Does e-commerce and the growing availability of trade data mean that the customs declaration may no longer be required?

Geoff Bowering

Abstract

This research examines whether the growth in the availability of trade and logistics data, and the ability of customs authorities to access it, means that the import declaration is no longer required. A literature review explored existing trade data, relevant technology and recent trade-data-related initiatives. Case studies of the role of the import declaration identified how it is used for customs border management and the data required. The analysis shows that an effective Authorised Economic Operator (AEO) program, combined with separately sourced data, may remove the need for an import declaration from compliant traders.

1. Introduction

Trade facilitation measures reduce the cost of conducting international trade by minimising or streamlining interactions with government to limit their impact on business and stimulate international trade (Grainger, 2008, p. 20). Common approaches include replacing documentary processes with electronic ones, such as through electronic customs systems; aggregating separate transactions with different agencies into one transaction, such as through single window systems; or reducing the complexity of those interactions, through the use of harmonised data sets (Choi, 2011, pp. 6–18).

Initiatives supporting the data pipeline concept seek to make greater use of supply chain data to increase accuracy and provide operators, including customs authorities, with greater visibility (Hesketh, 2015, paras 1–5). At the same time, Customs reuses industry-generated data to reduce the reporting burden on supply chain operators.

Previous initiatives have sought to change the way that declarations to customs authorities are made. However, developments in technology and data availability may offer opportunities to remove the need for these declarations altogether.

This paper explores the trade and logistics data that is generated and used by supply chain operators, and how it is used by customs authorities. It considers whether current and emerging technology can be used to remove the need for customs declarations, specifically the import declaration.

The research question that this paper aims to address is: Does e-commerce and the growing availability of trade data mean that the customs declaration may no longer be required?

This question will be explored through consideration of three key areas of study in the literature-based research:

1. The current state of trade and logistics data availability and the initiatives that have leveraged this in the past.
2. The data, regulatory and procedural requirements that the import declaration satisfies.
3. The issues that exist beyond the data requirements of import declarations, which must be addressed to remove the import declaration.

2. Literature review

The 'data pipeline' concept, as described by Hesketh (2009, 2010) and detailed further by Van Stijn et al. (2011), changes the nature of the traditional customs declaration. It allows trade and logistics data to be shared and reused throughout the supply chain and be available to the origin or destination customs authorities from the moment that it is created. It has also been the subject of a number of proofs of concept and trials by customs administrations, in particular in the European Union (EU) through the Common Assessment and Analysis of Risk in Global Supply Chains (CASSANDRA) and Consistently Optimised Resilient Secure Global Supply Chains (CORE) projects.

Data pipeline initiatives piggyback on the data available in the enterprise resource planning (ERP) systems of operators in the supply chain (Tan, Bjørn-Andersen, Klien, & Rukanova, 2010). ERP systems share data between different areas within an organisation—including finance, operations and logistics—to maximise efficiency through data reuse. They facilitate the sharing of data between vendors, suppliers and customers (Madu & Kuei, 2005, pp. 1–5), and are 'the digital backbone for information in supply chains' (Wang, Hulstijn, & Tan, 2016, p. 3).

Data sourced directly from ERP systems will be of a higher quality than the equivalent obtained by customs through other means (Henningsson, Gal, Bjorn-Andersen, & Tan, 2011; Tan et al., 2010). By linking supply-chain actors in real time and establishing an audit trail, ERP systems reduce data inaccuracies and the potential for fraudulent activity (Kloeden, 2007, p. 13). This includes real-time detection through the continuous monitoring of transactions (Stanton, 2012, pp. 12–13) and data validation to identify and remove inconsistencies before reporting documents to customs (Ernst & Young, 2006, p. 34). Customs may also 'pull' this data directly from ERP systems, rather than wait for it to be 'pushed' to them as formal reports or declarations (Hofman, 2011).

'Pulling' this data, though, can neglect benefits of receiving data through formal declarations. Parties making declarations to customs are required to attach their signature to that declaration to confirm their identity; demonstrate that they approve of and accept the contents of the declarations; and prevent later deniability of that declaration ('non-repudiation') (Reed, 2000; Lim, 2002). That signature can take many forms, from the name at the end of an email, a password or personal identification number (PIN), through to biometric identifiers or cryptographic signatures (Vaduva, 2014). The use of cryptographic signatures, supported by public key infrastructure (PKI), can replicate signatures used on traditional documentation and, in a technical sense, will be even more secure (Chukwuma, 2013).

Data from declarations or ERP systems can be supplemented to increase visibility along the supply chain. Supply chain visibility is the knowledge of 'the identity, location and status of entities transiting the supply chain, captured in timely messages about events, along with the planned and actual dates/times for these events' (Francis, 2008, p. 182). Container security devices (CSDs) and related technologies provide supply chain visibility for cargo transported at the shipping container level. These devices can use global positioning system (GPS) or mobile telephone technology to record and transmit the location of a container at given intervals to interested parties. Some devices are also able to report whether the container has been opened, or monitor the temperature, humidity and shock that the container has been subjected to (Scholliers, Permala, Toivonen, & Salmela, 2016). Track and trace technologies, used by logistics operators to provide real-time awareness of an article's location, also support supply chain

visibility (Shamsuzzoha & Helo, 2011). Scans of barcodes and radio frequency identification (RFID) devices generate large amounts of data that can inform the logistics provider and others about where a consignment is, or was, when it arrived and departed, and even who was responsible for its delivery or acceptance.

