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11 The challenges of ICTs in the shipping sector among international uniform law, codification and *Lex Mercatoria*: the electronic bill of lading

Dr Elena Orrù

Abstract: *The chapter addresses the issues concerning the electronic bill of lading with specific regard to the new technologies and tools that are being explored for this purpose, in particular blockchain technology and smart contracts.*

The main problems analysed by this chapter are of two kinds. From the one side, the feasibility of blockchain technology and smart contracts for e-bills of lading (or e-transport records, as in the Rotterdam Rules). From the other side, the actual lack of a uniform – and, often, even domestic – specific regime. To this purpose, the chapter further investigates whether it is possible to identify a suitable regime already existing or what could be the feasible solutions for governing e-bills of lading and ensuring that they can lawfully perform the same role of traditional bills of lading.

1. Introduction

Nowadays ICTs are increasing their relevance in the shipping sector. This ‘revolution’ is interesting, in particular, the bill of lading: since the 1980s, many shipping companies and other stakeholders are trying to develop a true electronic transport document or record performing the same functions of the paper bill of lading.

The issues that are rising with regard to the e-bill of lading are similar to those met by the traditional bill of lading in the past and mainly concern the applicable regime. The paper bill of lading developed before and contemporarily to its regime, which was, at the beginning, provided by the so-called *Lex Mercatoria* and only later ‘codified’ both in national (maritime) codes and in international conventions. On the contrary, nowadays there is not a standard e-bill of lading (or e-transport record) regularly used at the international level: therefore, the lawmaking is addressing a tool that does not exist yet.

At the international and EU level, the recent years have seen a prolific lawmaking on ICTs, however no international hard law provisions in force specifically apply to e-bills of lading and deal with all the related issues.

At the domestic level, many Countries enacted or are drafting new statutes (or even codes) specifically addressing the use of ICTs or e-trade, but few ones provide for the shipping sector or take due account of the e-bill of lading's particular characteristics.

Moreover, due to the lack of a uniform and certain regime, the relevant international associations are adapting their model or standard contract clauses to these new instruments.

The exam of these sources is useful in order to assess whether they provide for identical or similar solutions that could be considered expression of general principles and practices forming a new *Lex Mercatoria*.

The article addresses the issue whether a suitable regime already exists or what could be the feasible solutions in order to ensure that the e-bill of lading can lawfully perform the same functions of the paper one. Furthermore, it is necessary to ascertain whether this purpose can be achieved by a new *Lex Mercatoria* or by the interpretation of the existing law by Courts or, especially in civil law systems, by revising it or enacting new statutes.

2. The paper and electronic bill of lading

2.1 The features and regime of the traditional bill of lading

In the medieval ages, when bill of lading developed as a receipt for the goods loaded on-board a ship and a document of title,¹ its regime was essentially based on the so-called *Lex Mercatoria* or – better – *Lex Maritima*.² The bill of lading's role as negotiable document of transport and its importance for

¹ W. P. Bennet, *The history and present position of the bill of lading as a document of title to goods* (Cambridge University Press, 1914), 2 ff; E. Bensa, *Le forme primitive della polizza di carico: ricerche storiche con documenti inediti* (Stabilimento d'arti grafiche Caimo & C, 1925), 7 and 12 ss; A. P. La Rosa, *Studi sulla polizza di carico* (Giuffrè, 1958), p. 3; A. P. La Rosa, 'Polizza di carico', *Enciclopedia del diritto* (1985) vol XXXIV, p. 201, 203; G. Boi, 'Profili documentali del trasporto marittimo e brevi riflessioni sulla specialità ed autonomia della materia' (2010) *Rivista del diritto della navigazione* 45; S. Zunarelli, M. M. Comenale Pinto, *Manuale di diritto della navigazione e dei trasporti*, 2nd edn (CEDAM 2013), p. 486; R. Aikens, R. Lord, M. Boole, *Bills of Lading*, 2nd edn (Informa Law, 2016) 1 ff. See also *Guidon de la mer*, Ch 2, art 8. According to Bernardino Scorza, [*La polizza di carico* (Società editrice del Foro italiano 1936), vol I, 1], the first examples of bills of lading could be traced back to the Roman age.

² E. Van Hooydonk, 'Towards a worldwide restatement of the general principles of maritime law' (2014) 20 *Journal of International Maritime Law*, p. 170; E. Bensa, *Le forme primitive della polizza di carico: ricerche storiche con documenti inediti*, *supra* note 1, p. 7. Eg, *Consolato del mare*, Ch 55 *passim* and 59.61.

enabling trades therefore mainly lied on the consensus on its features widely recognized at the international level, also through the development of standard models or clauses. It was only more recently, that, along with the raise of national States, a process of codification was spread at the domestic level,³ among the other reasons, in order to prevent some practices that did not conform to its regime as envisaged by the well-established international usages.⁴ In this way, however, this process contributed to hinder the degree of uniformity enabled by the above mentioned *Lex Maritima*. To counterbalance this trend and fulfil the need of uniformity and legal certainty, necessary for the circulation of the bill of lading at the international level, the Hague Rules and the subsequent Hague-Visby Rules⁵ were signed, under the auspices of the CMI.⁶

2.2 *The issues related to the electronic bill of lading*

Since the 1980s and, in particular, during the most recent years, the new ICTs are improving the organization and management of logistics services and international trade flows, reducing the related costs.⁷ In this scenario, several have been the attempts to obtain an electronic bill of lading. For this purpose, it is necessary to take into consideration that the relevance of bill of lading is not limited to the contract of carriage, but involves different contracts, in particular the contract of sale and documentary credit, where agreed as payment method by the seller and the buyer and provided that the letter of credit requires the submission of a bill of lading.

