A legal perspective on a blockchain-based e-bill within international trade law

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LIST OF ABBREVIATIONS*

BCMP	Bolero Core Messaging Platform
BETRL	Bahrain Electronic Transferrable Records Law
BoL	Bill of lading
BBoL	Bolero bill of lading
Bolero	Bill of lading for Europe
BTR	Bolero Title Registry
CMI	*Comité Maritime International*
CMI Rules	CMI Rules for Electronic Bills of Lading
COGSA	Carriage of Goods by Sea Act
DDC	Documentary Clearance Centre
DLT	Distributed ledger technology
E-bill	Electronic bill of lading
E-commerce	Electronic commerce
EDI	Electronic data interchange
DLT	Distributed ledger technology
HVR	Hague Visby Rules
INCOTERMS	International Commercial Terms
MLETR	Model Law on Electronic Transferrable Records
Rotterdam Rules	United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea
UCP	Uniform Customs and Practice for Documentary Credits
UNCITRAL	United Nations Commission for international trade law
WTO	World Trade Organisation

1 Introduction

The bill of lading (BoL) is one of the most imperative and widely used documents in the shipping industry. This traditionally paper-based BoL has been assisting international trade for centuries and is still a prominent feature of today's global trade. However, our current world is known as the global age of no distance, where information can virtually be acquired from the palm of one's hand. Transportation has adapted and naturally the laws regulating international trade, transportation and carriage have evolved.

International trade is growing and increasingly leaning towards electronic commerce (e-commerce) and paperless transactions, doing away with paper-based documents such as the BoL, while also minimizing human interaction and physical use of documents. One of the first technological innovations of electronic data interchange (hereafter referred to as EDI), which was applied to the BoL, originated in the early seventies by use of computer-to-computer data interchange concomitant with specified agreed message standards. EDI was and is used to electronically transmit structured information and documents traditionally captured on paper, such as the BoL, upgrading the paper-based BoL to an electronic bill of lading, known in abbreviated form as an e-bill.

Blockchain technology, the buzzword that became popular since the cryptocurrency-Bitcoin-boom in 2009, was in fact devised in 1990 with the original objective of preventing tampering with online documentation. Although cryptocurrencies are the most common examples of blockchain usage, blockchain's use of unique "distributed ledger technology" (DLT) is proving to serve a multitude of additional functions such as data storage, financial transactions, real estate and asset management.

However, the World Trade Organisation has been slow to match technological advances and electronic commerce among cross-border countries. This delay is mainly attributable to the complex nature of digital trade coupled with the dissimilarities among various countries' internet regulations and e-commerce systems. Nonetheless, in pursuit of advancing international trade, the potential of blockchain technology demands an investigation into existing and future supporting legal infrastructure to

determine whether it can be accommodated and possibly embrace and utilise this technological innovation.

This study will delve into the history and evolution of the BoL as well as the examination of the role, characteristics and functioning of the original BoL within international trade law. The e-bill's development and platforms that are utilised for the functioning of e-bills will be analysed, considering at the outset that e-bills function in a closed system with a central registry. The study will subsequently determine legal and regulatory instruments that are in place for the BoL as well as the e-bill. An explanation of blockchain technology concomitant with its ability to record all transactions will be provided. Other unique blockchain features warranting discussion are its transparency, resistance to tampering and the recording of a complete history of each transaction, which is publicly available to relevant parties on a blockchain ledger.

However, unless legal systems provide adequate support around these developments, a blockchain-based BoL will not function optimally. This study will therefore and in conclusion examine the foremost international instruments to this end, namely the United Nation's convention on contracts for the international carriage of goods, known as the Rotterdam Rules, as well as the United Nations Commission for international trade law's model law on electronic transferrable records (UNCITRAL MLETR). A blockchain-based BoL will be compared against these works to consider their functional equivalence and determine whether it can be equated with the paper BoL.

1.1 Problem statement

Although effective and serving a vital role, the paper BoL is inadequate in one or two important respects. The foremost problems around this comprise the following:

1. Upon the production of the original BoL carriers were required to discharge the goods. This is problematic as the promptness of transport is a key element to the success of these operations while cargo can be sold several times during carriage. As the BoL flows too slowly within the trade traffic and is every so often not delivered to the consignee on time to facilitate the lawfully required delivery of the goods to the entitled party, carriers are left with no other option

but to accept a letter of indemnity.[1] Complications arise due to malpractices involved in BoL in exchange for a letter of indemnity.[2] The letter of indemnity does not release the carrier from the liability placed on him by the BoL and adds additional administration and costs to the trade;[3]

2. Irregular practice arises where the delivery of goods is made to a party who avers that they will become the lawful holder of the original BoL on its arrival. This then supersedes an indemnity letter or a bank guarantee which ought to have protected the carrier should another party present the BoL and claim the goods.[4] If the delivery of goods is contrary to letters of indemnity and becomes a regular practice, the BoL's physical transferability function becomes compromised and buyers and banks could be threatened by an insolvent seller's creditors";[5]

3. A paper BoL can be, and often is, easily forged and carriers remain liable for delivery against a forged BoL;[6]

4. Having the BoL functioning within a paper system is expensive: its costs are in fact estimated to be between 5-10% of the value of goods carried each year;[7]

5. Furthermore, the need to physically move the BoL from the exporting company to the importing company is a considerable impediment to carriers.[8]

Solutions to address these challenges have been proposed including making use of alternative transport documents, simplifying and standardising documents, having a

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1 Proctor *The legal role of the bill of lading, sea waybill and multimodal transport document in financing international sales contracts* 145.
2 Proctor *The legal role of the bill of lading, sea waybill and multimodal transport document in financing international sales contracts* 145.
3 Bury 2016 *Tul Mar LJ* 65.
4 Proctor *The legal role of the bill of lading, sea waybill and multimodal transport document in financing international sales contracts* 146.
5 Secretariat *The Economic and Commercial Implications of the Entry Into Force of the Hamburg Rules and the Multimodal Transport Convention* 64.
6 *Motis Exports Ltd v AF* 1912 [2000] 1 Lloyd's Rep 211, CA.
7 Europe *The United Nations electronic Trade Documents (UNeDocs) Project*.
8 Goode and Mills *Goode on Proprietary Rights and Insolvency in Sales Transactions* 71.

central registry system to localise documents, and making use of electronic data processing to accelerate transmission of documents.[9]

Due to trade evolution, a need arose for the BoL to be easily accessible and electronically available. The e-bill became regularly used within the flow of trade. However, this presented a gap between practice and legal reality.[10] In theory, the e-bill conveniently addressed the issues of the paper BoL as briefly unpacked above, and provided benefits such as reducing the administrative burden on carriers, since the e-bill can be sent instantaneously; affording easy and cost effective amendments and additions; offering electronic payment systems and improving security as well as the opportunity to make the electronic system more secure than its paper equivalent.[11] The dilemma at hand is that the e-bill has not yet caught up with modern commerce. One reason is that e-bills are not treated as documents of title, while such treatment would have enabled it to be negotiated and transferred.[12]

It is furthermore known that the Hague Visby Rules apply to a paper BoL. However, in its electronic form, the e-bill is regulated by parties who must conclude a multiparty contract and subscribe to the rules of the electronic trading system on which the e-bill is run.[13] The Bill of Lading for Europe Project (BOLERO), which commenced in 1994, is an example of an electronic trading system which has been growing and developing exponentially, reigning the field of digitisation of international trade. BOLERO combines CMI Rules with a central registry operated by an independent party to electronically replicate the negotiable BoL.[14] The use of an electronic trading system, however, entails that the e-bill is only accessible to members of the chosen system and in the case of a non-member contracting with a subscribed member, resorting to the paper-based BoL unavoidable. This limits the use and ultimately the growth of e-bills as

9 Proctor *The legal role of the bill of lading, sea waybill and multimodal transport document in financing international sales contracts* 133.
10 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 12.
11 Bury 2016 *Tul Mar LJ* 60.
12 Bury 2016 *Tul Mar LJ* 61.
13 Bury 2016 *Tul Mar LJ* 61.
14 Proctor *The legal role of the bill of lading, sea waybill and multimodal transport document in financing international sales contracts* 152.

electronic trading systems are optimally effective and cost-effective for traders only once they dispose of a large number of members.[15]

Finally, use of an electronic trading system is susceptible to risks such as system collapse, hacking, electronic theft and viruses, all of which would require additional, specific and costly insurance not commonly offered to traders.[16]

The innovative distributed ledger technology presented by blockchain technology took the electronic universe by storm and promises pioneering uses such as storage, financial transactions and asset management. Unfortunately, it is yet to be tried and tested for efficacy, acceptability and security.

In laymen's terms, blockchain technology can be defined as

> [a] method of recording and confirming transactions where instead of a centralised platform, participants each hold a complete record of transactions through peer to peer verification of transactions.[17]

A blockchain platform could possibly provide an additional solution to challenges around the form of electronic data interchange towards facilitating the e-bill as a smart contract. A smart contract is defined by Nick Szabo as

> [a] set of promises, including protocols within which the parties perform other promises. The protocols are usually implemented with programs on a computer network, or in other forms of digital electronics, thus these contracts are "smarter" than the paper-based ancestors. No use of artificial intelligence is implied.[18]

This begs the question whether blockchain technology will be effective in facilitating international trade and if so, to what extent, with a view to advancing international trade law while concomitantly fulfilling the role and requirements of the paper BoL towards solving the predicaments around the paper BoL and e-bill. Moreover, will blockchain be able to align with current regulatory frameworks or is there a need to develop an up-to-date regulatory framework to enable secure and improved trade?

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15 Bury 2016 *Tul Mar LJ* 60.
16 Bury 2016 *Tul Mar LJ* 61.
17 Lee 2018 https://hackernoon.com/blockchain-benefits-in-trading-d981753677e2.
18 Finance 2016 https://www.iif.com/Publications/ID/582/Getting-Smart-Contracts-on-the-Blockchain.

1.2 Research question

To what extent will blockchain technology be able to facilitate the operation of e-bills within the context of international trade law?

1.3 Research methodology

To obtain a comprehensive understanding of this topic and respond to these questions, all databases will be explored in terms of their relations to the traditional BoL, the e-bill and blockchain technology. The research project will mainly take the form of a legal literature study that will make use of legislation and legal text sources as primary resources while journals, textbooks, electronic sources and discursive materials originating in other disciplines will be used as secondary sources. Although legal regulating regimes will be explored, the focus will be on commercial regimes governing the BoL and concerns about different regimes as well as various efforts made to address these issues.

Aside from this, international regulatory legislation will be examined and utilised including the United Nations Commission for international trade law Model Law on electronic transferrable records,[19] The Uniform Bills of Lading Act,[20] The United Nations Convention on International Bill of Exchange and International Promissory Notes,[21] the United Nation's convention on contracts for the international carriage of goods (the Rotterdam Rules) and The United Nations Convention on the Use of Electronic Communication in International Contracts.[22]

In short, this research is predominately qualitative and conclusions drawn will be based on the interpretations and inferences gathered from this careful literature review.

1.4 Chapter framework

1 Introduction

19 2017.
20 1909.
21 1988.
22 2005.

2 Context: a historical perspective of the bill of lading

2.1 Introduction

From a legal point of view as well as a commercial trade perspective, the BoL serves a considerable role. Legally, a BoL is a binding document and can be used in litigation as it provides evidence of the contract of carriage. Commercially, a BoL must be completed and handed to the shipper when the freight is to be picked up. A BoL is also used in this sense to note the condition of goods and certify where and when these were loaded onto the ship and dispatched from the ship. It furthermore contains the details needed to process the shipment and invoice it accordingly.

