physical contents of a shipment before making the declaration. The party best placed to provide accurate information about a shipment is the exporter. After all, it is generally the exporter who "packed the bag."

Platforms like TradeLens allow Customs and other government agencies to piggyback

就不能更改。如果数据中有错误，则必须添加一个新版本，在区块链中同时显示新旧版本。

• 许可：可以确定各方，并且只有参与特定装运的各方可以查看、提交或批准相关数据。这与处于比特币核心的区块链网络非常不同，在这个网络中，所有各方都是完全匿名的。

• 通道：将区块链网络划分为独立的子网络。任何给定通道中的数据都只分布到属于该通道的节点。

• 选择性背书：这是 TradeLens 网络永远不会遭受困扰比特币的电力消耗要求的原因。比特币必须在保持匿名的同时验证交易，并使用一种工作证明机制来做到这一点。正是这种工作证明机制，为比特币带来了巨大的电力需求。TradeLens 成员不是匿名的，因此可以使用更有效的选择性背书方法来验证交易。

• 智能契约：嵌入在区块链网络中的软件代码。它们为特定事务编码业务规则，并可用于实现跨国家和跨机构的自动化流程。

像 TradeLens 这样的平台的好处是广泛的。

私营部门的可见性

在许多国家，贸易商仍然很难找到一个跨机构的了解货物的放行状态的途径。通过向贸易商、海关和其他政府机构发布关键事件和信息，可以提高贸易商对货物状况的可见度。这有助于私营部门更好地规划其活动，节省时间和金钱。

增加信任

如今，大多数海关手续的主要参与者是进口商。他们的代理人利用出口商提供的信息负责报关，但通常他们在报关前没有机会核实货物的实际内容。最能提供准确装运信息的一方是出口商。毕竟，通常是出口商“打包”。

像 TradeLens 这样的平台允许海关和其他政府机构在现

their supervision processes on top of existing commercial information exchanges. As soon as a container is stuffed in the exporting country, the importing country's Customs agency could pull the purchase order and packing list from TradeLens and use them to perform a risk assessment on the shipment. Access to earlier, more complete, immutable data improves the effectiveness of targeting processes, facilitating legitimate trade, increasing compliance and improving Customs' efficiency.

A global network of local communities

In many countries, initiatives such as national electronic Single Windows and port community systems have been successful in improving the efficiency and coordination of border processes. TradeLens can integrate with and complement these initiatives, providing access to its global network of members.

TradeLens can also accelerate the emerging trend of connecting Single Windows or port community systems in order to create regional networks, by enabling these different communities to share data on a global scale.

Towards paperless trade

Since the 1970s, people have been boldly predicting the paperless office. Forty years on, paper documents remain prevalent in international trade. Bills of lading, certificates of origin, phytosanitary certificates… the list goes on. Blockchain platforms like TradeLens provide the ideal mechanism for digitizing these documents. Channels, permissions, and encryption ensure that even the most sensitive information can be kept safe from prying eyes.

Smart contracts allow the creation of automated processes that cross national and organizational boundaries. For example, a paperless end-to-end process for phytosanitary certificates; from issuance in the exporting country through to verification in the importing country. In such a process, the approval of the certificate in the exporting country is visible in real time in the importing country, and the blockchain technology ensures that no one can alter the certificate.

Platforms simplify blockchain adoption

Nodes, channels, smart contracts, consensus… Implementing your first blockchain solution can require the learning of a whole host of new terminology and technology.

有的商业信息交流的基础上履行他们的监管程序。一旦集装箱在出口国被填满，进口国的海关机构就可以从贸易商那里提取采购订单和装箱单，并利用它们对货物进行风险评估。对更早、更完整、更不可变的数据的访问提高了确定目标流程的有效性，促进了合法贸易，提高了合规性，并提高了海关的效率。

一个由当地贸易商组成的全球网络

在许多国家，诸如国家电子单一窗口和港口社区系统等倡议已成功地提高了边界进程的效率和协调。TradeLens 可以整合并补充这些倡议，提供进入其全球网络的途径。

TradeLens 还可以通过使这些不同的贸易商能够在全球范围内共享数据，加快连接单一窗口或港口社区系统的新趋势，从而创建区域网络。

迈向无纸贸易

自上世纪 70 年代以来，人们一直在大胆预测无纸化办公。四十年过去了，纸面文件在国际贸易中仍然很普遍。提单、原产地证书、植物检疫证书等等还有很多。像 TradeLens 这样的区块链平台为这些文档的数字化提供了理想的机制。通道、权限和加密确保即使是最敏感的信息也能被保护起来不被窥探。

智能契约允许创建跨越国家和组织边界的自动化流程。例如，无纸化的植物检疫证书端到端流程；从出口国的签发到进口国的核查。在此过程中，证书在出口国的批准到进口国是实时可见的，而区块链技术确保了任何人都不能更改证书。

平台简化了区块链的应用

实现第一个区块链解决方案可能需要学习大量的新术

It doesn't have to be like that. Platforms like TradeLens package the blockchain technology and benefits into an easily consumable form.