Port community systems (PCS) act as hubs for a significant amount of logistics data, linking transport and regulatory documents. By integrating with customs systems and container integrity systems that track container movements, PCSs are able to provide visibility down to the level of the individual container within the port environment (Van Oosterhout, Veenstra, Meijer, Popal, & Van den Berg, 2007).

Direct access to commercial data offers real-time supply chain visibility, letting regulatory authorities proactively address emerging supply chain risks (Widdowson & Holloway, 2009; Klievink et al., 2012). Accessing supporting data along the supply chain in near-real-time, such as that available from CSDs, gives Customs much greater capacity to determine the risk of interference in the consignment and respond appropriately (Altemöller, 2016, p. 28). Greater supply chain visibility increases the integrity of the supply chain and reduces its susceptibility to be used to traffic illicit commodities (Hintsa, Männistö, Urciuoli, & Ahokas, 2012).

While traditional customs risk assessment relies upon consignment data from customs declarations, a better picture of the supply chain is available with the addition of third-party logistics and trade data (Inter-American Development Bank, 2010, p. 38). Risk assessment commences when the consignment commences and occurs along the supply chain. However, this does complicate the task by requiring continual reassessment and integrating multiple data sources along the supply chain (Greis & Nogueria, 2011).

A current initiative to develop a secure open interface by shipping line, AP Moller Maersk, and IBM—a shipping information pipeline (SIP)—uses blockchain technology to facilitate the sharing of logistics data between supply chain parties, while maintaining the security and integrity of that data (IBMBlockchain, 2017). This initiative aims to provide supply chain actors with an end-to-end visibility of consignments and access to relevant logistics documents or supply chain events. It is also intended to give customs 'real time visibility, significantly improving the information available for risk analysis and targeting' (IBM, 2017, para 9).

A blockchain is a 'list ("chain") of groups ("blocks") of transactions' (Staples et al., 2017, p. 2). Rather than being centrally stored in a traditional database, these blocks are replicated across all systems participating in the blockchain. This data replication prevents a participant from tampering with records on the blockchain. Users digitally sign data before adding them to the blockchain to maintain data integrity and security. The use of a blockchain also establishes a mechanism for data to be shared across a number of parties without the need for a centralised controlling authority (Hackius & Petersen, 2017). Chukwuma (2013) criticises the use of electronic data, compared to paper documents, as it can be secretly manipulated or corrupted. The use of an immutable blockchain record would overcome that concern.

The World Customs Organization's (WCO) Framework of Standards to Secure and Facilitate Trade (SAFE Framework) provides a mechanism for supply chain integrity through authorised economic operators (AEOs), with supply chain security and trade compliance processes validated by Customs, connected across countries participating in mutual recognition agreements (MRAs; WCO, 2015). Where AEOs make their logistics data (such as that from in their ERP systems), available to Customs, greater supply chain visibility is possible, risk assessment is improved and the trust between customs and industry increased (Henningsson et al., 2011; den Butter, Liu, & Tan, 2012).

Making a data pipeline viable is complicated by conflicts around the sharing of data, adoption of standards and the level of participation required from the large number of supply chain operators involved (Rukanova, Henningsson, Henriksen, & Tan, 2017), as was borne out by the CASSANDRA

initiative (Zomer, Tan & Hofman, 2014). To succeed, a data pipeline requires a governance structure in place with a lead organisation (such as in the IBM/Maersk SIP); considerable sharing of data (e.g. CASSANDRA), or a strong sense of collaboration between participants (Hulstijn, Hofman, Zomer, & Tan 2016). Reducing the number of required participants while simplifying the mechanism for sharing data could improve the chances of realising trade facilitation benefits sooner.

3. The purpose of the import declaration

Import declarations are used by customs authorities to meet a variety of purposes. Two case studies—Australia and the United States—supported by WCO recommendations, will draw out these purposes and the data required for the import declaration to fulfil them.

3.1 Australia

In Australia, the Department of Home Affairs and its operational arm, the Australian Border Force (ABF), perform the customs function. In the international trade context, ABF 'facilitates legitimate trade while remaining vigilant to attempts to circumvent trade regulations and processes' (Department of Immigration and Border Protection [DIBP], 2016, p. 25). The information on the import declaration is used to determine duties, taxes and charges payable; whether the goods are subject to controls, such as requiring a permission or being prohibited; and as the basis for compiling international merchandise trade statistics (DIBP, 2009; Australian Bureau of Statistics, 2017).

The import declaration requires the person lodging it to provide the information, including: the overseas supplier and the importer; the Harmonized System (HS) code, quantities, origin and customs value of the goods; any applicable duty preference schemes; and any required permits, licences and certificates. The import declaration also requires the transport details of the consignment, such vessel or flight, container number, air waybills or bills of lading (Australian Customs and Border Protection Service [ACBPS], 2013, pp. 4–30).

Importantly, a person making an import declaration to ABF must provide evidence of identity (EoI) to verify their identity with ABF. Where a broker lodges an import declaration on behalf of the importer, the broker will have provided EoI to ABF in the past and will have procedures in place to establish the identity of the importer (ACBPS, 2013, p. 2). Where brokers or importers lodge import declarations electronically via the Integrated Cargo System (ICS), they will establish their identity with a digitally signed certificate using PKI. This certificate is also used to secure the electronic message to prevent non-repudiation by the sender and tampering of the message in transit (ABF, n.d., paras 1–2).