The BoL did not appear suddenly but rather developed gradually as international trade grew. Initially, no need arose for a regulatory document for trade-goods as a dual role was served by merchants who were also masters of the vessels shipping their goods in cross-border trade.[23] When merchants remained ashore and began business transactions with others at a distance, involving the sending of merchandise from one place to another, a memorandum of bargain with the carrier for the carriage of the goods was the logical next step; this is the reason why distinction is drawn between

23 De Roover 1963 *Cambridge economic history of Europe*.

mercantile and carrier services.[24] This separation as well as the fact that merchants lost control over their cargo established a need for a document providing a record of goods shipped and received. This document, although not in the form in which it is known today, was a simple earlier version of a contract of carriage and became commonly utilised by merchants and shippers.[25]

2.2 The origin and development of the bill of lading

The modern BoL can be traced back to 1063, which marked the rise of great commercial cities on the Mediterranean.[26] In this early century, the BoL was used for its evidentiary function when intermediary clerks recorded goods on board ships and, today still, this function has remained a vital characteristic of the BoL,.[27] Statutes were passed by several cities as early as 1063 to regulate and control shipping of goods. The statute expressly stated that the clerk was not the agent of the shipper or the captain but rather a public officer appointed to safeguard the interests of both parties.[28] Furthermore, the statutes required a clerk to accompany every master on board the vessel shipping trade goods. The clerk was obliged to take an oath of fidelity and enter in a register book a record of the goods received from the shipper. This register served as evidence of the receipt of the goods and merely stated the number of packages or bales received.[29]

In the thirteenth and fourteenth century, a manuscript called *Customs of the Sea* [30] was produced, which carried much of the provisions of the register book.[31] In addition to a register of goods received, the contract of carriage and proof of payment made were also included.[32] Bennet,[33] refers to this period as a transitional period for the BoL where oral evidence of goods shipped and received was gradually replaced by evidence

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24 McLaughlin 1926 *The Yale law journal* 550.
25 McLaughlin 1926 *The Yale law journal* 35.
26 McLaughlin 1926 *The Yale law journal* 550.
27 Williams 1991 *Transnat'l L & Contemp Probs* 557.
28 McLaughlin 1926 *The Yale law journal* 550.
29 Murray 1982 *U Miami L Rev* 690.
30 Du Toit 2005 *Fundamina: A Journal of Legal History* 17: "Also known as the *Consols de la Mar*".
31 Du Toit 2005 *Fundamina: A Journal of Legal History* 17.
32 Du Toit 2005 *Fundamina: A Journal of Legal History* 17.
33 Du Toit 2005 *Fundamina: A Journal of Legal History* 17; Bennett *The history and present position of the bill of lading as a document of title to goods* 4-6.

from the register.[34] This period also marked the evolution of the BoL from a record of goods into a document of title.[35]

In 1350 statutes provided that if the register had been in the possession of anyone but the clerk, the information contained therein was not to be regarded as true and correct.[36] The clerk's duties were so imperative that the master could not load onto or remove from the vessel any goods except in the clerk's presence.[37] In 1397 statutes required a clerk to produce a copy of his register to those having a right to demand it, "and this in spite of any prohibition by the master or owner."[38] In addition to the delivery of the copies to the shipper, a copy of the register had to be left at the port of departure in the hands of a trustworthy person. The reason for this was that in the possible event of an accident to the clerk or his book, proof of that which was loaded onto the vessel and proof of its quality and quantity could be found in the copy that had been deposited.[39] McLaughlin stated that up to this period the BoL was merely a "book" and a "register" and not a "bill."[40] As an excerpt from this book was delivered to the shipper, he/ she received what is similar to the modern document we know today as the BoL.[41]

From the sixteenth century, the BoL took on a form similar to what we use in our current age and evidently indicated more information than what the fifteenth century BoL contained.[42] Indentures on the BoL recited the delivery by the merchant to the captain, the loading on board the ship, statements of the condition of the goods were even more specific[43] and the contract to carry the shipment and to deliver it at the point of discharge to the shipper or an assignee.[44] Toward the end of the Sixteenth

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34 Du Toit 2005 *Fundamina: A Journal of Legal History* 17.
35 Bennett *The history and present position of the bill of lading as a document of title to goods* 5; Williams 1991 *Transnat'l L & Contemp Probs* 557.
36 McLaughlin 1926 *The Yale law journal* 551.
37 McLaughlin 1926 *The Yale law journal* 551.
38 McLaughlin 1926 *The Yale law journal* 551.
39 McLaughlin 1926 *The Yale law journal* 551.
40 McLaughlin 1926 *The Yale law journal* 551.
41 McLaughlin 1926 *The Yale law journal* 551.
42 Williams 1991 *Transnat'l L & Contemp Probs* 557.
43 Murray 1982 *U Miami L Rev* 691.
44 McLaughlin 1926 *The Yale law journal* 552.

Century, the use of the BoL was common practice.[45] It was defined as: "the acknowledgment which the master of the ship makes of the number and quality of the goods loaded on board."[46]

A statute was passed in France in 1600 describing the BoL as:

> An acknowledgment, given by the master of the vessel, of the number and quantity of the goods, loaded on board and requiring that it contain the marks of the merchandise, its condition, the name of the consignee and the amount of freight and that three copies be issued, one to be retained by the shipper, one by the master and one to be forwarded by another ship to the consignee.[47]

In 1657 the evidentiary use of the BoL continued. However, a French Ordonnance provided that a BoL was to be accepted as evidence, only if executed before a Notary Public or recorded in a distinct register containing the required entries.[48] This decree was not enforced as it proved to be too onerous a burden on commerce.[49] In the Mediterranean trade, it was still required that the BoL be drawn up by a clerk listing all the goods loaded on board the vessel - this too died out and the practice conformed to that of France.[50]

After the seventeenth century, *Lex mercatoria* became part of English common law and established the first modern negotiable instrument.[51] However, this first negotiable document of trade merely served two functions: evidence and receipt. Grönfors deemed documents performing only these two functions as meaningless and merely a transport document used for ocean transportation. Grönfors furthermore stated that documents that only serve the functions of receipt and evidence, cannot be regarded as bills of lading as they are known today.[52]

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45 McLaughlin 1926 *The Yale law journal* 552.
46 Desjardins *Traité de droit commercial maritime* sec. 1, a.
47 Pardessus *Collection de lois maritimes antérieures au XVIII. e siècle* 381.
48 McLaughlin 1926 *The Yale law journal* 553.
49 Pardessus *Collection de lois maritimes antérieures au XVIII. e siècle* sec. 1, art 904.
50 McLaughlin 1926 *The Yale law journal* 553.
51 Masters date unknown https://www.academia.edu/7210033/History_Importance_and_Evolution_of_the_Bill_of_Lading.
52 Masters date unknown https://www.academia.edu/7210033/History_Importance_and_Evolution_of_the_Bill_of_Lading.

By 1802 numerous principles governing bills of lading were established[53] as bills of lading contained detailed information regarding the quantity and quality of goods, and served as protection for masters who included exceptions to liability in case of damage to goods.[54] The then Marine Ordinances held masters accountable for goods loaded on-board their respective ships and in terms of the bills of lading the masters are obliged to deliver accordingly.[55] All bills were required to stipulate the "quality, quantity and mark of the goods", as this was no longer optional.[56] As masters were not capable of testifying as to the condition of goods in packages and containers, the Ordinances limited the liability of the master in this regard.[57] As a result, it became a practice that the masters would indicate on a clean bill of lading, and by having them attesting to the quality and quantity of the goods, these were based on the shipper's representations thereof. By qualifying the bill of lading, the master would be protected should a dispute arise as to the quantity or quality of the goods.[58]

In the notable case of *Grant v Norway*[59] the Court held that the owner of the ship cannot be held liable for misrepresentations made by the master.[60] The reason being that usage made it known that the authority of the captain to provide bills of lading, is limited to such goods having been put on board the ship.[61] Although the master had the authority to sign bills of lading stating the condition of goods received, he/ she lacked the authority to sign for goods not received.[62] Hence, the master's signature on a BoL, untruthfully stating that certain goods had been loaded on the ship did not subject the owner of the vessel to liability.[63]

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53 Murray 1982 *U Miami L Rev* 691.
54 Mitchelhill *Bills of lading: law and practice* 1.
55 Peters *et al Admiralty Decisions in the District Court of the United States for the Pennsylvania District* 100.
56 Peters *et al Admiralty Decisions in the District Court of the United States for the Pennsylvania District* 100.
57 Murray 1982 *U Miami L Rev* 691.
58 Murray 1982 *U Miami L Rev* 692.
59 *Grant v Norway* 1851 10 CB 665, 138 Eng Rep 263.
60 *Grant v Norway* 272.
61 Murray 1982 *U Miami L Rev* 693.
62 Murray 1982 *U Miami L Rev* 693.
63 Murray 1982 *U Miami L Rev* 693.

In 1919 universal use of a new trade document was prevalent, stating that goods are "received for shipment" and not shipped. This bound the carrier to only carry them to their destination, leaving it to his discretion the selection of the vessel on which they were to be transported.[64] McLaughlin states that the bank's counsel was in view of a document which was essentially different from the longstanding instrument that the courts deemed and honoured as a BoL.[65] The document at that stage merely recited the receipt of goods and did not stipulate the place of receipt, and it undertook to carry the goods upon any ship and not on a specific ship.[66]

2.3 The characteristics, role and function of the bill of lading

The above shows that the traditional BoL evidences a contract of carriage and its original function, acting as the acknowledgment of goods shipped on board a vessel bound for a certain destination.[67] Secondly, a BoL stipulates the terms on which such goods are received and carried, to be released against surrender of the original bill endorsed by the consignee.[68] Lastly, and probably the most characteristic feature, the BoL serves as a document of title.[69] It is of utmost importance to clearly identify and define the characteristics of the BoL to determine whether the e-bill and possibly a blockchain-based BoL embody functional equivalences to the original.

2.3.1 Bill of lading as receipt of goods

The initial role of the BoL was to serve as a receipt of goods on board a vessel by the carrier. This is still the primary function of the BoL.[70] The BoL contains data relating to characteristics of the shipped goods such as quantity, quality and capacity. In accordance with article III (4) of the *Carriage of Goods by Sea Act* (hereinafter referred

64 McLaughlin 1926 *The Yale law journal* 553.
65 McLaughlin 1926 *The Yale law journal* 553.
66 McLaughlin 1926 *The Yale law journal* 553.
67 Malan and Faul 1989 *S Afr Mercantile LJ* 323.
68 Malan and Faul 1989 *S Afr Mercantile LJ* 324.
69 Malan and Faul 1989 *S Afr Mercantile LJ* 324.
70 *Sewell v Burdick* 1884 10 App Cas 74.

to as COGSA),[71] if leading marks and statements are made on the BoL they are regarded as *prima facie* evidence of the description of the goods received.

In terms of common law, the *Bill of Lading Act*[72] stipulates that the carrier is liable for the proper delivery of the exact cargo received and is liable to prove that no cargo went missing whilst the goods were placed in his care. In the case of *Grant v Norway*, it was evident that the carrier's liability was not clearly defined. The carrier could therefore easily discharge his burden of liability as the master had no authority to sign the relevant BoL when a mistake arose due to the master's fault. Since the role of the BoL was thus undermined, the consignees and endorsees were driven away because they did not enjoy the assurance of the BoL.[73]

The position on carrier liability was clarified by COGSA of 1971 accompanied by the Hague Visby Rules (hereinafter HVR). Statements brought onto the BoL were regarded as *prima facie* evidence and the carrier could provide evidence proving the contrary only before the document was transferred to a third party acting in good faith. Thereafter, statements were deemed irrefutable and no proof to the contrary was acknowledged.[74] However, in cases not governed by the HVR, the irregularity persisted. COGSA of 1992 ended the uncertainty by declaring that statements in a BoL are regarded conclusive evidence against the carrier.[75]

In accordance with Article III (3) of the HVR,[76] carriers have the responsibility of attesting to the quality and condition of the goods and accordingly must issue a BoL. A clean BoL will be issued where the cargo is in good condition and order. Contrary to a clean BoL, a claused BoL will indicate with remarks any defects to the goods or their condition. It is common practice for shippers to offer indemnity to carriers should damage or loss occur whilst a clean BoL was issued. Carr, however, states that this

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71 *Carriage of Goods by Sea Act* 1991.
72 *Bill of Lading Act* 1855.
73 Roussos *The key functions of the bill of lading with reference to its role as a contract for the carriage of goods in international trade and transport by sea* 4.
74 Roussos *The key functions of the bill of lading with reference to its role as a contract for the carriage of goods in international trade and transport by sea* 5.
75 Wilson *Carriage of goods by sea*. 71
76 *Hague-Visby Rules* 1968.

practice is frowned upon by courts as "detriments to the commercial community, far outweigh the emerging convenience."[77]

2.3.2 Bill of lading as evidence of the contract of carriage

Although the BoL contains contractual terms and serves as evidence of the contract of carriage, it is not the contract itself.[78] The reason is that the contract of carriage is only signed and issued after the goods have been shipped and the contract has been concluded.[79] In other words the contract of carriage is issued long before the BoL.[80] As the BoL may serve as evidentiary material in that it is a declaration made by the carrier of the terms of the carriage contract, it indeed provides strong evidence but is not conclusive.[81] Should the BoL not contain all the terms of the original agreement, shippers are allowed the opportunity to provide additional evidence.[82]

Bills of lading serving as evidence are case sensitive and they depend on the terms contained in the relevant bill. In the New South Wales' Supreme Court case of *Ace Imports (Pty) (Ltd) v Companhia De Navegacao Lloyd Brasileiro*,[83] the relevant BoL was stated to be subject to the Hague Rules, which provided that a shipped-on-board BoL should be *prima facie* evidence of the receipt by the carrier of the goods as defined therein.[84] The same judge, Yeldham J, however also stated in *Associated Packaging Pty Ltd v Sankyo Kaiun Kabushiki Kaisha*[85] that any presumption, inference or estoppel allegedly arising from the terms of a BoL can be rebutted by appropriate evidence or on the terms of the BoL itself. Oral evidence may be presented relating to the relationship between the ship-owner and shipper. However, the BoL becomes

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77 Carr *International trade law* 102.
78 Du Toit *The Bill of Lading in South African Law* 76; Wilson *Carriage of goods by sea*; *Crooks v Allan* 1879 5 QBD 38.
79 Dillon and Van Niekerk *South African maritime law and marine insurance: selected topics* 57.
80 Roussos *The key functions of the bill of lading with reference to its role as a contract for the carriage of goods in international trade and transport by sea* 5.
81 Todd 2004 40.
82 Carr *International trade law* 102.
83 *Ace Imports (Pty) (Ltd) v Companhia De Navegacao Lloyd Brasileiro* 1988 1 Lloyd's Rep 206.
84 Yeldham J accepted that the bill of lading is usually prima facie evidence of the quantity of goods shipped and referred to *Henry Smith & Co v The Bedouin Steam Navigation Co Ltd*, *Attorney-General of Ceylon v Scindia Steam Navigation Co Ltd* and *Scrutton on Charter Parties* (18th Edition).
85 *Associated Packaging (Pty) Ltd v Sankyo Kaiun Kabushiki Kaisha* 1983 3 NSWLR 293.

conclusive evidence once in possession of a *bona fide* third party and no evidence is then admissible.[86]

Another relationship that requires discussion under the contractual obligations of a BoL, is the Himalaya clause that embodies a special clause in the contract of carriage. This special clause was introduced to protect independent contractors in the contract of carriage, such as protecting stevedores from liability under that contract of carriage.[87]

The dictum in *Adler v Dickson*[88] was the case that led to this clause obtaining its name: the ship in this matter was named "Himalaya." In this case the claimant suffered personal injury as a result of a gangway collapsing, causing him to fall 5,5 meters. The claimant instituted a claim against the master as well as the crew where he/ she relied on the principle of privity to the contract under which defendants were not parties. It was found by the court of appeals that "in the contract of passengers as well as in the carriage of goods, the law permitted a carrier to stipulate not only for himself but also for those with whom he/ she engaged to carry out the contract." Therefore it was held that in the absence of such a clause, expressly or tacitly in favour of the master or crew, they were deemed responsible. This decision was upheld in various other cases and is now considered a settled principle of common law.