TradeLens members can connect to the platform using standard approaches such as web application programming interfaces (APIs). Or, they can use the platform's out-of-the-box user interfaces.A Customs authority can establish a connection in a few days, with a small team, rather than requiring its staff to first invest in becoming blockchain experts.

To further simplify adoption, TradeLens is committed to the promotion of industry standards and interoperability of platforms. It is continuing to align with relevant standards bodies such as UN/CEFACT as well as exploring blockchain specific interoperability mechanisms.

Customs can realize immediate benefits

By joining TradeLens, Customs authorities and other government agencies can immediately access more timely, accurate and verifiable data, and use it to improve their targeting and selection processes. This can facilitate legitimate trade and increase compliance.

The team behind TradeLens looks forward to continuing to work with governments who embrace the opportunities that the platform offers. Together, we are shaping its future and ushering in a new era of global trade that is both frictionless and compliant.

语和技术。不一定是这样的。像 TradeLens 这样的平台将区块链技术和好处打包成一种易于消费的形式。

TradeLens 成员可以使用标准方法（如 web 应用程序编程接口）连接到平台。或者，他们可以使用平台的打开即用的用户界面。海关当局可以在几天内与一个小团队建立联系，而不是要求其员工首先成为区块链专家。

为了进一步简化采用，TradeLens 致力于促进行业标准和平台的互操作性。它将继续与联合国 /CEFACT 等相关标准机构保持一致，并探索区块链特定的互操作性机制。

海关可以实现立竿见影的效益

通过加入 TradeLens，海关当局和其他政府机构可以立即获得更及时、准确和可核实的数据，并利用这些数据改进其目标和筛选过程。这可以促进合法贸易和提高合规程度。

TradeLens 背后的团队期待着继续与那些接受该平台提供的机遇的政府合作。我们正在共同塑造未来，引领全球贸易进入一个无摩擦、合规的新时代。

Going beyond the national Single Window

In December 2017, Singapore's Networked Trade Platform (NTP) became operational. A new one-stop trade information management platform, the NTP will connect digital islands across the entire trade ecosystem from traders' enterprise resource planning systems and other proprietary systems to freight forwarders and freight management systems, to last mile delivery and tracking services.

The new Platform will incorporate services currently provided through two systems: TradeNet®, Singapore's National Single Window (NSW) that caters for Business-to-Government (B2G) and Government-to-Government (G2G) connectivity, and TradeXchange®, a 10-year old information technology (IT) platform that enables the exchange of both Business-to-Business (B2B) and B2G information.

Services from TradeXchange have since been migrated to the NTP. The new NTP introduced a suite of user friendly features and value-added services to help the trade and logistics communities. Since then, the user base of the NTP has more than doubled compared to TradeXchange. In June 2018, Singapore Customs began the progressive migration of B2G trade services, currently available through TradeNet, onto the NTP.

"If it ain't broke, why fix it?"

TradeNet is almost 30 years old. Launched in 1989, when the Internet was still the domain of academics and researchers, it was well ahead of its time and its successful implementation captured the imagination of many – most aptly in the 1990 Harvard Business Review case study "TradeNet: A Tale of One City." Today, the concept of a NSW is well understood. In 2007, another chapter was written when TradeXchange was launched as part of an effort to unify the B2B trade ecosystem.

Fast forward to 2018 and the NTP. It will enable the exchange of digital trade data from source, across various B2B and B2G transactions along the entire lifecycle of trade: ranging from purchase orders and invoices, permits and shipping instructions to trade finance applications, payments and reconciliation. Today, a single trade can involve over 25 parties, generating 30-40 documents, and about 60-70% of the information is manually re-entered at least once.