3.2 The United States

The United States Customs and Border Protection (CBP) describes its mission as '[t]o safeguard America's borders thereby protecting the public from dangerous people and materials while enhancing the Nation's global economic competitiveness by enabling legitimate trade and travel' (CBP, n.d., para 4).

To obtain release from Customs of imported goods, the importer must make an 'entry filing' to CBP. This may be submitted prior to the goods arrival, and will be comprised of supporting documents to allow CBP to make a risk assessment of the goods and determine the amount of revenue payable. These may include a bill of lading or air waybill, a commercial invoice, a packing list, evidence that any duties can be paid, and any import permits required (Jones & Rosenblum, 2013, pp. 18–19). The entry filing also requires details about the vessel or flight importing the goods, including shipping document numbers; identification of the importer and consignee; and a description, HS code and country of origin of the goods (Brew & Jenkins, 2004, pp. 8–9).

The entry filing also requires evidence that a bond has been established with CBP to secure the revenue payable on the goods being imported (CBP, 2016, p. 1). Therefore, this entry filing is not used for the basis of calculating the revenue payable in the goods (other than to provide guidance that the bond is sufficient to cover the revenue payable), and is used principally for the determination of risk of the consignment. Following the release of the goods, the 'entry summary' is lodged by the importer or broker, which contains much of the information of the entry filing, with more detailed information about the goods to allow CBP to make an accurate assessment of the revenue payable for the consignment (CBP, 2006, p. 13).

EDI submissions to the automated commercial environment (ACE) are through a virtual private network, which offers the security of transmission, and users are identified through unique message queues and an EDI password (CBP, 2010, p. 26).

3.3 World Customs Organization

The WCO's Revised International Convention on the Simplification and Harmonization of Customs procedures (Revised Kyoto Convention; RKC) is a set of standards for customs procedures designed to promote the facilitation of international trade while maintaining the integrity of the border and the collection of revenue (Yasui, 2010, p. 2). With regard to the making of a goods declaration to a customs authority, the RKC recommends that:

- the party making the declaration is held accountable for the quality of data in the declaration
- the declaration data should be limited to that required for calculation of revenue payable and the collection of statistics, although supporting documentation may be submitted to ensure that all customs laws are met
- it should be possible to lodge the declaration and supporting documentation before the arrival of the goods
- it should be possible to lodge declarations electronically, and customs authorities should make use of e-commerce as much as possible to enhance customs control (WCO, 2006, pp. 6–25).

The information required on the declaration will include 'importer, description, quantity, valuation, classification, supplier, origin and any licensing requirements' (WCO, 2000, p. 19). The WCO also recommends that the need for supporting documents, such as invoices and transport documents, be eliminated where possible and otherwise provided electronically. This allows for the 'release and clearance of cargo based only on electronic declaration and automated verification' (WCO, 2012, p. 2).

3.4 Import declaration functions

Based on the Australian and United States case studies, the import declaration supports the following functions:

- risk assessment of goods crossing the border, to identify illicit goods
- calculation of revenue payable
- determination of whether permits and licences etc. are required and to communicate their existence to customs
- collection of trade statistics.

Ideally, the declaration will be communicated electronically before the arrival of the goods in the importing country. It will contain information regarding the parties in the transaction, such as the exporter and importer; details of the goods in the consignment; the conveyance that carried the goods, such as vessel or flight; and evidence of any required permits or licences.

The party making the declaration is held accountable for the accuracy of the importation supplied to customs, so therefore must be reliably identified. When communications with customs authorities are electronic, this is through a form of electronic signature.

4. An alternative to the data pipeline

The data pipeline and the initiatives to develop it further—CASSANDRA and CORE—offer trade facilitation benefits to supply chain participants through reduced reporting burden and greater supply chain visibility. They also offer customs authorities a wider range of data earlier in the supply chain, strengthening risk assessment capabilities.

However, supply chains involve a large number of parties that must coordinate their activities to expedite international trade. While not all of these parties will contribute data to the pipeline—only four messages were used in the CORE initiative—the active participation of all necessary parties is required for the success of a data pipeline. In addition, the 'network effect' of these initiatives means that, until the scope of participants is large enough to provide net benefits to new participants, growth will be slow (Rukanova et al., 2017, p. 196).

To offer the benefits of a data pipeline to supply chain operators and customs authorities, an alternative could involve using supply chain and supporting data while requiring the active participation of fewer supply chain participants. With fewer required participants, the negative impacts of the network effect are minimised and the chance for initial success and future growth is increased.

Trade facilitation benefits of a data pipeline arise from the simplification of reporting to customs authorities, as this reduces the cost of a trade transaction to industry. Rather than simplifying this transaction, a greater trade facilitation benefit could be obtained from removing this requirement completely. To do so would require using various supply chain data sources and technology for customs authorities to access and manage it.

5. Opportunities to remove the import declaration

5.1 Using the SAFE Framework to remove the import declaration

The SAFE Framework supports the risk assessment of entities operating in the supply chain, rather than their individual consignments. Where trading partners engage in MRAs, it is possible to secure the end-to-end supply chain—an 'authorized supply chain' (WCO, 2015, p. 12) or 'trusted trade lane' (Hulstijn et al., 2016, pp. 304–305)—and treat the goods as consistently low risk.