2.3.3 Bill of lading as a document of title

The need to trade goods while they were aboard gave rise to the BoL developing its unique feature of a negotiable document of title. It is commonly known that a BoL is symbolically delivered and by obtainment thereof the buyer acquires possession of the goods.[89] In common law, a document of title is not comprehensively defined. What then constitutes a document of title? The general turn of phrase, title, indicates the

86 Wilson *Carriage of goods by sea* 59.
87 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 67.
88 *Adler v Dickson* 1954 2 All ER 397.
89 *Sanders Bros v Maclean & Co* (1883) 11 QBD 327, 341.

right of ownership of goods.[90] This however, would be an oversimplification of the word "title" as it relates to bills of lading. Various debates have arisen as to what the exact definition of a document of title ought to be. Some jurists consider the holder of the BoL to possess the title to ownership[91] while others follow the judgment in the notorious case of *Lickbarrow v Mason*[92], which held that the physical BoL document was a mere symbol of ownership. Biswas[93] states that it is a myth that the document of title indicates a document of ownership and in reality the document of title can only be considered as a document of possession. In support of this statement he/ she reasons that the transfer of goods may not be intended for the transfer of ownership.[94] In *Sewell & Nephew v Burdick*[95], Lord Bramwell stated that property does not pass by the endorsement but by the contract of carriage. If a cargo afloat is sold, the property would pass to the vendee, even though the BoL was not endorsed. Therefore it can be said that ownership passes by virtue of the contract of sale.[96] Goode explains this aspect:

> Under the express or implied terms of the contract of sale or other agreements, property in the goods may be made to pass on delivery of the document of title but this results from the agreement, not from the status of the document of title as such. The delivery of the document is simply a convenient mechanism for implementing the contract between the parties in relation to the transfer of ownership.[97]

The BoL represents the goods and possession of the BoL is regarded as equal to possession of the goods covered by it.[98]

Transferability and negotiability are inseparable from the characteristic "title" feature of the BoL. In this regard, a BoL can either be "straight," indicating a non-transferrable document transferring goods to a certain party, or "order," indicating a transferrable document between a carrier and a shipper in which legal possession of goods may be

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90 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 72.
91 Biswas 2011 5.
92 *Lickbarrow v Mason* (1787) 2 TR 63, 100 ER 35.
93 Biswas 2011 5.
94 Biswas 2011 5.
95 *Sewell & Nephew v Burdick* (1884) 10 AC 74.
96 Biswas 2011 6.
97 Collins *RM Goode, Proprietary Rights and Insolvency in Sales Transactions* 60.
98 Biswas 2011 7.

delivered by endorsement from person to person. Carr[99] states that in the legal context it is more suitable to refer to a BoL as a transferrable document rather than a negotiable document, although it boils down to the same concept and is dependent on the context in which it occurs. To briefly revisit the *Lickbarrow v Mason* case: it engenders ambivalence. In this case the plaintiff (also the shipper) tried to claim possession of the goods in transit when it came to light that the defendant was bankrupt. The plaintiff directed the carrier to not deliver the goods to the defendant, which was deemed to be conducted without legal authority. The *Lickbarrow* decision was seen to conform to the supposition that the BoL transfers property in goods but is silent regarding negotiability of the BoL. It was held that the holder of the BoL had the right to claim possession of the goods from the master of the ship but, on the other hand, it was held that the decision was based on the principle of negotiability.[100] In previous attempts (which will be discussed subsequently) to electronically replicate the BoL, the function of a BoL as a document of title has proven to be the most challenging to replicate in electronic format.[101] Pair this hindrance with the uncertainties regarding the BoL as a negotiable instrument, particularly in banking, and we begin to recognise the difficulty of incorporating these necessary features into an electronic document. These uncertainties are aggravated since only bills containing such clauses or that are ordered, are negotiable.[102] Furthermore, the negotiability of a BoL is not similar to a banking instrument as the BoL does not hold the title any more securely than the issuer and the BoL's title is subservient to the title of the issuer.[103]

2.4 Conclusion

It has been noted that the BoL has been defined variously in different time periods of its history. Its definition depended on the perceptions of the relevant age. Throughout

99 Carr *International trade law* 23.
100 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 80.
101 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 81.
102 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 83.
103 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 88.

the course of history, this document served multiple functions and was not presented in the same format as it is known today. The BoL evolved from a receipt of goods to a document of title and latterly to a contract of carriage. Furthermore, the BoL assists banks as it provides for financial credits from banks and serves as collateral for loans given. Carriers also rely on the BoL as it stipulates their rights and liabilities. The key function of the BoL centres on its ability to transfer goods in transit as no other document is capable of serving this function as efficient as the BoL.

3 The electronic bill of lading

3.1 Introduction

The BoL is still a paper-based document and has not yet reached the level of evolution where it dovetails with international trade. Although many efforts have been made to introduce the e-bill, support was not obtained to the extent where it could replace the paper-BoL.[104] Two great obstacles facing the adoption of the e-bill are technological hindrances presented in replicating the BoL's functions and the legal infrastructure needed to provide adequate support for its comprehensive implementation.[105]

A well-established and effective document such as the BoL required changes to survive the challenges posed in the present era.[106] Cargo containers and multimodal transport became common modes of carrying goods instead of using single ships. These developments in international trade placed a high value on time and the processing of information and so stakeholders expected an instrument that would meet these demands. Furthermore, trade transactions were instantly affected across continents by means of the internet and electronic communications, making it much swifter and economical for traders than before.[107] Jafari states:

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104 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 90.

105 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 90.

106 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 90.

107 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 90.

> The use of technology became fully evident in the case of transportation modes, banking transactions and traders' practises, but there is still a gap between the practice and the legal reality in the case of the BoL.[108]

3.2 The origin and development of the e-bill

The e-bill originated out of the need to remedy the problems experienced when using the traditional paper-based BoL in modern trade.[109] Chandler[110] states that the ultimate goal of implementing electronic documents is the electronic transmission and negotiation of bills of lading which will also manage all shipping documents, without generating any paper.

In 1960 efforts were made to streamline standard shipping documents, including the BoL, so that all documents could be run from a common "master," rather than having to type each document separately.[111] This provided for uniform documents and saved parties quite some effort and time.

Various systems have been developed to facilitate e-bills within international trade. Regardless of the system under which an e-bill is issued, a BoL issued in electronic format would still constitute an e-bill.[112] Notable systems which attempted to move the paper-BoL to an e-bill include SEADOCS, the *Comite* Maritime International (CMI) Rules, Bolero and @GlobalTrade. These systems make use of EDI which that served as the platform for the transmission of electronic transferrable documents that were provided for and regulated by the CMI Rules for Electronic Bills of Lading and the UNCITRAL Model Law on Electronic Transferrable Records,[113] which will subsequently be discussed.

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108 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 90.
109 Senekal *The electronic bill of lading: a legal perspective* 23.
110 Chandler 1989 *Mar L & Com* 571; Senekal *The electronic bill of lading: a legal perspective* 23.
111 Chandler 1989 *Mar L & Com* 572; Senekal *The electronic bill of lading: a legal perspective* 23.
112 Senekal *The electronic bill of lading: a legal perspective* 24.
113 Senekal *The electronic bill of lading: a legal perspective* 24.

3.3 The role and functioning of the e-bill

As mentioned, BoL performs three functions: it is a contract of carriage, a receipt of goods and a document of title. These three functions need to be replicated electronically for an e-bill to be a suitable substitute. Dubovec[114] states that the electronic replication of the legal functions of a BoL is dependent on the law of the country in which the BoL is issued as that country's laws govern the relevant transaction.

The evidentiary and receipt functions of an e-bill can easily be performed by electronic means as they are in essence the transfer of information.[115] The BoL serving as a document of title is the further function that should be replicated in an electronic form that would represent three uses of the BoL:

1. Possession of the BoL constitutes constructive possession and control over the goods it represents;

2. The BoL may be used to transfer title to the goods; and

3. The BoL is used to provide security in the goods it represents.[116]

International transportation laws regulate the first two of these functions but the last function is associated with secured transactions laws.[117] As indicated by Dubovec, security is one of the most challenging obstacles for the e-bill to replicate:

> If the secured transaction laws do not provide sufficient rules that would guide the bank through the process of creation and perfection of a security interest in an electronic document of title, the electronic replication of paper documents of title would not be possible.[118]

If the traditional BoL is to be electronically replicated, it is vital that the electronic document fulfils the same legal requirements as the conventional BoL. Once the conventional functions can be replicated and performed by the electronic transmission

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114 Dubovec 2005 *Ariz J Int'l & Comp L* 450.
115 Dubovec 2005 *Ariz J Int'l & Comp L* 450.
116 Dubovec 2005 *Ariz J Int'l & Comp L* 448.
117 Dubovec 2005 *Ariz J Int'l & Comp L* 449.
118 Dubovec 2005 *Ariz J Int'l & Comp L* 449.

of information, then the critical business function, that is, negotiability, can be embarked on as well.[119]

3.4 Previous attempts to dematerialise the bill of lading

3.4.1 The SEADOCS System

The SEADOCS system was the first to facilitate e-bills.[120] This semi-automated system made use of a central registry where original paper bills were dispensed.[121] The central registry was operated by Chase Manhattan Bank serving as the middleman through which parties to the transaction conversed.[122] SEADOCS did not supersede its trial period due to practical dilemmas.[123]

The following main reasons led to SEADOCS' failure:

> Traders were reluctant to record their transactions in a central registry because this subjected them to inspections by tax authorities and competitors;
>
> The ultimate buyer of the cargo resisted acquiring a BoL from the central registry;
>
> Banks were uncomfortable with the fact that one of their competitors had exclusive access to the registry;
>
> The liability of participants was not established, so insurance of the registry operations was relatively expensive; and
>
> No provision was made for the transfer of contractual rights and liabilities to transferees of the bill, apart from the original shipper.[124]

The downfall of SEADOCS pointed out the detriment of granting monopoly to a registry that operates a closed system of registration. This registry should have an open registry to allow all interested parties access to the BoL's status. The monopoly in this instance was granted to a bank which was in competition with other financiers.[125] The Society for Worldwide Interbank Financial Telecommunications (SWIFT)-model would

119 Chandler 1989 *Mar L & Com* 472; Dubovec 2005 *Ariz J Int'l & Comp L* 449.
120 Dubovec 2005 *Ariz J Int'l & Comp L* 449.
121 Dubovec 2005 *Ariz J Int'l & Comp L* 449.
122 Chandler 1989 *Mar L & Com* 468; Dubovec 2005 *Ariz J Int'l & Comp L* 449.
123 Dubovec 2005 *Ariz J Int'l & Comp L* 449.
124 Dubovec 2005 *Ariz J Int'l & Comp L* 450.
125 Dubovec 2005 *Ariz J Int'l & Comp L* 450.

be a more suitable system to use as it is an independent operator.[126] Dubovec[127] furthermore suggests that trade records should contain minimal information to give trading companies peace of mind knowing that information is not readily available to competitors. This would entail that it would be the registered holder's discretion to disclose specific information.