The potential value of stitching disparate digital islands together is immense. In

案例四
新加坡网络化贸易平台及区块链

2017 年 12 月，新加坡互联贸易平台（NTP）正式运营。作为一个全新的一站式贸易信息管理平台，NTP 将整个贸易生态系统的数字岛屿连接起来，从贸易商的企业资源规划系统和其他专有系统，到货运代理和货运管理系统，再到最后一英里的交付和跟踪服务。

新平台将整合目前通过两个系统提供的服务：TradeNet（新加坡国家单一窗口（NSW））和连接贸易与物流网络的 TradeXchange（商贸讯通平台，一个已有 10 年历史的信息技术（IT）平台，支持企业对企业（B2B）和 B2G 信息的交换）。

TradeXchange 的服务已经迁移到 NTP，2018 年 6 月，新加坡海关开始逐步将 B2G 贸易服务迁移到 NTP。

“如果它没有坏，为什么要修理它？”

TradeNet 几乎有 30 年的历史。1989 年，当互联网还只是学术界和研究人员的领域时，它就已经启动了，它远远领先于它的时代，它的成功实施吸引了许多人的想象力——最恰当的例子是 1990 年《哈佛商业评论》（Harvard Business Review）的案例研究《TradeNet: 一个城市的故事》（TradeNet: A Tale of One City）。2007 年，TradeXchange 的启动作为 B2B 贸易生态系统一部分又书写了新篇章。

到 2018 年 NTP 整合了涉及 B2B 和 B2G 交易的所有信息。今天，一笔交易可以涉及 25 个以上的参与方，生成 30-40 个文档，并且大约 60% -70% 的信息至少需要手工重新输入一次。

信息的连接除了提高生产力、效率和准确性之外，还提

addition to productivity, efficiency and accuracy gains, there is a multitude of opportunities for innovation as data becomes connected.

During the intervening decades, the concept of the Single Window has also evolved.

Trade is to a large extent today cross-border. Digital connectivity for the NTP must, therefore, go beyond our little red dot and interoperate with other trade communities and platforms, regardless of geography or technology.

Singapore is not the only country embarking on a trade digitalization journey. All around the world, there have been hives of activity around trade digitalization fuelled by a combination of pressing business needs and pain points, combined with new possibilities and disruptions from emerging technologies.

There is now a growing willingness among businesses across the globe to digitalize, and like-minded governments and Customs authorities to ensure open and fair trade around the world. With this, Singapore is now taking another bold leap into the digital trade world.

From island to island, locally and across borders: the NTP and the GTCN

In November 2017, one month before the NTP became operational, the Monetary Authority of Singapore (MAS) signed a Memorandum of Understanding with its Hong Kong counterpart to jointly develop a cross-border distributed ledger technology (DLT) based utility infrastructure that will link up digital trade platforms and the growing number of trade-related DLT platforms and communities around the world. The seeds of what was to become the Global Trade Connectivity Network (GTCN) were sown, and the GTCN is expected to be operational in 2019.

The GTCN is envisioned as an industry-neutral, service-agnostic, cross-border utility infrastructure that does not aim to control or dominate partner networks. For a start, it will provide a common view for trade finance applications between Singapore and Hong Kong, empowering participating banks to share immutable and auditable ledger across the border, while maintaining data privacy and confidentiality through a distributed network. This allows the various stakeholders to retain control of their own commercial and financial destinies. However, the GTCN will be larger than Singapore-Hong Kong and will go beyond trade finance, even though the initial minimum viable product (MVP) is funded by monetary authorities.

The GTCN marks the first attempt to integrate digital platforms starting with

供大量的创新机会。

几十年来，单一窗口的概念也不断演变。

今天的贸易很大程度上是跨境的。因此，NTP 必须与其他贸易社区和平台进行互操作，不论地理位置或技术如何。

新加坡并不是唯一一个踏上贸易数字化之路的国家。在全球范围内，围绕贸易数字化的倡议如蜂箱般涌现。

如今，全球企业越来越愿意数字化，志同道合的政府和海关部门也越来越愿意确保全球贸易的开放和公平。有鉴于此，新加坡正朝着数字贸易领域迈出又一大步。

从一个岛到另一个岛，本地和跨境：NTP 和 GTCN

2017 年 11 月新加坡金融管理局（Monetary Authority of Singapore）与香港金融管理局（HongKong Monetary Authority）签署了一份谅解备忘录，双方将合作开发“全球贸易连接网络”（GTCN），运用分布式分类账技术（DLT）构建跨境基础设施建设，推动贸易数码化与逐渐增多的 DLT 平台融合。预期“全球贸易连接网络”将在 2019 年初投入运作。新加坡同时于 2018 年 9 月正式启动“互联贸易平台”，本文解释了在 DLT 和非 DLT 技术的支持下，这两个系统如何在构建全球贸易生态系统方面发挥互补作用。