A condition of the SAFE Framework is that AEOs have demonstrated compliance with customs requirements (WCO, 2015, p. IV/3). Depending upon the national customs legislation, this may include compliance with requirements to obtain permissions and licences for border clearance. Where this is the case, rather than use the import declaration to determine whether import permits are required, the importer can be expected to manage this.

Without an import declaration, the statistical data it provides must come from another source. A possibility is for the exporting country's customs authority to provide this from their export declaration.

The 'authorized supply chain' concept recommends the use of the export declaration to meet the import declaration requirements. This requires the export declaration to contain enough information to meet the importing country's statistical purposes. In practice, though, export declaration data can be less detailed than that for the import declaration (ACBPS, 2009, pp. 4–5).

More complete and accurate data will be available from the exporter's ERP system. In addition to being capable of providing the required statistical data, this data will identify the parties in the transaction to confirm that they are low risk.

Trade and logistics information, such as invoices and packing lists, are increasingly stored and shared electronically between parties through ERP systems, rather than by paper. Where documents have a legal basis, such as bills of lading, they can be securely transacted using frameworks such as the Bolero system (Bolero International Limited, n.d.). In addition to statistical data, the ERP systems of traders and service providers offer a source of logistics data to support risk management and assure customs authorities that the entities have well-managed business processes (Wang et al., 2016). ERP systems have the potential to be an alternative source of the data provided by importers on, or in addition to, the import declaration.

Data from the exporter's ERP system informs the beginning of the supply chain. The CORE initiative made use of data from the exporter at the consignment completion point (CCP). This data was followed by carriage data provided after departure and logistics data provided prior to arrival, allowing the consignment to be identified—logically and physically—along the supply chain (Hesketh, 2015). Pulling data from PCSs, CSDs, track and trace systems and other sources can provide real-time visibility.

Even if the entities in the supply chain are low risk, the importer must be held accountable if illicit goods are detected. If the only data available is that provided originally by the exporter, the importer may be able to deny knowledge of any illicit goods. To prevent this, a mechanism by which the importer takes responsibility is necessary.

A suitable technology for this is a blockchain. Rather than use a blockchain to receive, store and provide all data within a transaction, which could be considerable, only the data required to describe the transaction and to establish the exporter's and the importer's responsibility for the consignment is required. A purchase order or similar commercial document would establish the counterparties in the transaction, confirmed by the attachment of their digital signatures to the document through the blockchain. With the identities of the counterparties and their relationship to the consignment established immutably by blockchain and a digital certificate, the importer could be held responsible for the consignment even without having provided data to the destination country's customs authority.

The SAFE Framework recommends that AEOs have internal systems that secure the information contained therein, and can communicate electronically with customs authorities (WCO, 2015, p. IV/7). There is no requirement, however, for AEOs to have modern ERP systems and to integrate them with their supply chains. This requirement would need to either be established within the SAFE Framework or established separately within the AEO programs used for this process. However, this may limit the size and sophistication of traders who can participate in this solution. While the SAFE Framework requires that AEOs comply with customs requirements, this needs to be confirmed to include compliance with all border-related laws, including requirements to obtain necessary permissions and licences to import (or export) goods.

The Australian import declaration is not only used as a mechanism to determine whether an import permit or licence is required, but also as a vehicle for reporting some of those permits to the government. While an AEO can be relied upon to obtain all of the necessary permits prior to importation and meet all legislative requirements, without the import declaration an alternative way to report any permits is needed.

5.2 Removing the import declaration without the SAFE Framework

Without being able to rely upon the security and trade compliance requirements of AEO programs, and the availability of trade and logistics data from an AEO's ERP system, the ability to remove the import declaration is more complicated. The destination country's customs authority is unable to rely upon the data from the exporter's ERP system; there may not be the MRA relationship that allows the data to be shared; and the parties in the supply chain are unknown and therefore of unknown risk.

A means of achieving the removal of the import declaration within this context could build upon the previous solution—counterparties digitally signing a trade contract immutably recorded on a blockchain—to maintain consistency of approach. The use of a PKI-based digital certificate establishes identity.

Without an AEO relationship between the exporter and the exporting country's Customs, there can be no expectation of obtaining trade data from an ERP system. Instead, the initial data for the consignment may be drawn from the export declaration and placed on the blockchain to be digitally signed by both the exporter and importer. This may not be sufficient for an import declaration (ACBPS, 2009, p. 4), but will be sufficient to create an initial record of the consignment and to establish liability for data accuracy.

The destination country's customs authority can use this information to make an initial decision about the risk assessment about the consignment, supported by data obtained throughout the supply chain. This includes transactional data from the buyer, seller and their intermediaries; physical data from supply chain monitoring technologies; and risk management data from quality control checks and standards (Klievink, Aldewereld, Knol, & Tan, 2014, p. 10).

There are many third-party sources of trade and logistics data: the International Air Transport Association's (IATA's) e-freight initiative seeks to make air waybills and other air cargo documents fully electronic (International Air Transport Association, 2017, paras 2–4); Bolero hosts a system to manage legally acceptable electronic bills of lading (Bolero, n.d., pp. 1–2); GS1 has information frameworks that identify goods at greater levels of granularity than HS codes, and facilitate the sharing of detailed event and tracking data (GS1 US, 2012, p. 1; Good, Gahan, Butar, & Dehghan, 2015, p. 2) and supply chain data integrators, such as Buy Sell Move, use the cloud to share goods, transport and other supply chain data between parties (BSM Global, 2017, paras 1–5).