3.4.2 The CMI Rules for Electronic Bills of Lading

The CMI Rules for Electronic Bills of Lading (hereafter the CMI rules) came to play in 1990. Unlike SEADOCS, it is an open system that does not require parties to subscribe as members or pay registration fees.[128] Parties contractually agree to make the CMI rules applicable to their business transactions as the rules do not carry the force of law.[129] The CMI rules are based on a system of private keys which replace bills of lading.[130] A Private Key is defined in Article 2 of the CMI Rules:

Any technically appropriate form, such as a combination of numbers and/ or letters, which the parties may agree to for securing the authenticity and integrity of a transmission.

Using a private key as a substitute for the BoL however brings about uncertainties regarding jurisdictions.[131] The carrier of the private key is the only person authorised to issue it and to name or substitute a consignee.[132] Each private key is unique to each successive holder and is non-transferrable as the carrier is the only person authorised to do so.[133] Therefore, the carrier's involvement is required throughout the negotiation process every time the BoL is transferred. After the e-bill has been negotiated, it is particularly imperative that the carrier is informed of the identity of the eventual consignee to whom he/ she is under obligation to deliver.[134]

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126 Dubovec 2005 *Ariz J Int'l & Comp L* 450.
127 Dubovec 2005 *Ariz J Int'l & Comp L* 450.
128 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
129 Dubovec 2005 *Ariz J Int'l & Comp L* 450.
130 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
131 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
132 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
133 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
134 Dubovec 2005 *Ariz J Int'l & Comp L* 451.

The paper-based BoL passes from merchant to merchant while retaining its identity as a single document and does not return to the carrier until the goods have been discharged.[135] The CMI model's e-bill, in contrast, returns to the carrier each time it has been negotiated and each consecutive trader is allotted a new document transmitted from the ship.[136]

As in the case of SEADOCS, the CMI Rules proved to be unsuccessful as they failed to resolve the issues which were essential to creating a negotiable e-bill.[137] The CMI Rules have not received ample support from merchants for the following reasons:

> They fail to make provision for contractual rights and liabilities to be transferred with the documentation;
>
> It is unclear what happens if a holder who has accepted the right of control transfers defaults;
>
> No provision is made for the passing of property in the goods;
>
> There was a failure to create a comprehensive system or body to administer it; and
>
> The CMI model was not protected due to the private code not being encrypted.[138]

3.4.3 The Bolero System

In April 1994, the Bolero project was initiated by a confederation of carriers, traders, banks and telecommunication companies but was eventually developed by SWIFT and Through Transport Club (TT Club), which commercialised a European Union (EU)-funded research initiative into the Bolero Operations Ltd.[139] In 1995, the research initiative yielded the Bolero Association Limited (BAL), which grew a member base of carriers, shippers, consignees, banks and port authorities to name a few, that were connected to international commerce and dependent on paper documents.[140] The main objective of Bolero was to replace paper bills of lading with electronic documents, using a central Title Registry finally to achieve inter-function between industries involved in

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135 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
136 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
137 Dubovec 2005 *Ariz J Int'l & Comp L* 451.
138 Dubovec 2005 *Ariz J Int'l & Comp L* 451-452.
139 Dubovec 2005 *Ariz J Int'l & Comp L* 452. Low 2000 *Int'l Trade & Bus L Ann* 177. Bury 2016 *Tul Mar LJ* 218.
140 Bury 2016 *Tul Mar LJ* 218.

international commerce.[141] This Title Registry was an application that could create and transfer obligations pertaining to an e-bill.[142] The Bolero system did not produce a solitary electronic document performing all of the functions of a paper-based BoL but instead replicated the document by sequences of electronic messages and data records in the Title Registry.[143] Bolero Operations Ltd offers Core Messaging Platform (BCMP) and cross-industry services which ensure the secure and reliable exchange of trade information between parties as it validates the information contained in the message to confirm its authenticity and integrity.[144] In addition to the BCMP service,[145] Bolero offered the Bolero Title Registry (BTR)[146] and the Bolero Rulebook which services will subsequently be discussed.[147]

To make use of the Bolero system, involved parties had to enter into a contract, agreeing to be regulated by the Bolero Rulebook.[148] The Bolero Rulebook stipulates that Bolero messages will be recognised with the same legal force as paper documents while the legitimacy of these messages encrypted by Bolero would not be challenged and that English law would govern any disputes that might arise.[149] Therefore, the Bolero Rulebook implements a single legal regime that acknowledges the legality and validity of EDI transmissions which in its turn addresses member concerns regarding choice and applicability of law conflicts.[150] Bolero therefore resolves acknowledgement issues that the CMI model fails to do, as accurate data such as dates and times of messages is provided.[151]

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141 Low 2000 *Int'l Trade & Bus L Ann* 177; Dubovec 2005 *Ariz J Int'l & Comp L* 452.
142 Dubovec 2005 *Ariz J Int'l & Comp L* 452.
143 Dubovec 2005 *Ariz J Int'l & Comp L* 452.
144 Low 2000 *Int'l Trade & Bus L Ann* 178.
145 The BCMP allows Bolero users to electronically communicate with each other electronically and is owned by the BAL. The BCMP "acts like an independent certification authority" that secures electronic communications through "advanced cryptographic techniques, namely encryption and digital signatures and ensures authenticity of messages. Automated BCMP receipt acknowledges bolero.net messages, and notifies senders when receivers open it. See Bury 2016 *Tul Mar LJ* 219.
146 The BTR tracks Bolero BoL holders and transfers in ownership.
147 Bury 2016 *Tul Mar LJ* 219.
148 Bury 2016 *Tul Mar LJ* 219.
149 Bury 2016 *Tul Mar LJ* 219.
150 Bury 2016 *Tul Mar LJ* 219.
151 Bury 2016 *Tul Mar LJ* 219.

The BMCP serves as a verifiable receipt and as evidence of the contract of carriage, both of which are vital functions of the paper BoL, as indicated.[152] However, these mentioned functions are not important in replication as is the function of transferability of the document of title.[153]

Unless carriers receive the possessory right by receiving a transferrable document of title, they cannot hand over cargo to consignees.[154] Bolero satisfies this need through the BTR together with the Bolero Rulebook, which allow members to electronically transfer rights while goods are in transit.[155] The BTR serves as a trusted third party that safeguards obligations and rights of its members.[156]

The Bolero process runs as follows:

1. The shipper and carrier conclude a contract of carriage for the transport of cargo "to order;"

2. The carrier retains the goods on the shipper's account pending the presentation of the correct "key" by a consignee who gives the carrier the authority to transfer these rights to his own account;[157]

3. The "key" is represented by a negotiable BoL; however, Bolero's "key" is embodied by an electronic message which can only be held by one party due to the BTR. When a carrier issues an electronic "key" to the shipper via bolero.net, he/ she acknowledges the private key-holder's power to transfer rights and liabilities – in exactly the same manner as a person in possession of a paper BoL's rights would be recognised;[158] and

4. The holder of the new private key obtains contractual rights enforceable against the carrier as the shipper is replaced by the consignee as an original contracting

152 Bury 2016 *Tul Mar LJ* 220.
153 Bury 2016 *Tul Mar LJ* 220.
154 Bury 2016 *Tul Mar LJ* 220.
155 Bury 2016 *Tul Mar LJ* 220.
156 Bury 2016 *Tul Mar LJ* 220.
157 Schaal *The 21st Birthday of the Electronic Bill of Lading: With Age Comes Maturity* 124.
158 Schaal *The 21st Birthday of the Electronic Bill of Lading: With Age Comes Maturity* 124.

party, "so that the consignee assumes the shipper's rights and liabilities under the contract of carriage."[159]

A Bolero transaction commences with the establishment of a Bolero BoL (BBoL) that is communicated to the shipper through the BCMP.[160] The BCMP will authenticate the identities of the two members and send a receipt to the carrier and the BBL to the relevant shipper. The issuance of the shipper's BBoL is also recorded in the BTR which allows the shipper to transfer the BBoL to a letter of credit financing the bank for examination and presentment.[161] The latter occurs after the shipper sent instructions to the BCMP, ordering transfer of the BBoL.[162] The BCMP then verifies the electronic signature of the sender prior to verifying the authenticity of the BBL against the BTR.[163] As soon as the validity of the electronic transfer is confirmed by Bolero, the new owner of the BBL is recorded as the title holder of the relevant goods.[164]

Bolero's downfall is mainly due to lack of support from the banking industry and carrier companies with the main concern centring on whether Bolero's BTR central registry system would be able to function on a large scale.[165] Furthermore, a BTR issued BBoL is not recognised by international conventions and the majority of national legislation as it does not match the definition of a regular BoL.[166] To get around the fact that the BBoL is not strictly an electronic equivalent of a paper-based BoL, that is, an E-Bill), Bolero intentionally named their electronic document a Bolero BoL.[167] As previously stated, Bolero consequently requires members to sign a contract that binds them to the Bolero Rulebook, which assigns England jurisdiction and English law to govern disputes.[168] This, however, does not guarantee members that the Bolero Rulebook will be upheld by foreign courts in cases where it is in conflict with their own legislation.[169]

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159 Schaal *The 21st Birthday of the Electronic Bill of Lading: With Age Comes Maturity* 124.
160 Schaal *The 21st Birthday of the Electronic Bill of Lading: With Age Comes Maturity* 124.
161 Bury 2016 *Tul Mar LJ* 221.
162 Delmedico 2003 *Hertfordshire Law Journal[Online]* 99.
163 Delmedico 2003 *Hertfordshire Law Journal[Online]* 99.
164 Delmedico 2003 *Hertfordshire Law Journal[Online]* 99.
165 Bury 2016 *Tul Mar LJ* 221.
166 Bury 2016 *Tul Mar LJ* 222.
167 Schaal *The 21st Birthday of the Electronic Bill of Lading: With Age Comes Maturity* 124.
168 Bury 2016 *Tul Mar LJ* 222.
169 Bury 2016 *Tul Mar LJ* 222.

Additionally, financial institutions issuing letters of credit are hesitant to use the BTR, regardless of the BTR's eUCP compliance, to safeguard their rights to electronic documents providing title, as security cannot be provided by means of a direct link to the goods.[170] Most jurisdictions call for security interests to be recorded in a public registry, reviewable by interested parties, which unfortunately entails that the BTR is non-compliant as it is a closed system.[171] This results in banks not being able to determine "the status of their rights, or their priority with respect to other creditors" and therefore hesitant to issue letters of credit," in the words of Bury.[172]

Lastly, Bolero's greatest hindrance is the exclusion of insurance that does not attract support from banks or industry corporations:

> P&I clubs excluded liabilities for cargo carried under any electronic trading system, including Bolero's, until February 2010. Regardless, even after P&I clubs extended coverage to Bolero transactions, the EDI alternative has yet to become the expected panacea to replace paper bills of lading that the legal community expected.[173]

3.4.4 @GlobalTrade

The @GlobalTrade system's functioning was dependant on the Documentary Clearance Centre (DCC).[174] The DCC administered and centralised various forms of transport, trade, insurance and financial documents.[175] It acted as a trade finance subdivision of a greater, international bank as it played the role of issuing and authenticating letters of credit.[176] Letters of credit issued by the DCC include the eUCP and UCP500. Upon presentation of the relevant documents, the DCC would ensure compliance of the documents upon which the documents would be honoured and the transaction completed. This checking process took a maximum of twenty-four hours or less.[177] "Document management services were billed on a transactional basis" and no

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170 Dubovec 2005 *Ariz J Int'l & Comp L* 453.
171 Dubovec 2005 *Ariz J Int'l & Comp L* 453.
172 Bury 2016 *Tul Mar LJ* 222.
173 N.E.P.I.A, *Electronic (Paperless) Trading Systems – Bolero International Limited and Electronic Shipping Solutions* (2010); Bury 2016 *Tul Mar LJ* 222.
174 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 178.
175 Dubovec 2005 *Ariz J Int'l & Comp L* 455.
176 Damas 2001 *American Shipper* 88.
177 Damas 2001 *American Shipper* 88.

membership fees applied, "according to Dubovec.[178]Subsequently, the DCC would assign and transfer proceeds and provide payment to the relevant beneficiary as well as see to the delivery of necessary documents in paper format, usually by way of fax or courier.[179]

Recent reformation of the @GlobalTrade system was effected to meet expectations of bankers, merchants and carriers. The @GlobalTrade system was capable of offering an automated engine that was user-friendly and more reliable compared than most other systems that functioned under the control of the service provider.[180] Although the @Global system is not popular in trade today, it is worth examining for the valuable lessons it hols for future development of electronic commerce systems.[181]

3.4.5 TradeCard

In 1994, the World Trade Centre Association created TradeCard which, unlike previous systems, made use of paperless documents and alternative payment methods.[182] TradeCard is an internet-powered e-commerce system that allows parties and service providers to purchase and sell goods as well as effect payment for such transactions, while providing electronic services related to such transactions via the internet.[183]