GTCN 被设定为一个行业中立、服务无关、跨国界的公用事业基础设施，其目标不是控制或主导合作伙伴网络。首先，它将为新加坡和香港之间的贸易融资应用程序提供一个共同的视角，使参与其中的银行能够在跨境共享不可变和可审计的账簿，同时通过一个分布式网络维护数据隐私和机密性。这使得各利益攸关方能够保持对自己商业和金融的管控。不过，GTCN 的规模将超过新加坡和香港，而且将超越贸易融资。

GTCN 标志着从新加坡和香港开始整合数字平台的首次

Singapore and Hong Kong, and aims to address and provide digital solutions to challenges prevalent in international trade, where differing trade regulations and documentation standards predominate. In addition, the GTCN would help lay the foundation for a regional digitalized trade and supply chain platform in Asia. The end outcome is to enhance supply chain transparency, integrity and security.

The power of the whole is always greater than the sum of its parts. Just as the benefits to the economy are far greater than the sum of individual firms' bottom-line and top-line gains. The NTP and the GTCN play complementary roles to stitch up the global trade ecosystem, empowered by both DLT and non-DLT based technologies. The GTCN will technically enable different stakeholders to connect through DLT platforms and automatically exchange information between parties, according to specific protocols.

As Karl Wust and Arthur Gervais aptly sum it up, "Blockchain is being praised as a technological innovation, which allows (us) to revolutionize how society trades and interacts. This reputation is, in particular, attributable to its properties of allowing mutually mistrusting entities to exchange financial value and interact without relying on a trusted third party."

In the world of cross-border trade, where different regulators such as Customs authorities, central banks and monetary authorities, food and health regulators, and security agencies, interact with a myriad of business (logistics, ocean and air freight, warehousing and trucking, banks, and traders of every imaginable form), one can easily imagine the potential of the technology.

DLT is useful where there is no central authority and the community self-orchestrates and self-organizes. Information is only written into the distributed ledger, timestamped and digitally signed, after consensus has been reached between the parties involved. Any change thereafter is a new entry to the ledger. This feature of DLT provides for protected data storage and provides a sense of transparency, enforcing accountability where there is no central authority.

Kurt and Gervais list three conditions where DLT will make sense. First, where there are multiple mistrusting entities, and there is no agreement on who is an online trusted third party. Second, there are multiple writers of data and there is data to be stored. Finally, the multiple mistrusting entities must want to interact and change the state of a system.

尝试，旨在解决和提供数字解决方案，以应对国际贸易中普遍存在的挑战：在国际贸易中存在不同的贸易法规和文件标准。此外，GTCN 还将为亚洲地区的数字化贸易和供应链平台打下基础。最终的结果是提高供应链的透明度、完整性和安全性。

整体的力量总是大于各部分的力量之和。NTP 和 GTCN 发挥互补作用，通过 DLT 和基于 DLT 的非 DLT 技术来构建全球贸易生态系统。GTCN 将在技术上允许各方通过 DLT 平台连接，并根据特定的协议在各方之间自动交换信息。

正如 Karl Wus 和 Arthur Gervais 恰当地总结的那样，“区块链被誉为一项技术创新，它让（我们）能够彻底改变社会交易和互动的方式。”这种声誉，特别是由于其允许相互不信任的实体交换财务价值和互动，而不依赖于一个值得信任的第三方”。

跨境贸易不同的监管机构，如海关，中央银行，食品和卫生监管机构和安全机构，与无数的业务方交互（物流、海、空运、仓储和运输，银行，和各种形式的交易员），人们可以很容易地想象技术的潜力。

DLT 在没有中央权威和社区自组织的情况下非常有用。只有在相关各方达成一致意见后，才会将信息写入分布式分类账，并加盖时间戳和数字签名。此后的任何变动都要重新入账。DLT 的这一特性提供了受保护的数据存储，并提供了一种透明性，可以在没有中央权威的地方强制执行问责制。

Karl Wust 和 Arthur Gervais 列出了 DLT 有意义的三种条件。首先，存在多个不可信的实体，并且没有就谁是在线可信第三方达成协议；其次，有多个数据写入器，需要存储数据；最后，多个不信任实体必须想要交互并更改系统的状态。

Linking up digital trade ecosystems, like any collaboration, can only succeed when the diverse needs, interests and concerns of all stakeholders are satisfactorily addressed. Because needs and interests are often different and evolve differently for stakeholders over time, all parties find it challenging to entrust the control of any shared platform to any single party.