However, rather than require specific messaging that needs to align to all messages for a consignment within the supply chain, as per the CORE initiative, customs authorities can instead pull this data from available systems as the goods progress along the supply chain. In doing so, they can build a complete picture of the consignment and the risk that it poses to the border. This reduces the burden on the supply chain parties to send messages to one or more customs authorities.

Where enough data becomes available for customs to make a decision that the goods do not pose a risk to the border, the customs release may be communicated to the importer. Even when the traders involved in the consignment are not AEOs, they are able to benefit from greater availability of supply chain data.

The SAFE Framework requires that AEOs have measures in place to secure the cargo and conveyances in their supply chains, and for their service providers to maintain supply chain security (WCO, 2015, pp. IV/8–IV/13). Where the supply chain operates outside of the SAFE Framework, other means to secure the supply chain will be required.

Using CSDs with the functionality to provide the real-time container tracking allow the importing country's customs authorities to track the location and status of the container. They can identify any movements inconsistent with those expected from the movement data received from other sources, or if the container has been accessed. Alternatively, the use of track and trace technology can provide a degree

of supply chain visibility. However, each data source needs to be secure and trusted as accurate, in order to be relied upon by customs.

This approach can provide data sufficient for risk assessment and providing visibility across the supply chain, assuming the required data sources are in place and can be trusted. While data would be pulled from the required systems, each data provider must have the necessary infrastructure in place to allow data to be accessed. However, the need to involve numerous data providers complicates the implementation and operation of this approach. As per the CASSANDRA and CORE initiatives, the network effect may limit early adoption.

The legislative compliance that AEOs must have in the approach under the SAFE Framework does not exist here. While there may be sufficient data for the import country's customs to determine if an import permit or licence is required for the consignment, they will be unable to confirm if such a permit or licence exists.

Further, without AEO compliance requirements Customs is unable to trust the importer to calculate revenue liabilities correctly. While simple consignments with, for example, a transaction valuation may mean that their revenue to be calculated fairly easily from export declaration data, more complex valuation methods or the use of preferential duty rates could not be supported through this approach.

6. Conclusion

The import declaration serves a number of purposes for customs authorities: risk assessment; revenue calculation; determination of permit and licence requirements; and the collection of statistical data. Any approach seeking to remove the import declaration must also be capable of meeting these requirements. It must also have a mechanism to hold the importer responsible for the data reported to customs.

New and existing sources of trade and logistics data can be leveraged to provide the data that would otherwise be supplied to a customs authority through the import declaration. When available to Customs, data used to provide supply chain visibility, such as that from CSDs, can help mitigate supply chain risks.

The SAFE Framework allows customs authorities to trust operators in the supply chain, and therefore rely upon the importer meeting many of the requirements of the import declaration independently. When original data comes from a trusted exporter in the country of origin, this data can be taken to be correct. It can be assumed that the importer will pay the correct amount of revenue, have all necessary permits and licences, and not pose a risk to the border. The destination country's customs authority provides an import clearance much earlier, giving the importer certainty in the operation of their supply chain, and reduces the burden of submitting documentation. As long as this data is sufficient for statistical collection purposes, it could meet all of the requirements of an import declaration.

Where the operators in the supply chain do not participate in an AEO program, it is not possible to meet the requirements of the import declaration with third-party data sources and supply chain technology. Receiving the export declaration from the customs authority in the origin country is unlikely to be sufficient to meet the data requirements of the import declaration, although it can be supplemented with other data gathered along the supply chain. This may be sufficient for risk assessment purposes and for the collection of statistical data. While this data may be used to determine whether a permit or licence is required, it can't confirm that the permission exists. It also can't be relied upon to determine the correct duty payable.

Where the exporter and importer are AEOs and an MRA exists between the relevant customs authority, there is potential to remove the need for an import declaration, although some enhancements to the SAFE Framework may be required. However, without the trust established through an AEO program and an MRA relationship between trading partners, the removal of the import declaration is unrealistic.

To further this possible solution, the scope of the data to be initially stored on the blockchain and countersigned by the traders involved must be confirmed. In particular, it must contain enough data to meet the statistical data collection requirements of the importing country. It must be available to the exporter at the CCP so that it can be provided to the destination country's customs authority.

It will also need to be determined whether a digital signature attached by the importer to the trade data supplied to the blockchain by the exporter is sufficient to establish a legal liability for that data upon the importer. Finally, the potential for data provided by the exporter on the blockchain to meet the requirements of the import declaration would need to be tested in practice to determine whether this approach provides tangible trade facilitation benefits to make participation in this solution worthwhile.

References

ACBPS—see Australian Customs and Border Protection Service.

Altemöller, F. (2016). Counter-terrorism and data transfers in international trade. *World Customs Journal, 10*(1), 27–34.