The initial purpose of TradeCard was to replace the paper-based letter of credit.[184] To effect a transaction, the buyer would create an electronic purchase order recorded on the system.[185] The order was then sent to the seller who then negotiated the terms with the buyer online.[186] Once concensus was reached on the terms, the parties digitally signed the order.[187] TradeCard subsequently required certain documents to be submitted electronically and the goods were shipped to the buyer.[188] A guarantee

178 Dubovec 2005 *Ariz J Int'l & Comp L* 455.
179 Damas 2001 *American Shipper* 88.
180 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 182.
181 Dubovec 2005 *Ariz J Int'l & Comp L* 455.
182 Albrecht 2018 *Tul Mar LJ* 456.
183 Albrecht 2018 *Tul Mar LJ* 456.
184 Albrecht 2018 *Tul Mar LJ* 456.
185 Albrecht 2018 *Tul Mar LJ* 456.
186 Albrecht 2018 *Tul Mar LJ* 456.
187 Albrecht 2018 *Tul Mar LJ* 456.
188 Albrecht 2018 *Tul Mar LJ* 456.

of payment was annexed to the purchase order, guaranteeing the seller that he/ she would receive payment upon receipt of the goods, should the terms of the purchase order have been adhered to.[189] Proof of delivery, insurance certificates and other necessary documents were submitted electronically to TradeCard, which compared them to the purchase order. If these documents were in compliance with the original purchase order, funds were transferred from the buyer's account to the seller's account.[190] Financial institutions transferring funds merely acted as paymasters and could not be held liable by TradeCard to verify compliance of the submitted electronic documents.[191]

TradeCard allowed parties to negotiate terms of the agreement, which include negotiation of insurance coverage in terms of the International Commercial Terms (INCOTERMS).[192] INCOTERMS facilitated electronic communication provided parties agreed to this and commercial documents relating to the transaction may in other words be replaced by EDI messages using INCOTERMS. TradeCard therefore offed a multitude of services such as contracting for goods, insurance and payments without making use of paper documents.[193]

3.5 Conclusion

The efficiency of the paper-based BoL and the different roles it plays in international trade and transportation has led to attempts to convert it into an electronic format to keep up with the developing pace of international trade. The paper BoL is not quick enough to support the fast-paced trade taking place. Although it is important to replicate the paper-based BoL's functions in electronic format, Jafari[194] poses the caveat that questions will arise around different jurisdictions these will manage the use of one electronic format or how the latter will manage them. Various attempts to facilitate the e-bill were analysed in the present chapter and the benefits and downfall

189 Albrecht 2018 *Tul Mar LJ* 456.
190 Albrecht 2018 *Tul Mar LJ* 456.
191 Albrecht 2018 *Tul Mar LJ* 456.
192 Albrecht 2018 *Tul Mar LJ* 456.
193 Albrecht 2018 *Tul Mar LJ* 457.
194 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 92.

of each system were discussed. The concerns raised thus should be reviewed as they also reflect apprehensions that carriers and shippers experience about the acceptance of the e-bill. Some apprehensions are of a legal nature whilst others are commercial, but a solution ought to be found for all issues raised by concerned parties.[195] The possibility exists that issues experienced around the e-bill may be effectively addressed by use of blockchain technology, but the exact implementation of this potential solution is yet to be determined.

4 Electronic data interchange (EDI) and the BoL

4.1. Introduction

EDI was a significant evolutionary step towards dematerialising paper-based bills of lading and introducing e-bills. Eiselen defines EDI as follows:

> The electronic interchange of machine processable, structured data, which has been formatted according to agreed standards and which can be transmitted directly between different computer systems with the aid of telecommunication interfaces.[196]

The internet coupled with EDI prompted electronic data security using encrypted information and private key protected transactions.[197] During its peak and still today, EDI has played a vital role in electronic commerce as electronic information flows between computers on more efficient and cost-effective systems than previously known means.[198] This information is commonly known as electronic business information and ought to be defined by certain standards of a given system, provided that the data be structured, otherwise it will not be deemed business information or EDI data as it may be of an unstructured nature.[199]

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195 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 92.

196 Eiselen 1995 *S Afr Mercantile LJ* 1.

197 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 159-160.

198 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 160.

199 Gengeswari and Hamid 2010 *Jurnal Kemanusiaan* 112; Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 160.

4.1 EDI and the electronic bill of lading

Jafari[200] states that using EDI in e-bills requires intactness of legal and technological aspects. The technological aspect of security is vital for the success of EDI in an economic environment as it is a prerequisite of all parties involved.[201] Legal recognition would also be dependent on the reliability of the system's security feature.[202] Legal requirements will demand a security network working to secure data in the process of its being transferred through a system.[203] Security features should ensure that this data is only accessible to authorised users.[204] For this feature to be viable a technical audit together with a discussion among stakeholders holding financial interest should be held, or else the system's security and the data it contains will be compromised.[205]

Another feature requiring deliberation is the integrity of the messages sent from the system.[206] Existing electronic security features include password protection, PIN codes, electronic signatures and encryption.[207] Each security feature has its positive and negative traits and not a single solution is currently suited for the e-bill, albeit that encryption is superior to the rest.[208] Messages are encrypted when they are sent and decrypted at the port of destination which, as contended by Jafari, "protects the contents of data from being understood if they are intercepted by any unauthorised user."[209] However, recent intelligence attacks on international databases have led to

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200 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 160.
201 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 160.
202 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 160.
203 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 160-161.
204 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.
205 Ni *et al* "Application of EDI Information System Based on XML in the Container Multi-Model Transportation" 57.
206 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.
207 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.
208 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.
209 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.

doubts around the integrity of encryption security.[210] Encryption is, furthermore, not legally permitted in some countries and may cause legal difficulties in the relevant countries' jurisdictions.[211]

EDI's initial instalment, licencing costs and costs of insurance of the goods are considerable, yet maintenance and further business expenses are negligible, thus deeming it cost effective.[212]

Digital signatures used on electronic documents are another security option that secures ownership of a document and its contents by the author.[213] A third party's verification is needed to ensure that security is maintained and electronic signatures are authentic. Therefore, an agreement between the contracting parties and the nominated third party needs to be concluded and costs thereof need to be covered.[214]

EDI based business solutions such as the discussed Bolero and SeaDocs provide fast processing of data to match the current trade pace. By reducing and in some instances replacing the paper BoL with an EDI business solution, physical hindrances related to handling paper are avoided.[215] Furthermore, delivery at the port of delivery and the presentation of the BoL are improved through implementation of EDI messages.[216] Encryption ensures that only authorised persons may produce and spread messages while also verifying the origin of the messages.[217]

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210 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.

211 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.

212 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 161.

213 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

214 Muthow *The Impact of EDI on Bills of Lading: A Global Perspective on the Dynamics Involved*; Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

215 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

216 Muthow *The Impact of EDI on Bills of Lading: A Global Perspective on the Dynamics Involved*;Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

217 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

For a system to be secured the accuracy of the data needs to be ensured.[218] EDI provides secure software and hardware with a format agreed to by the interested parties.[219] Information disclosed via messages can be verified using the private key of parties or using an electronic signature.[220] The possibility of fraud is reduced by using encryption methods to protect the security of the data.[221]

4.1.1 EDI and evidentiary value of the BoL

EDI messages are ensured to enjoy substantial evidentiary value since it utilises the SWIFT code across borders.[222] Furthermore, it is confirmed that EDI-supported messages serve as the contract of carriage as agreed to by the relevant parties and as it relates to BoL contracts.[223] EDI aids in verification and inspecting of online documents by all parties as they relate to the granting of a letter of credit.[224]EDI moreover archives provide a reliable audit trajectory of fraudulent transactions which are admissible as evidence in a court of law.[225]

The availability of only one copy of the online BoL and shedding of issuance of the BoL in sets reduce the opportunity of committing fraud.[226] Only selected parties have limited authority to amend relevant documents and this is how it is avoided.[227] All

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218 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

219 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

220 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

221 Elentably 2011 *Transport Systems and Processes: Marine Navigation and Safety of Sea Transportation* 4;Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

222 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

223 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 162.

224 Todd *Bills of lading and bankers' documentary credits* section 4.5.2; Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 163.

225 *The Saudi Crown VIII and Rudolf A Oetker* 1 Lloyd's Rep 261; Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 163.

226 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 163.

227 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 163.

interested parties have access to relevant information for purposes of control and revising, which is another feature that renders EDI-based BoL attractive.[228] In the case of *Rudolf A Oetker v IFA International Frachagentur AG* it is stated that:

> The electronic record also helps in the identification of lapses and inconsistencies on the part of parties that leads towards the resolution of responsibilities at the time of disputes.[229]

4.1.2 EDI and the negotiability function

EDI systems with the function of negotiability were introduced by SeaDocs, the CMI model and the Bolero project. However, users have been slow to respond to it.[230]

The straight BoL lacks the negotiability function but serves two other roles: providing evidence of the contract of carriage and receipt of the goods.[231] This straight BoL is not a document of title and therefore goods cannot be used as security to obtain a loan from a bank against the goods.[232] Solutions have arisen such as the Cargo Key Receipt which provides for the features of non-negotiable documents as well as the non-selling of goods in transport.[233] This development made the acceptance by banks of the straight BoL as a letter of credit more likely. Generally, however, the introduction of this document has resulted in less delay in shipping, cost benefits and risk-free transactions on the accompanying 'Automated Data Processing' system, which today is known as EDI.[234]

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228 Chukwuma 2013 *Public Policy and Administration Research* 101-108; Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 163.

229 *Rudolf A Oetker v IFA International Frachagentur AG (The Almak)* (1985) 1 Lloyd's Rep 557; Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 164.

230 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 164.

231 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

232 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

233 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

234 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

However, most banks are still apprehended by the idea of replacing a negotiable BoL with a straight BoL as it must yet to be proven that the e-bill will facilitate a reliable transaction.[235] Consequently, banks continue to insist on the submission of the original set op copies of the BoL to secure credit against goods.[236] The rules governing the mentioned transactions are retained by several business associations such as the CMI, UCP and Incoterms.[237]

4.2 Conclusion

The internet indubitably advanced commercial trade but, in a sense, acted simply as a stepping stone since it did not succeed in creating a digital replication of the BoL as a result of numerous legal challenges faced by EDI.[238] These legal challenges include EDI's inability to guarantee singularity or uniqueness.[239] As EDI can be replicated and sent to multiple parties, importers risk being defrauded and carriers risk incorrect delivery by presenting a fraudulent bill, which cannot be used as a defence to avoid liability.[240] Herd[241] states that this inability of EDI to guarantee singularity will challenge the application of rules on carriage of goods by sea including challenging rules and instruments for implementing carrier liability.[242]

The solution arose that an EDI-system would depend on security hardware or a central registry system to verify and ensure e-bill singularity.[243] This is performed by a trusted

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235 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

236 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

237 Jafari *The concerns of the shipping industry regarding the application of electronic bills of lading in practice amid technological change* 165.

238 Herd 2018 *QUT L Rev* 308.

239 United Nations Commission on International Trade Law, Possible Future Work on Electronic Commerce: Transfer of Rights in Tangible Goods and other Rights, 3 8th sess, UN Doc A/CN.9/WG.IV/WP.90 (12-23 March 2001) 27 [95]-[96]; Also *see BHP Trading Asia v Oceaname Shipping* (1996) 67 FCR 211, 222; Also see *Motis Exports v Dampskibsselskabet AF 1912 Aktieselskab* [1999] 1 Lloyd's Rep 837; Herd 2018 *QUT L Rev* 308.

240 United Nations Commission on International Trade Law, Electronic Data Interchange, 30 ' sess, UN Doc A/CN.9/WG.IV/WP.69 (31 January 1996) 4 [5]; Herd 2018 *QUT L Rev* 308.