DLT emerges as the technology with features that are a good fit for the GTCN. The 'connect once, connect to all' model of the GTCN allows all participants to quickly scale their own connectivity to a wide spectrum of national Single Windows operated by governments and digital platforms in the B2B space, which cater to a wide spectrum of business and transaction needs.

Here, the need to manage interests not only traverses countries, but also various industries and companies, with each of these interests intersecting and interacting with their own countries' regulators and authorities.

Taken together, the distributed authority and immutable characteristics of DLT has made it possible for the GTCN to address not just the functional needs of integrating digital trade across the trade ecosystem, across borders, but also the underlying challenges of marrying various stakeholders' interests and associated trade-offs that would have to be agreed upon before the possibilities of a shared platform without a single, central authority.

Conclusion

The GTCN's vision to connect different trade platforms without intervening in each platform's rules and processes is ambitious, but probably not new3. While the GTCN's success is not dependent on DLT per se, the characteristics of DLT have removed some long standing stumbling blocks when a large number of parties, often unknown to each other, come together to interact and transact.

One critical success factor remains – willing actors. As Adam Green writing for the Financial Times notes, while the technology might be tamper-proof and collaboration-friendly, "the same is not always true of its users."4 Despite uncertainties with DLT, such as scalability, many acknowledge that, in cross-border trade, at least, participants would benefit from DLT.

Despite the vast potential of DLT to address the stumbling blocks of cross-border digital trade connectivity, there is still a critical role for regulators to play, by, for

与任何合作一样，只有在满足所有利益攸关方的各种需求、利益和关切时，数字贸易生态系统之间的联系才能取得成功。由于需求和兴趣常常是不同的，并且随着时间的推移，涉及的各方也会有所不同，所以所有各方都发现将任何共享平台的控制权委托给任何一方都很有挑战性。

DLT 作为一种技术出现，其特性非常适合 GTCN。GTCN 的“一次连接，连接到所有人”模型允许所有参与者快速地将自己的连接扩展到政府运营的全国性单一窗口和 B2B 领域的数字平台的广泛范围，这些平台满足了广泛的业务和交易需求。

在这方面，管理利益的需要不仅涉及各国，而且涉及各个行业和公司，每个行业和公司的利益都与各自国家的监管机构和当局相交叉和相互影响。

综上所述，DLT 的分布式权威和不可变的特点已经使 GTCN 不仅解决了需要集成跨国境数字贸易生态系统的功能，而且在挑战各个利益相关者的利益之前，已经在没有一个集中权威的情况下就共享平台达成一致。

结论

GTCN 的愿景是在不干预每个平台的规则和流程的情况下连接不同的贸易平台，这是雄心勃勃的。虽然 GTCN 的成功并不依赖于 DLT 本身，但 DLT 的特点消除了一些长期存在的障碍，即大量互不相识的各方聚集在一起进行交互和交易。

一个关键的成功因素仍然存在——参与者的意愿。正如亚当．格林（Adam Green）为英国《金融时报》撰写的一篇文章所指出的，尽管该技术可能具有防篡改和协作友好性，“但它的用户并不总是这样”。尽管 DLT 存在诸如可扩展性等不确定性，但许多人承认，至少在跨境贸易中，参与者将受益于 DLT。

尽管 DLT 在解决跨境数字贸易互联互通的瓶颈方面具有

example, providing data governance and standardization to ensure interoperability. Perhaps it is more important than ever before for regulators to do so.

With the technology capabilities in place with the advent of DLT, it is perhaps timely that regulators get together, step up and lead efforts to harness and harvest the potential that this new technology offers, as well as lead efforts to digitally connect trade end-to-end, across industries and across borders.

巨大潜力，但监管机构仍可发挥关键作用，例如提供数据治理和标准化，以确保互操作性。或许，监管机构这么做比以往任何时候都更为重要。

随着 DLT 的出现，技术能力已经具备，监管机构也许是时候聚在一起，加强并领导努力，利用这项新技术所提供的潜力，并努力实现跨行业、跨国界的端到端的数字贸易连接。

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