Australian Bureau of Statistics. (2017). *5368.0 – International trade in goods and services, Australia, July 2017*. Retrieved from http://www.abs.gov.au/Ausstats/abs@.nsf/0/EAE0FA2D43C9E588CA2577360017E8FE?OpenDocument

Australian Customs and Border Protection Service. (2009). *Customs to customs data exchange proof of concept report*. Canberra, Australia: Australian Customs and Border Protection Service. Retrieved from http://www.customs.gov.au/webdata/resources/files/CustomsDataExchangeConcept.pdf

Australian Customs and Border Protection Service. (2013). *Documentary import declaration comprehensive guide*. Australian Customs and Border Protection Service. Retrieved from https://www.homeaffairs.gov.au/Importingandbuyinggoodsfromoverseas/Documents/documentaryimportdeclarationguideupdatedjan2013web.pdf

Bolero International Limited. (n.d.). *The Bolero Electronic Bill of Lading (eBL) – Overview*. Bolero International Limited. Retrieved from http://www.bolero.net/files/downloads/eBLOverview.pdf

Brew, J., & Jenkins, N. M. (2010). *Customs 101: Importation process basics*. Crowell & Moring, LLP. Washington DC: Trade & Customs Law. Retrieved from https://www.crowell.com/documents/Customs-101-Importation-Process-Basics.pdf

BSM Global. (2017). Frequently asked questions. Retrieved from http://www.buysellmove.com/knowledge-resources/faqs/

CBP—see US Customs & Border Protection.

Choi, J. Y. (2011). *A survey of single window implementation* (Research Paper No. 17). World Customs Organization. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.696.1904&rep=rep1&type=pdf

Chukwuma, R. F. S. C. (2013). Can the functions of a paper bill of lading be replicated by electronic bill of lading? *Public Policy and Administration Research, 3*(8), 101–108.

den Butter, F. A. G., Liu, J., & Tan, Y.-H. (2012). Using IT to engender trust in government-to-business relationships: The Authorized Economic Operator (AEO) as an example. *Government Information Quarterly, 29*(2), 261–274. https://doi.org/10.1016/j.giq.2011.05.004

Department of Immigration and Border Protection. (n.d.). *About digital certificates*. Retrieved from https://www.border.gov.au/Busi/cargo-support-trade-and-goods/cargo-support/integrated-cargo-system/about-digital-certificates

Department of Immigration and Border Protection. (2009). *Clearance of Cargo – Imports: Practice Statement PS2009/23*. Canberra: Department of Immigration and Border Protection. Retrieved from https://www.border.gov.au/AccessandAccountability/Documents/practice-statements/ps200923-clearance_of_cargo_imports.pdf

Department of Immigration and Border Protection. (2016). *Department of Immigration and Border Protection: Annual report 2015–16*. Canberra: Department of Immigration and Border Protection. Retrieved from https://www.border.gov.au/ReportsandPublications/Documents/annual-reports/annual-report-full-2015-16.pdf

DIBP—see Department of Immigration and Border Protection.

Ernst & Young. (2006). *Global customs risk management: An examination of leading practices*. Retrieved from http://www.ey.com/Publication/vwLUAssets/EY-Global_Customs_Risk_Management:_An_Examination_of_Leading_Practices/$FILE/EY-2006-Customs-Symposium-Report.pdf

Francis, V. (2008). Supply chain visibility: Lost in translation? *Supply Chain Management: An International Journal, 13*(3), 180–184. https://doi.org/10.1108/13598540810871226

Grainger, A. (2008). Customs and trade facilitation: from concepts to implementation. *World Customs Journal*, *2*(1), 17–30.

Good, L., Gahan, P., Butar, I., & Dehghan, S. (2015). *Leading technological innovation & productivity improvement across the supply chain: An evaluation of the ALC Intermodal Visibility Pilot of the GS1 Electronic Product Code Information Service (EPCIS) standard.* Melbourne: Centre for Workplace Leadership, University of Melbourne. Retrieved from https://www.workplaceleadership.com.au/app/uploads/2015/03/Centre-For-Workplace-Leadership_EPCIS-Report.pdf

Greis, N. P., & Nogueira, M. L. (2011). *Use of data mining for validation and verification of maritime cargo movement*. Institute of Homeland Security Solutions. Retrieved from http://www.kenan-flagler.unc.edu/~/media/Files/kenaninstitute/CLDS/IHSS_Research%20Brief_Greis_Cargo%20Security.pdf

GS1 US. (2012). Improving the consumer goods importing process. New Jersey: The Global Language of Business. Retrieved from https://www.gs1us.org/DesktopModules/Bring2mind/DMX/Download.aspx?command=core_download&entryid=478&language=en-US&PortalId=0&TabId=134

Hackius, N., & Petersen, M. (2017). Blockchain in logistics and supply chain: Trick or treat? Paper presented at the *Hamburg International Conference of Logistics*, Hamburg, Germany. Retrieved from https://www.researchgate.net/profile/Moritz_Petersen/publication/318724655_Blockchain_in_Logistics_and_Supply_Chain_Trick_or_Treat/links/5979e9e3aca272e8cc0a27f9/Blockchain-in-Logistics-and-Supply-Chain-Trick-or-Treat.pdf

Henningsson, S., Gal, U., Bjorn-Andersen, N., & Tan, Y.-H. (2011). The next generation information infrastructure for international trade. *Journal of Theoretical and Applied Electronic Commerce Research, 6*(1), 1–15. https://doi.org/10.4067/S0718-18762011000100002

Hesketh, D. (2009). Seamless electronic data and logistics pipelines shift focus from import declarations to start of commercial transaction. *World Customs Journal, 3*(1), 27–32.