241 Herd 2018 *QUT L Rev* 308.

242 Due to a reduced liability claim against carriers, insurance costs will increase. Herd 2018 *QUT L Rev* 308.

243 Herd 2018 *QUT L Rev* 308.

administrator.[244] Nonetheless, such add-on and central-authority systems present a set of concerns of their own such as corruption, fraud, hacking and physical destruction.[245] Therefore, EDI does not provide legal certainty, which leads to resistance to its implementation within the trade sector.[246]

Lastly, if EDI cannot serve as a negotiable document of title, banks will be reluctant to rely on it as a form of security for financing payment based on a letter of credit.[247]

5 Blockchain technology

5.1 Introduction

Blockchain technology has attracted the attention especially of role players in the shipping industry.[248] Blockchain is a database that operates by using an online distributed ledger, known as distributed ledger technology or DLT. Simplified, it can be described as a decentralised bookkeeping system.[249] It is capable of recording vast amounts of information and transactions – all of which are necessary for a BoL to function optimally.[250]

A single blockchain ledger is composed of a chain of blocks, each holding a pair of confirmed transactions.[251] Based on its peer-to-peer functioning, the blockchain system is decentralised and therefore independent from any trusted entity to verify transactions.[252] A new transaction would add onto a new block which then forms part of the chain of pre-existing blocks.[253] To verify additions to blockchain a complex mathematical computation must be solved.[254] All transactions are recorded as they

244 Zetzsche, Buckley and Arner 2018 *U Ill L Rev* 10; Herd 2018 *QUT L Rev* 308.
245 Zetzsche, Buckley and Arner 2018 *U Ill L Rev* 10; Herd 2018 *QUT L Rev* 308.
246 Herd 2018 *QUT L Rev* 308.
247 Herd 2018 *QUT L Rev* 309.
248 Cuccuru 2017 *International Journal of Law and Information Technology* 179-184; Albrecht 2018 *Tul Mar LJ* 262.
249 Cuccuru 2017 *International Journal of Law and Information Technology* 179-184; Albrecht 2018 *Tul Mar LJ* 262.
250 Albrecht 2018 *Tul Mar LJ* 262.
251 Takahashi "Implications of the Blockchain Technology for the UNCITRAL Works" 202; Albrecht 2018 *Tul Mar LJ* 262. Also see Zetzsche, Buckley and Arner 2018 *U Ill L Rev* 11.
252 Albrecht 2018 *Tul Mar LJ* 262.
253 Albrecht 2018 *Tul Mar LJ* 262.
254 Herd 2018 *QUT L Rev* 309.

can strictly be appended only to the chain of blocks, making it essentially impossible to alter or remove a transaction which has been executed, certified and added to the ledger.[255] The outcome of this is precise authentication of the transferor's identity and an immutable record of data.[256] Should changes be made, it is allocated with a Unix timestamp,[257] which eliminates any possibility of fraud occurring and ultimately fraudulent dated bills of lading.[258] Banks will also receive protection as letters of credit will not erroneously be issued against counterfeit BoLs.[259]

A hash (similar to a fingerprint) is allocated to each block, which is based on the inputs of preceding blocks.[260] Each user holds a complete and constantly updating record of the data processing system; these are referred to as nodes.[261] Due to the availability of the records of the transaction history to all users, the out-dated practice of preparing a set of three BoLs can be done away with,[262] while this is "a practice that has been criticised for a long time."[263]

The key differentiation between DLT-based EDI and regular, centralised EDI is the history contained on the blockchain.[264] Every circulating token's history is recorded on blockchain, providing proof of who owns what at any given interval through a chain of notarised appendages.[265]

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255 Albrecht 2018 *Tul Mar LJ* 262.
256 Zetzsche, Buckley and Arner 2018 *U Ill L Rev* 15.
257 Also known as UNIX Epoch time. Unix time is a system for establishing a certain point in time. It is the number of seconds that have elapsed since the Unix epoch, that is the time 00:00:00 UTC on 1 January 1970, minus leap seconds. Leap seconds are disregarded and every day is deemed to contain 86400 seconds. Unix time is commonly used in operating systems and file formats; see Matthew and Stones *Beginning linux programming*.
258 Albrecht 2018 *Tul Mar LJ* 262.
259 *United City Merchands Ltd v Royal Bank of Canada* 1 AC 168 (HL) *United City Merchands Ltd v Royal Bank of Canada* 184; Albrecht 2018 *Tul Mar LJ* 263.
260 Hackius and Petersen "Blockchain in logistics and supply chain: trick or treat?"; Albrecht 2018 *Tul Mar LJ* 263.
261 Albrecht 2018 *Tul Mar LJ* 263.
262 Albrecht 2018 *Tul Mar LJ* 263.
263 Albrecht 2018 *Tul Mar LJ* 263.
264 Findlay 2015 *Recordkeeping Roundtable*.
265 Herd 2018 *QUT L Rev* 309.

5.2 Operation of blockchain technology in the context of international trade

In maritime shipping, DLT-based EDI is capable of recording goods in the form of tokens, which guarantees the uniqueness of the record.[266] Upon the carrier receiving the cargo from the shipper, the carrier will sign off the transaction, as he/ she would have done in the case of a regular BoL. The carrier will state the description of the goods and whether or not the bill is claused in addition to recording additional relevant information such as the consignor's or consignee's identity.[267]

The relevant transaction is then disseminated and deemed unprocessed until a miner[268] selects it from the large pool of transactions.[269] The selected, unconfirmed transactions compile a single block.[270] Various miners will add the same transaction to their own blocks, entailing that each transaction will form part of a greater number of blocks.[271] This transaction will not be verified until it has been added to the blockchain.[272] For transactions to be added to the blockchain by miners, a unique key is needed, which, as mentioned, is produced by deciphering a complicated mathematical equation.[273] The concept of relying on "the crowd" to verify transactions seems unusual, and the community might be reluctant to trust this system as opposed to central registries.[274] It should however be mentioned that confidentiality and privacy concerns around this system, as indicated in a survey conducted by the United Nations Conference on Trade and Development (UNCTAD), amounted to a mere ten percent (10%) of respondents.[275]

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266 Herd 2018 *QUT L Rev* 309.
267 Herd 2018 *QUT L Rev* 309.
268 Miners use special software to solve math problems and are issued a certain number of cryptocurrencies in exchange. This is an innovative way to issue the currency while also creating an incentive for more people to become miners.
269 Herd 2018 *QUT L Rev* 310.
270 Herd 2018 *QUT L Rev* 310.
271 Herd 2018 *QUT L Rev* 310.
272 Herd 2018 *QUT L Rev* 310.
273 Herd 2018 *QUT L Rev* 310.
274 Albrecht 2018 *Tul Mar LJ* 267.
275 Albrecht 2018 *Tul Mar LJ* 267.

Both a private and a public key is needed. The private key is undisclosed by the one party while the public key is available and used for identification verification by the relevant party.[276] Decryption is only possible upon presentation of the public- and private keys.[277] Parties are enabled to "sign" the transaction by means of using either key.[278] Blockchain allows a carrier to issue a message in conjunction with his private key, which recognises him as the issuer.[279] The receiver, holding the public key, recognises the transferee as the entitled party who should receive the token.[280] Transferees are now able to corroborate the signature as well as the accompanying message.[281] Hashing, as defined below, facilitates the transfer of a token:

> Permanent transfer of a token on the blockchain is made possible by cryptographical "hashing," whereby an alphanumerical hash-value is generated that is merely operating in one direction and becomes, thus, irreversible for the issuer.[282]

On the moment when the transaction is verified and added to blockchain, the relevant transaction is recorded on the distributed ledger.[283] Any party having an interest will be able to view the immutable history of transferral of the token.[284] Subsequently, the tokens are issued to the shipper who is then capable of transferring the tokens to a buyer as payment.[285] This transaction is concluded in accordance with a contract of sale based on the terms of the contract of carriage.[286] Once tokens have been transferred, the shipper will not be able to access them whereas the buyer would.[287] At the port of destination, the carrier will deliver the goods to the person in possession of the public key that matches the most recent recipient of the token on blockchain.

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276 Albrecht 2018 *Tul Mar LJ* 263.
277 Albrecht 2018 *Tul Mar LJ* 263.
278 Albrecht 2018 *Tul Mar LJ* 263.
279 Albrecht 2018 *Tul Mar LJ* 263.
280 Albrecht 2018 *Tul Mar LJ* 263.
281 Albrecht 2018 *Tul Mar LJ* 263.
282 Albrecht 2018 *Tul Mar LJ* 263.
283 Herd 2018 *QUT L Rev* 310.
284 Herd 2018 *QUT L Rev* 310.
285 Herd 2018 *QUT L Rev* 310.
286 Herd 2018 *QUT L Rev* 310.
287 Herd 2018 *QUT L Rev* 310.

5.3 Various blockchain systems

Albrecht[288] highlights the importance of distinguishing between blockchain's distributed ledgers as opposed to systems merely based on a central registry using blockchain technology. However, central registry systems are similar to previous systems and models used for e-bills and may therefore be excluded from examination in this dissertation.[289]

Upon analysing distributed ledger systems, distinction must be drawn between "permissioned" and "permission-less" systems. Permission-less systems are available to all interested parties via the internet and are commonly used by cryptocurrencies such as Bitcoin or Ethereum.[290] Permissioned systems require parties to register on the network by means of identification.[291] These networks ensure greater security and trust amongst parties in the system. Conversely, "member-only systems are subject to compatibility concerns, depending on the access criteria."[292] Should non-members transact with system-members, the blockchain bill will be replaced by the traditional paper BoL.[293] In contrast, permission-less systems can accommodate an assortment of parties whose identities are publicised by their public key, providing for actual anonymity.[294] Intriguingly, the paper-based BoL system corresponds with the permission-less system since it includes anonymous parties.[295] Trade taking place by using a bearer-bill will require the party demanding delivery at the discharge port to merely present an original bill to the carrier and not proof of his identity.[296] UNCITRAL Model Law does not require the identity of the party in control[297] to be placed on record: rather, it requires electronic records to be issued to anonymous bearers.[298]

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288 Albrecht 2018 *Tul Mar LJ* 264.
289 See Albrecht 2018 *Tul Mar LJ* 264.
290 Albrecht 2018 *Tul Mar LJ* 264.
291 Albrecht 2018 *Tul Mar LJ* 264-265.
292 Albrecht 2018 *Tul Mar LJ* 265.
293 Albrecht 2018 *Tul Mar LJ* 265.
294 Albrecht 2018 *Tul Mar LJ* 265.
295 Albrecht 2018 *Tul Mar LJ* 265.
296 Albrecht 2018 *Tul Mar LJ* 265.
297 Article 11 of the UNCITRAL Model Law defines the electronic equivalent of holding an original BoL as "control"; Albrecht 2018 *Tul Mar LJ* 265.
298 Albrecht 2018 *Tul Mar LJ* 265.

A permission-less distributed ledger ensures that transactions are irreversible as there will not be a sufficient amount of nodes to facilitate working collectively in an attempt to alter the blockchain.[299] It therefore provides secure technology not susceptible to tampering, power cuts or network interruptions.[300] However, permission-less blockchains do present disadvantages such as the inability to verify the identities of parties and participants on the system , who cannot be traced as they are conveniently anonymous, while they are nonetheless able to gain access to shipping transaction information.[301] Furthermore, due to the availability of public freight lists the system could be exploited by crime groups and pirates who could target valuable vessels.[302] Due to these perils, parties would become selective and cautious about the information they were willing to reveal. In its turn, this could raise further concern as such information would not cater for tracing the BoL, which would dispossess the BoL of its receipt function, entailing the loss of one of its vital roles. All of this necessitates a suitable solution to the encryption of valuable data in a strengthened manner that would only allow involved parties to access it.[303]

Alberts[304] mentions an alternative approach to ensure security, which entails making use of a permissioned blockchain while setting the bar exceptionally low on access criteria. He suggests that "access could be linked to proof of registration in a commercial registry."[305] This would combine the benefit of security provided by a widely distributed ledger with the advantage that malicious parties can be barred from making use of the system.[306]

It can therefore be said that a decentralised system would be most suitable for the functioning of a BoL on the blockchain system.[307] Bury indeed states that a

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299 Bacon *et al* 2018 *Rich JL & Tech* 24; Albrecht 2018 *Tul Mar LJ* 265.
300 Clack, Bakshi and Braine 2016 *arXiv preprint arXiv:160800771* 4; Albrecht 2018 *Tul Mar LJ* 265.
301 Stahlbock, Heilig and Voß 2018 *HMD Praxis der Wirtschaftsinformatik* 1197; Albrecht 2018 *Tul Mar LJ* 265-266.
302 Albrecht 2018 *Tul Mar LJ* 266.
303 Kosba *et al* "Hawk: The blockchain model of cryptography and privacy-preserving smart contracts"; Albrecht 2018 *Tul Mar LJ* 266.
304 Albrecht 2018 *Tul Mar LJ* 266.
305 Albrecht 2018 *Tul Mar LJ* 266.
306 Albrecht 2018 *Tul Mar LJ* 266.
307 Albrecht 2018 *Tul Mar LJ* 266.

decentralised blockchain model will function only if consensus is reached as to which blocks ought to be added to the blockchain without a central authority deciding this on behalf of all participants.[308]

5.4 Conclusion

First and foremost, the outcome attained by blockchain is equal to that which would be attained by a traditional paper BoL.[309] As discussed, vital features required to unite the BoL and the e-bill is to ensure exclusive control as well as guarantee a record's exclusivity from the time of the issuance of the BoL until it is used.[310] Blockchain's guaranteed uniqueness offers issuance of a single record by means of a decentralised system. It therefore may well be suitable for the issuing of an exclusive BoL record. As is known, EDI technology has benefitted international trade by cutting costs and reducing delays. However, EDI combined with DLT not only provided the same benefits but were also capable of decreasing fraud by making use of artificial intelligence.[311]

Besides obvious benefits, in the future DLT will have the ability to serve as a platform for new technologies to network. For example, "smart contract-based letters of credit could operate so as to issue payment on the receipt of a conforming DLT-based EDI."[312] Combine these possibilities with the internet and a real-time record could be produced on blockchain, reflecting necessary information, location and, if applicable, temperature of the goods.[313] The diversity and applicability of DLT exceed that of EDI alone. DLT-based EDI will indubitably contribute to the development of international trade.