Hesketh, D. (2010). Weaknesses in the supply chain: Who packed the box?. *World Customs Journal, 4*(2), 3–20.

Hesketh, D. (2015). *Seamless integrated data pipelines*. CORE 2nd Newsletter. Retrieved from http://www.coreproject.eu/newsletters/core-2nd-newsletter-august-2015/seamless-integrated-data-pipelines-by-david-hesketh-hmrc.aspx

Hintsa, J., Männistö, T., Urciuoli, L., & Ahokas, J. (2012). Does better visibility help mitigate security risks in cross-border supply chains? Case FP7-CASSANDRA. Paper presented at *e-Freight 2012 Conference,* Delft, The Netherlands. Retrieved from https://www.researchgate.net/profile/Juha_Hintsa/publication/276166097_Does_better_visibility_help_mitigate_security_risks_in_cross-border_supply_chains_-_Case_FP7-CASSANDRA/links/56162cb508ae983c1b4276c0.pdf

Hofman, W. (2011). Supply chain visibility with linked open data for supply chain risk analysis. In S. Overbeek, Y-H. Tan, & G. Zomer (Eds.). *1st workshop on IT innovations enabling seamless and secure supply chains* (pp. 20–31). Delft, The Netherlands: Retrieved from https://www.researchgate.net/profile/Wout_Hofman/publication/221141614_Supply_Chain_Risk_Analysis_with_Linked_Open_Data/links/543685000cf2643ab9871de8.pdf#page=32

Hulstijn, J., Hofman, W., Zomer, G., & Tan, Y.-H. (2016). Towards trusted trade-lanes. In A. Ko & E. Francesconi (Eds.). *International Conference on Electronic Government and the Information Systems Perspective* (pp. 299–311). Switzerland: Springer. Retrieved from http://link.springer.com/chapter/10.1007/978-3-319-44421-5_24

IBM. (2017). *Maersk and IBM unveil first industry-wide cross-border supply chain solution on blockchain*. Retrieved from https://www-03.ibm.com/press/us/en/pressrelease/51712.wss

IBMBlockchain (2017). IBM and Maersk demo: Cross-border supply chain solution on blockchain. Retrieved from https://youtu.be/tdhpYQCWnCw

Inter-American Development Bank. (2010). *Risk management for cargo and passengers: A knowledge and capacity product* (Technical Notes No. IDB-TN-294). Inter-American Development Bank. Retrieved from http://www10.iadb.org/intal/intalcdi/PE/2011/08876.pdf

International Air Transport Association (IATA). (2017). *e-freight*. IATA. Retrieved from http://www.iata.org/whatwedo/cargo/e/efreight/Pages/index.aspx

Jones, V. C., & Rosenblum, M. R. (2013). *US customs and border protection: Trade facilitation, enforcement, and security.* Washington DC: Congressional Research Service. Retrieved from http://digitalcommons.ilr.cornell.edu/key_workplace/1041/

Klievink, B., van Stijn, E., Hesketh, D., Aldewereld, H., Overbeek, S., Heijmann, F., & Tan, Y.-H. (2012). Enhancing visibility in international supply chains: The data pipeline concept. *International Journal of Electronic Government Research, 8*(4), 14–33. https://doi.org/10.4018/jegr.2012100102

Klievink, A. J., Aldewereld, H. M., Knol, A., & Tan, Y.-H. (2014). *Governing logistics information platforms: DINALOG extend single window (ESW)*. WP3 final report. Delft: Delft University of Technology. Retrieved from http://repository.tudelft.nl/islandora/object/uuid:250bd778-e549-4e33-859f-90e2c3cb0cdb?collection=research

Kloeden, P. (2007). *ERP systems facilitating XBRL reporting and regulatory compliance.* Rochester, New York: Rochester Institute of Technology. Retrieved from http://scholarworks.rit.edu/article/1628

Lim, Y. F. (2002). Digital signature, certification authorities and the law. *Murdoch University Electronic Journal of Law, 9*(3). Retrieved from http://www5.austlii.edu.au/au/journals/MurUEJL/2002/29.html

Madu, C. N., & Kuei, C. H. (2005). *ERP and supply chain management*. Fairfield, Connecticut: Chi Publishers Inc.

Reed, C. (2000). What is a signature? *The Journal of Information, Law and Technology* (JILT), *3*. Retrieved from http://www2.warwick.ac.uk/fac/soc/law/elj/jilt/2000_3/reed/

Rukanova, B., Henriksen, H. Z., Henningsson, S., & Tan, Y.-H. (2017). The anatomy of digital trade infrastructures (pp. 184–198). Presented at the *International Conference on Business Informatics Research*, Prague, Czech Republic. Springer. https://doi.org/10.13140/RG.2.2.23382.04167

Scholliers, J., Permala, A., Toivonen, S., & Salmela, H. (2016). Improving the security of containers in port related supply chains. *Transportation Research Procedia, 14,* 1374–1383. https://core.ac.uk/download/pdf/82352572.pdf

Shamsuzzoha, A., & Helo, P. T. (2011). Real-time tracking and tracing system: Potentials for the logistics network. In *Proceedings of the 2nd International Conference on Industrial Engineering and Operations Management* (pp. 22–24). Kuala Lumpur, Malaysia.

Stanton, G. (2012). Detecting fraud: Utilizing new technology to advance the audit profession. *Honors Theses and Capstones, 18.* Retrieved from http://scholars.unh.edu/cgi/viewcontent.cgi?article=1017&context=honors

Staples, M., Chen, S., Falamaki, S., Ponomarev, A., Rimba, P., Tran, A. B., … Zhu, J. (2017). *Risks and opportunities for systems using blockchain and smart contracts*. Sydney: CSIRO. Retrieved from https://www.data61.csiro.au/~/media/D61/Files/Blockchain-reports/Blockchain-RisksandOpps-HTML.html?la=en&hash=B30AF266CCDE4BC81684C676AE70E61E72E9E995

Tan, Y. H., Bjørn-Andersen, N., Klein, S., & Rukanova, B. (Eds.). (2010). *Accelerating global supply chains with IT-innovation: ITAIDE tools and methods*. Heidelberg: Springer Science & Business Media.

US Customs & Border Protection. (n.d.). *About CBP*. Retrieved from https://www.cbp.gov/about

US Customs & Border Protection. (2006). *Importing into the United States: A guide for commercial importers*. US Customs & Border Protection. Retrieved from https://www.cbp.gov/sites/default/files/documents/Importing%20into%20the%20U.S.pdf

US Customs & Border Protection. (2010). *Automated Commercial Environment (ACE) Automated Broker Interface (ABI) CBP and Trade Automated Interface Requirements: Introduction and getting started*. US Customs & Border Protection. Retrieved from https://www.cbp.gov/sites/default/files/documents/intro_get_started_3.doc

US Customs & Border Protection. (2016). *CBP Form 3461 – Instructions*. US Customs & Border Protection. Retrieved from https://www.cbp.gov/sites/default/files/assets/documents/2016-Jun/CBP%203461%20Instructions_0.pdf

Vaduva, D. (2014). E-commerce. *Legal and Administrative Studies, 178*(1), 47–57. Retrieved from https://www.upit.ro/_document/2411/JLAS_2014_issue_1_BT.pdf

Van Oosterhout, M. P., Veenstra, A. W., Meijer, M. A. G., Popal, N., & Van den Berg, J. (2007). Visibility platforms for enhancing supply chain security: A case study in the Port of Rotterdam. In *Proceeding of the International Symposium on Maritime Safety, Security and Environmental Protection*, Athens (pp. 1–11). Retrieved from http://transumo.cerium.nl/upload/documents/03%20Projecten/Beveiliging%20in%20de%20logistieke%20keten/03%20Output/02%20Wetenschappelijke%20publicaties/Paper%20Visibility%20platforms%20case%20Rotterdam%20PROTECT.pdf

Van Stijn, E., Hesketh, D., Tan, Y., Klievink, B., Overbeek, S., Heijmann, F., … Butterly, T. (2011). The Data Pipeline. In *Proceedings of the Global Trade Facilitation Conference*, Geneva (pp. 1–26). Retrieved from https://www.unece.org/fileadmin/DAM/trade/Trade_Facilitation_Forum/BkgrdDocs/UNPaper_DataPipeline.pdf

Wang, Y., Hulstijn, J., & Tan, Y.-H. (2016). Data quality assurance in international supply chains: An application of the value cycle approach to customs reporting. *International Journal of Advanced Logistics, 5(2),* 76–85. https://doi.org/10.1080/2287108X.2016.1178501

WCO—see World Customs Organization

Widdowson, D., & Holloway, S. (2009). Maritime transport security regulation: Policies, probabilities and practicalities. *World Customs Journal, 3*(2), 17–42.

World Customs Organization. (2000). *Kyoto Convention: General Annex Guidelines: Chapter 6 Customs Control*. World Customs Organization. Retrieved from http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/conventions/pf_revised_kyoto_conv/kyoto_new/gach6.aspx

World Customs Organization. (2006). *International Convention on the Simplification and Harmonization of Customs Procedures (as amended)*. World Customs Organization. Retrieved from http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/conventions/pf_revised_kyoto_conv/~/media/A7D0E487847940AD94DD10E3FDD39D60.ashx

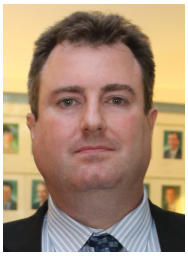
World Customs Organization. (2012). *Recommendation of the Customs Co-operation Council on the Dematerialization of Supporting Documents*. World Customs Organization. Retrieved from http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/recommendations/facilitation/rec_demat_en.pdf?la=en

World Customs Organization. (2015). SAFE Framework of Standards to secure and facilitate global trade. Retrieved from http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/safe-package/safe2015_e_final.pdf?la=en

Yasui, T. (2010). *Benefits of the Revised Kyoto Convention.* WCO Research Paper No. 6. World Customs Organization. Retrieved from http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/research/research-paper-series/rkc_benefits.pdf?la=en

Zomer, G., Tan, Y.-H., & Hofman, W. (2014). *D9.1 CASSANDRA Final Report*. European Commission. Retrieved from http://www.cassandra-project.eu/userdata/file/Public%20deliverables/Cassandra%20D9.1%20Final%20report.pdf

Geoff Bowering



Geoff Bowering is a Business Architect in the Australian Department of Home Affairs. Prior to this, he has worked in both policy and technical roles in the cargo and trade environment in the Australian Customs and Border Protection Service and Department of Immigration and Border Protection for about 20 years. He has a Bachelor of Economics, a Masters in Commerce and a Masters in Customs Administration.