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308 Bury 2016 *Tul Mar LJ* 235; Albrecht 2018 *Tul Mar LJ* 266.
309 Albrecht 2018 *Tul Mar LJ* 267.
310 Albrecht 2018 *Tul Mar LJ* 263.
311 Albrecht 2018 *Tul Mar LJ* 267. Also see Herd 2018 *QUT L Rev* 310.
312 Herd 2018 *QUT L Rev* 310.
313 Herd 2018 *QUT L Rev* 310.

6 International regulatory frameworks

6.1 Introduction

A combination of international and domestic instruments regulate sea carriage documents, including the BoL and the e-bill.[314] Before regulation of DLT-based EDI or blockchain-based BoL can be evaluated, it will be necessary briefly to discuss existing frameworks used to regulate traditional BoL and e-bill. The Hague-Visby Rules (HVR) embody the oldest regulating instrument of the BoL and e-bill and are ordinarily incorporated into carriage contracts. However, this already indicates that legislators at that time did not dispose of a concept of the internet, EDI or the dematerialisation of BoLs during the drafting thereof.[315] Therefore, the international trade community was doubtful as to whether or not the HVR would be capable of regulating DTL-based EDI.[316] This uncertainty was a main reason why DLT did not receive much support.[317]

Common law customs dictate that DLT-based EDI will not be recognised as a BoL since it does not meet the customary form of a physical document. Furthermore, common practice of referring to a BoL as a negotiable document of title proposes that there is a certain status reserved for it in marine customary law.[318] DLT is seen as a disruptor though not necessarily in the international trade sector: it is seen as a disruptor of regulations. Simultaneously, DLT contains the notion of transcending regulations.[319] However, regulation is necessary to give legal effect to DLT-based EDI.[320]

6.2 Regulatory frameworks for the bill of lading and the e-bill

Various international regulatory instruments have addressed the use of the BoL as well as the e-bill. In 1924, the Hague Rules advocated the acknowledgement of ship- and cargo-owners' rights and liabilities.[321] Minimum obligations to be adhered to by ship-

314 Herd 2018 *QUT L Rev* 310.
315 Herd 2018 *QUT L Rev* 310.
316 Herd 2018 *QUT L Rev* 310.
317 Herd 2018 *QUT L Rev* 310.
318 Herd 2018 *QUT L Rev* 310-311.
319 Herd 2018 *QUT L Rev* 311.
320 Herd 2018 *QUT L Rev* 311.
321 Mitchelhill *Bills of lading: law and practice* 558-559.

owners were stipulated and ship-owners were not fully enabled to contract out of certain obligations while their liability was limited.[322] This convention continues to be applied in many countries.[323]

In 1968, a revising protocol was signed in Brussels named the "Hague-Visby Rules."[324] These revised Hague-Visby Rules embodied an attempt at eradicating inadequate limits of liability; however, the attempt to unite such limits was not successful.[325] The Hamburg Rules were developed in 1978 to redress the issue of carrier liability contained in the Hague-Visby Rules.[326] Nonetheless, no significant maritime countries accepted these due to the certainty that it would entail increased cargo insurance rates.[327] As for the e-bill, the main regulatory framework established to govern it was the Rotterdam Rules, which was adopted in 2008 and is still used.[328]

6.3 Regulatory framework for the blockchain-based bill of lading

The Rotterdam Rules are more suitable than one might think as legislators made ample provision for possible technological developments and pertinently around electronic records long before blockchain technology became publicly popular.[329]

"Electronic transport records" are defined by the Rotterdam Rules as information contained in electronic communication which serves as evidence of the contract of carriage as well as receipt of goods. It may also be marked as "non-negotiable" or "to order."[330] The Rotterdam Rules takes an approach based on "functional equivalence," which requires that an electronic record ought to be deemed to serve the equivalent function as a regular BoL.[331] Functional equivalence requires exclusive control and

322 See Hartzenberg 2019 The impact of the Rotterdam Rules on liability of carriers and shippers at sea 40-47.
323 Mitchelhill *Bills of lading: law and practice* 558-559.
324 Mitchelhill *Bills of lading: law and practice* 558-559.
325 Mitchelhill *Bills of lading: law and practice* 558-559.
326 Mitchelhill *Bills of lading: law and practice* 558-559.
327 Mitchelhill *Bills of lading: law and practice* 558-559.
328 Albrecht 2018 *Tul Mar LJ* 272.
329 Takahashi "Implications of the Blockchain Technology for the UNCITRAL Works" 206; Albrecht 2018 *Tul Mar LJ* T 272.
330 *United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea* article 1; Albrecht 2018 *Tul Mar LJ* 272.
331 Gaskell 2010 *Lloyds Maritime and Commercial Law Quarterly* 271; Albrecht 2018 *Tul Mar LJ* 272.

transfer of the electronic records.[332] Exclusive control can be equated to possession since exclusive control of a blockchain token is provided for by the private key that entitles the holder thereof to be identified as entitled to the BoL token, since there is a unique address on the blockchain.[333]

The transfer requirement is possible for the additional reason that the blockchain token can be successfully transferred to a subsequent holder.[334] Therefore it can be said that blockchain technology is capable of classification in the Rotterdam Rules.[335] It is, however, not as simple as this. Article 9 of the Rotterdam Rules stipulates procedures for the use of electronic transport records and advocates certain required contents.[336] The convention allows parties to agree separately to specific provisions relating to procedural facets or to incorporate domestic legislation for this purpose.[337] Albrecht[338] states that the Rotterdam Rules lay down a basic foundation for a fully functional legal framework which should be used to build upon, but it does not address and regulate all the aspects of Blockchain technology.

An exciting and promising development occurred in 2017 when the UNCITRAL Model Law followed suit to implement an approach of technological neutrality.[339] This approach relies on drafting general rules to provide for future technological advancements.[340] Blockchain technology and the use thereof in international trade is therefore neither excluded nor expressly sorted underneath the UNCITRAL Model Law.[341] Chapter II of the UNCITRAL Model Law provides for functional equivalence and

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332 Albrecht 2018 *Tul Mar LJ* 272.
333 Takahashi "Implications of the Blockchain Technology for the UNCITRAL Works" 208; Albrecht 2018 *Tul Mar LJ* 272.
334 Albrecht 2018 *Tul Mar LJ* 272.
335 Albrecht 2018 *Tul Mar LJ* 272.
336 *United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea* article 9; Albrecht 2018 *Tul Mar LJ* 272.
337 Article 9, Rule 2; Albrecht 2018 *Tul Mar LJ* 272-273.
338 Albrecht 2018 *Tul Mar LJ* 273.
339 UNCITRAL Secretariat, Legal Issues Relating to the Use of Electronic Transferable Records, 3, U.N. Doc. A/CN.9/WG.IV/WP. 115; Albrecht 2018 *Tul Mar LJ* 273.
340 Albrecht 2018 *Tul Mar LJ*Takahashi "Implications of the Blockchain Technology for the UNCITRAL Works" 207; Albrecht 2018 *Tul Mar LJ* 273.
341 Albrecht 2018 *Tul Mar LJ* 273.

more Article 10(1) pertinently stipulates that a transferable document or instrument would be acknowledged if

> (a) The electronic record contains information that would be required to be contained in a transferable instrument or document; and
>
> (b) A reliable method is used.

In the case of the latter, it is necessary

> (i) To identify that specific electronic record as the electronic transferable record;
>
> (ii) To render that electronic record capable of being subject to control from its creation until it ceases to have any validity or effect; and
>
> (iii) To retain the integrity of that electronic record.[342]

A narrow scope of procedural requirements are incorporated within the UNCITRAL Model Law, in particular in Articles 11 and 15 that engage the matters of signatures control and endorsement.[343] Procedural particulars would, once more, be up to the parties' discretion and can be reduced to writing and enforced by means of a contract.[344]

The UNCITRAL Model Law appears to be suitable for application to the blockchain system. The only discrepancy remaining under the UNCITRAL Model Law is the confusion caused by equating "control" and "possession," as these concepts traditionally have different legal meanings.[345] A proposal has been made to adjust this UNCITRAL Model Law requirement towards preference for "possession"[346] for the sake of achieving legal certainty since established legal principles such as possession is directly linked to exclusive control.[347]

Should legislators prefer using "control," as it offers and umbrella term for various documents, it would however not hinder the suitability of blockchain technology to the BoL entirely.[348] In mercantile trade the role players are reliant on certain terms and

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342 *UNCITRAL Model Law on Electronic Transferrable Record* article 9-10.
343 Albrecht 2018 *Tul Mar LJ* 273.
344 Albrecht 2018 *Tul Mar LJ* 273.
345 Albrecht 2018 *Tul Mar LJ* 273.
346 Albrecht 2018 *Tul Mar LJ* 273.
347 Goldby 2008 *Lloyds Maritime and Commercial Law Quarterly* 145-156.
348 Albrecht 2018 *Tul Mar LJ* 274.

practices and adhere to them therefore custom changes to these are in other words unfeasible.[349] That is, the industry would not deprive themselves of a beneficial system to avoid legal uncertainty.[350] The need for legal certainty is therefore entwined with actions taken by the industry and it should rightfully function as such.[351] The e-bill as well as electronic documents offer promising benefits in international trade, nonetheless, and legislators ought to step in and facilitate the process.[352] Irrefutably, these models are innovative and a step towards the effective and successful functioning of e-bills. However, as demonstrated, extant regulations do not provide a completely satisfactory solution to the seamless coming together of e-bills and legal requirements. All in all, legislation supporting the functioning of the e-bill could be the conclusive element for the digital revolution in sea transport.[353]

6.4 CMI rules and contractual agreements

In comparison with closed systems decentralised systems are more desirable as it facilitates separation of contractual agreements between users and the main system.[354] It addresses the problem, as has been mentioned, that arises around the recognition that agreements should not be inseparably linked to one ledger while, simultaneously, it should not be subject to all users thereof.[355] Users ought to be able to change to other systems whilst still using and adhering to the original agreement and while it remains possible to make merely small changes.[356] Unlike the Bolero system which provides the infrastructure and issuing rulebooks to members, this system allows for contracts to be negotiated amongst users.[357]

To avoid legal uncertainty and disintegration, a standard template could be used in contracts between parties. The CMI Rules can possibly serve as a point of reference

349 Albrecht 2018 *Tul Mar LJ* 274.
350 Albrecht 2018 *Tul Mar LJ* 274.
351 Albrecht 2018 *Tul Mar LJ* 274.
352 Albrecht 2018 *Tul Mar LJ* 274.
353 Albrecht 2018 *Tul Mar LJ* 274.
354 Albrecht 2018 *Tul Mar LJ* 275.
355 Albrecht 2018 *Tul Mar LJ* 275.
356 Albrecht 2018 *Tul Mar LJ* 275.
357 Albrecht 2018 *Tul Mar LJ* 275.

due to their technological neutrality.[358] Some provisions contained in the CMI Rules do, however, warrant revision and redrafting as they were adopted decades ago while blockchain technology is a relatively recent technological advancement.[359] Albrecht provides two examples of such provisions demanding alteration as found in rule 3(d) and rule 8(b) of the CMI Rules:

> Rule 3(d) requires that a transaction must be confirmed by the recipient before he/ she may exercise rights based on the blockchain system. There is no need for this procedure. A confirmation would be redundant on the blockchain as the transaction's result is already accessible and verifiable.
>
> Rule 8(b) deals with the private key, which assumes that for each transaction, a new private key must be issued by the carrier while the old key becomes spent.[360]

The CMI Rules were critiqued for a lack of transparency and security concerns. The solution presented was to make use of Public Key Infrastructure encryption.[361] Blockchain technology could harmonise a system capable of transparency required for an inter-functioning model.[362] The CMI Rules provide a solid foundation for model law but demands revision and amendments such as addressing the issue of effectively regulating transferal of property which is not provided for by the CMI Rules.[363] A blockchain-based BoL will, therefore, only operate successfully on the condition that suitable legislation is adopted to recognise such bills or an alternative scheme is developed to transfer title.[364]

6.5 UNCITRAL MLETR

The UNCITRAL MLETR identified the need in international trade to address the uncertainty regarding the legal value of electronic transferrable records which then inherently also required unification and harmonisation of the law surrounding this

358 Albrecht 2018 *Tul Mar LJ* 275.
359 Girvin *Carriage of goods by sea* 202; Albrecht 2018 *Tul Mar LJ* 275.
360 Albrecht 2018 *Tul Mar LJ* 275.
361 Goldby 2008 *Lloyds Maritime and Commercial Law Quarterly* 59; Albrecht 2018 *Tul Mar LJ* 276.
362 Albrecht 2018 *Tul Mar LJ* 276.
363 Albrecht 2018 *Tul Mar LJ* 276.
364 Albrecht 2018 *Tul Mar LJ* 276.

uncertainty.[365] The UNCITRAL MLETR was adopted in 2017 and took the approach of functional equivalence and technological neutrality.[366] The former entails that any electronic version of a traditional instrument should not be deprived of validity, legal effect or enforceability based solely on its electronic form,[367] while the latter denotes that the law should not be applicable to a certain technology system or require a certain technology system to be made use of.[368] Thus it is ensured that the law regulating new technology will remain applicable regardless of technological developments.[369]

This less biased approach to technology is merely concerned with the result of the method, as opposed to the method itself.[370] This will encourage technology users and developers to revolutionise their dematerialised maritime carriage documents to replicate the paper versions thereof.[371] To illustrate this, the UNCITRAL MLETR defines electronic transferrable records as records reflecting the same information that would have deemed a paper-based transferrable document operational.[372] This provides for equal treatment under the law as electronic documents are placed on an equal footing with their paper-based equivalent.

As technology is advancing at a pace much faster than international legislators can maintain, the importance of making provision for functional equivalence ought to be fully comprehended. It is not as simple as merely regulating a document that has been used in practice for ages. Instead, as in the scenario discussed above, the approach must provide for the regulation of developing technologies without delving into the specific features of the technology itself.[373] The concept of functional equivalence enables rule-makers to represent the incumbent BoL as the "gold standard shipping

365 United Nations Commission on International Trade Law, Report of the Working Group on Electronic Data Interchange on the work of its twenty-ninth session, 28th sess, UN Doc A/CN.9/407 (16 March 1995) 5 [6]; Herd 2018 *QUT L Rev* 315-317.
366 Explanatory Note to the UNCITRAL Model Law on Electronic Transferable Records (United Nations, 2018) 23 [18] ('Explanatory Note'); Herd 2018 *QUT L Rev* 315-317.
367 MLETR art 7(1); Herd 2018 *QUT L Rev* 315-317.
368 Herd 2018 *QUT L Rev* 315-317.
369 Herd 2018 *QUT L Rev* 315-317.
370 Herd 2018 *QUT L Rev* 315-317.
371 Herd 2018 *QUT L Rev* 315-317.
372 MLETR art 2; Herd 2018 *QUT L Rev* 315-317.
373 Herd 2018 *QUT L Rev* 315-317.

document" and only the technological innovations that meet the standard and have the equivalent end-result, will enjoy the benefits and protection of regulation.[374] Should this regulation become embraced and adopted, the paper-based BoL will be deemed redundant yet will continue to provide a legal standard to which other shipping technologies can be compared.[375]

Although the MLETR is rather innovative since it finds itself at the forefront of electronic transferrable record regulation, it is not binding and purely provides guidelines for regulation of electronically transferrable records.[376] As these rules are non-binding they have "little regulatory effect on the maritime industry."[377]

In contrast to this, one state is paving the way for the necessary advances by adopting the MLETR. On 29 November 2018 Bahrain was the very first state to regulate technologies that are functionally equivalent to BoLs by adopting the MLETR as part of their domestic legal structure.[378] Adoption and implementation of the Model Law ought to be pursued by more countries, otherwise the MLETR could become a "stale agency threat at international level."[379] The Bahrain Electronic Transferrable Records Law (BETRL) incorporated the UNCITRAL MLETR as related to functional equivalence. Article 6 of the BETRL reflects article 10 of the MLETR and stipulates the criteria for an electronic record to be acknowledged as transferrable.[380] The first criterion to be met relates to the content of the record while the second concerns the reliability of the method used to convey the record.[381] Both requirements should be met for the electronically recorded information to be deemed as a recognised transferrable document under Bahrain law.[382] The first requirement of the BETRL is satisfied by the fact that the electronic record contains the information that is usually contained by a

374 Herd 2018 *QUT L Rev* 315-317.
375 Herd 2018 *QUT L Rev* 315-317.
376 United Nations Commission on International Trade Law, Model Law on Electronic Transferable Records (United Nations, 2018) ('MLETR').
377 Herd 2018 *QUT L Rev* 315-317.
378 Electronic Transferable Records Law, Law No 55 of 2018 (Bahrain); Herd 2018 *QUT L Rev* 315-317.
379 Nathan Cortez, 'Regulating Disruptive Innovation' (2014) 29 Berkeley Technology Law Journal 175; Herd 2018 *QUT L Rev* 315-317.
380 Herd 2018 *QUT L Rev* 315-317.
381 Herd 2018 *QUT L Rev* 315-317.
382 Herd 2018 *QUT L Rev* 315-317.

transferrable instrument.[383] As blockchain provides the ability to encrypt codes on tokens by using DLT, the first requirement would easily be satisfied.[384] The second requirement consists of three sub-requirements which state that a reliable method be able/ used to[385]

> Identify that electronic record as the electronic transferable record;[386]
>
> Render it capable of being subject to control from its creation until it ceases to have any effect or validity;[387] and
>
> Retain the integrity of that electronic record.[388]

The first sub-requirement would be satisfied if the user were able to enter input into the DLT-based electronic record, the exact same information as contained in a paper BoL.[389] If the record would be capable of containing the information, which amounts to an electronic transferrable record, this would be guaranteed.[390] As far as the second sub-requirement goes, DLT-based EDI provides users with exclusive possession, control and title of all records produced.[391] As only one person has exclusive possessive rights over tokens in a DLT-based system, this satisfies the control-requirement.[392] The third sub-requirement around the integrity of the electronic record that should be retained, could be fulfilled through DLT as it is immutable.[393] The Bahrain law defines a "document" explicitly as "including a BoL."[394] Since the third sub-requirement can be

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383 Electronic Transferable Records Law, Law No 55 of 2018 (Bahrain) art 6(1); MLETR art 10(1)(a); Herd 2018 *QUT L Rev* 315-317.
384 Herd 2018 *QUT L Rev* 315-317.
385 Herd 2018 *QUT L Rev* 315-317.
386 Electronic Transferable Records Law, Law No 55 of 2018 (Bahrain) art 6(2)(a); MLETR art 10(1)(b)(i); Herd 2018 *QUT L Rev* 315-317.
387 Electronic Transferable Records Law No. 55 of 2018 (Bahrain) art 6(2)(b); MLETR art 10(1)(b)(ii); Herd 2018 *QUT L Rev* 315-317.
388 Electronic Transferable Records Law No. 55 of 2018 (Bahrain) art 6(2)(c); MLETR art 10(1)(b)(iii); Herd 2018 *QUT L Rev* 315-317.
389 Electronic Transferable Records Law No. 55 of 2018 (Bahrain) art 6(2)(a); MLETR art 10(1)(b)(i); Herd 2018 *QUT L Rev* 315-317.
390 Herd 2018 *QUT L Rev* 315-317.
391 Herd 2018 *QUT L Rev* 315-317.
392 Herd 2018 *QUT L Rev* 315-317.
393 Herd 2018 *QUT L Rev* 315-317.
394 Electronic Transferable Records Law No. 55 of 2018 (Bahrain) art 1(e)(i); Herd 2018 *QUT L Rev* 315-317.

satisfied DLT-based EDI "can be used in a functionally equivalent capacity and with the same legal effect as a BoL under Bahrain law."[395]

6.6 Conclusion

The HVR have been regulating the BoL but technological advancement could not have been foreseen upon the drafting thereof. Nonetheless, the HVR provide a foundation and history of value on which legislators can build towards a contemporary regulatory framework.

DLT-based EDI in its current form necessitates legitimacy in the legal sense, which requires legislators and regulators to respond to this demand.[396] To bridge the gap between EDI and DLT-based EDI and the BoL, national and international regulation has been effected. On a national level, legislators who perceive that international law is outdated, have adjusted regulatory application to allow DLT-based EDI to invoke certain sea carriage rules, for example.[397] At international level, the MLETR was drafted by UNCITRAL in an attempt to develop legislation and avoid regulatory disruption by DLT.[398]

Should other countries adopt the UNCITRAL MLETR, the Model Law would acknowledge DLT-based EDI, which would create a transferrable document and therefore it would be deemed negotiable. As long as the record is capable of providing evidence of a contract of carriage, the negotiable document of title would be recognised by the HVR as constituting a "negotiable sea carriage document."[399]

DLT will become the new technology widely used in shipping logistics while also presenting a reliable system to substitute the practice of making use of paper bills of lading – but it does require a reliable regulatory framework in place.[400]

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395 Herd 2018 *QUT L Rev* 315-317.
396 Herd 2018 *QUT L Rev* 311.
397 Herd 2018 *QUT L Rev* 311.
398 Herd 2018 *QUT L Rev* 311.
399 Amended Hague-Visby Rules arts 1(1)(f); Herd 2018 *QUT L Rev* 315-317.
400 Herd 2018 *QUT L Rev* 315-317.

7 Conclusion

Although the BoL is a unique and vital legal document, the legal encumbrances which this paper-based document faces, hinders international trade as the law has a tendency to fall behind technological development. Albrecht[401] states that the BoL's goal to streamline commercial relations ought to be stressed in this instance. The present review of the origin, history and development of the BoL and the e-bill has demonstrated that the law can be customised to suit commercial practices, provided that these commercial practices are established and settled.[402]

The established practices and functions required of the BoL or any substitute thereof by the trade community are that it should serve as a receipt of the goods, serve as a contract of carriage and constitute a document of title as the drafting of common law legislation is reliant on the principle of established practices.[403] This principle ought to be viewed from a modern perspective and technological era, where new technologies are taken into account and provision is made for future development of technologies. The essential reservation clause here ought to expressly stipulate that the relevant technology is capable of performing the same ultimate functions as traditional practices.[404]

Blockchain technology was developed with peer-to-peer operation in mind. A guarantee of uniqueness is provided by the central registry which is administered by a trusted entity. A blockchain-based BoL could provide a platform that does not require users to subscribe. This is an advantage that blockchain enjoys over existing models, as the latter requirement posed a considerable obstacle to utilising electronic BoLs. Blockchain technology has been explained and analysed above to examine the possibility of the system when it comes to fulfilling traditional functions of the BoL.

401 Albrecht 2018 *Tul Mar LJ* 287.
402 McLaughlin 1926 *The Yale law journal* 548-549; Albrecht 2018 *Tul Mar LJ* 287.
403 Albrecht 2018 *Tul Mar LJ* 287.
404 Albrecht 2018 *Tul Mar LJ* 287.

Unless blockchain can fulfil these functions, a blockchain-based BoL cannot be used as a document of title.[405]

The main concern uncovered in this study around the functioning of a blockchain-BoL in accordance with practice standards is that it requires support from legal structures such as the Rotterdam Rules and the UNCITRAL MLETR.[406] A second matter engendered by the need for the required legal support structure is the control of an electronic record. Unless the control of a blockchain-BoL is deemed functionally equivalent to possession of a paper BoL, the control requirement will remain unsatisfactory.

The UNCITRAL's innovative adoption of the Model Law facilitates a re-evaluation of the domestic electronic commerce legal structure.[407] As discussed, the UNCITRAL METLR executed in Bahrain already introduced DLT based EDI concomitant with a supporting legal structure to the domain of commerce traffic.[408] The ripple effect of such adoption is a "productive disruption of the industry practice."[409] However, this has to date restricted to domestic level.

An international resolution would advance a more viable, long-term solution to harmonising cross-border trade.[410] Albrecht[411] states that an international agreement that would deal exclusively with electronic documents could be envisaged. This agreement could then serve as a supplementary instrument to the current legal framework, instead of antithetically replacing it.[412]

Besides the fact that the possible implementation of blockchain BoLs will affect international trade, the legal community as a whole should be prepared for and open to accepting all forms of blockchain records.[413] Financial institutions and credit

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405 Albrecht 2018 *Tul Mar LJ* 287.
406 Facilitation through contractual calibration would also pose a possible solution; Albrecht 2018 *Tul Mar LJ* 287.
407 Albrecht 2018 *Tul Mar LJ* 287.
408 Albrecht 2018 *Tul Mar LJ* 287.
409 Albrecht 2018 *Tul Mar LJ* 287.
410 Albrecht 2018 *Tul Mar LJ* 287.
411 Albrecht 2018 *Tul Mar LJ* 287.
412 Albrecht 2018 *Tul Mar LJ* 287.
413 Albrecht 2018 *Tul Mar LJ* 288.

providers will also be required to accept blockchain records in exchange for letters of credit as credit financing is the foundation of international trade and international transactions.[414] The scepticism towards the use of blockchain BoLs and the apprehension to accept and trust this "new kid on the bock," will be a hindrance to overcome in its own right.

Ultimately, blockchain technology has presented promising prospects and the potential to modernise and revolutionise international trade and transport documents.[415] Nonetheless, this study indicated legal challenges around it's the implementation towards facilitating BoLs. The importance of how technology functions versus the form in which technology presents itself in should be emphasised, as indicated.[416] The test of time will reveal the international trade industry's willingness to tread the digital grounds of our technological era. In conclusion, Albrecht aptly states that perhaps the sign of hope is displayed by global players calming the waves for the rest of the international trade community to join in on the voyage out of the ocean of paperwork.[417]

414 With eUCP,270 a technology neutral framework capable of incorporation into contracts, already exists for electronic documents within credit finance; Girvin *Carriage of goods by sea* 197; Albrecht 2018 *Tul Mar LJ* 288.
415 Albrecht 2018 *Tul Mar LJ* 288.
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