In particular, an electronic bill of lading should therefore be able to provide evidence of the existence of a contract of carriage, incorporating its terms in conformity with the relevant leading cases, of the

³ Eg, 1681 Ordonnance de France, title des connaissements; 1865 Italian commercial Code, art 391 ss.

⁴ E. Bensa, *Le forme primitive della polizza di carico: ricerche storiche con documenti inediti* (Stabilimento d'arti grafiche Caimo & C, 1925), p. 13. V 1882 Italian commercial Code, art. 555, para 5.

⁵ The International Convention for the Unification of Certain Rules of Law relating to Bills of Lading (Brussels, 1924), with Protocols.

⁶ E. Van Hooydonk, 'Towards a worldwide restatement of the general principles of maritime law' (2014) 20 *Journal of International Maritime Law*, p. 170-171; E. Bensa, *Le forme primitive della polizza di carico: ricerche storiche con documenti inediti* (Stabilimento d'arti grafiche Caimo & C, 1925), p. 14.

⁷ E. K. Morlok, 'Current Trends and Perspectives on Freight Transport in North America', in L. Bianco and A. La Bella (eds), *Freight Transport Planning and Logistics* (No 317 'Lecture Notes in Economics and Mathematical Systems', Springer-Verlag Berlin Heidelberg GmbH, 1989), p. 1, 36; M.-M. Damien, 'France', in ECMT Economic Research Centre, *What Markets Are There For Transport by Inland Waterways?* (ECMT Round Tables No 108, OECD, 1999), p. 83, 121; H. Caldwell *et al*, report *Freight Transportation: the European Market*, (US Department of Transportation, Federal Highway Administration, Washington, 2002), p. 10; E. Onghena, 'Integrators in a changing world', in R. Macário and E. Van de Voorde (eds), *Critical Issues in Air Transport Economics and Business* (Routledge Studies in the Modern World Economy, 2011), p. 112; H.-J. Schramm, *Freight Forwarder's Intermediary Role in Multimodal Transport Chains: A Social Network Approach* (Physica-Verlag, 2012), p. 281.

loading onboard of the goods and their conditions, enabling the carrier to add reservations.⁸ The electronic bill of lading must enable its lawful issuer to claim delivery of the goods there represented by the carrier. With specific regard to the contract of sale and documentary credit, the ICT systems enabling the issuance of an electronic bill of lading should grant its interoperability.

Concerning the advantages of an electronic bill of lading compared to a paper one, the former would enable an immediate transfer of the document of title, overcoming the issue of the bill of lading's arrival after cargo and of delivery without production of the bill of lading. The main problems of this tool are, from the one side, to obtain an electronic record that is generated, transferred and negotiated exclusively through an electronic management system, where it is kept and can be retrieved for future occurrences.⁹

From the other side, the issue is to grant its uniqueness and integrity since formation through the chain of contracts and certainty of its authorship and of the identity of further holders, preventing forgeries and double transfer to different endorsees¹⁰. In addition, the actual construction of the ICT system and, in particular, of transmission of the electronic document should entail the autonomy of the rights and obligations there represented from the underlying relationship,¹¹ which many of the systems experimented until nowadays have not been able to obtain. The achievement of these goals would overcome another weakness of a paper bill of lading, that is the risk of fraud.¹²

3. The past and current experiences

⁸ A. Møllmann, *Delivery of Goods under Bills of Lading* (Routledge, 2016), p. 155; E. Orrù, 'The Electronic Transport Record and Current Challenges of E-logistics and International Trade' in *2nd International Scientific Conference on Maritime Law 'Modern Challenges of Marine Navigation'* (Faculty of Law University of Split, 2018), p. 201, 205.

⁹ According to art. 4, let. b) and c), of the UN Convention on the Use of Electronic Communications in International Contracts, «Electronic communication» means «any communication that the parties make by means of data messages». «Data message» means «information generated, sent, received or stored by electronic, magnetic, optical or similar means, including, but not limited to, electronic data interchange, electronic mail, telegram, telex or telecopy».

¹⁰ A. Møllmann, *Delivery of Goods under Bills of Lading* (Routledge, 2016), p. 155; K. Takahashi, 'Blockchain technology and electronic bills of lading' (2016) 22 *Journal of International Maritime Law*, p. 202, 203 and 207; P. Cuccuru, 'Blockchain ed automazione contrattuale. Riflessioni sugli smart contract' [2017] 1 *La Nuova giurisprudenza civile commentata*, p. 107, 108.

¹¹ E. Orrù, 'The Electronic Transport Record and Current Challenges of E-logistics and International Trade', in *2nd International Scientific Conference on Maritime Law 'Modern Challenges of Marine Navigation'* (Faculty of Law University of Split, 2018), p. 205.

¹² A. Møllmann, *Delivery of Goods under Bills of Lading* (Routledge, 2016), p. 155; K. Takahashi, 'Blockchain technology and electronic bills of lading' (2016) 22 *Journal of International Maritime Law*, p. 203; E. Orrù, 'The Electronic Transport Record and Current Challenges of E-logistics and International Trade' in *2nd International Scientific Conference on Maritime Law 'Modern Challenges of Marine Navigation'* (Faculty of Law University of Split, 2018), p. 206.

3.1. BOLERO, *essDOCS* and *E-title*TM

With regard to the different systems developed during the past more than thirty years, whereas many services consist in booking platforms for carriage or logistics services (including unimodal carriage by sea or multimodal carriage with a sea leg), where the bill of lading that can be drafted through these platforms still works as a traditional document and therefore needs to be printed,¹³ other platforms have been developed for issuing a true e-bill of lading, with no great success until now.¹⁴ One of the first examples in order of time is Seadocs: this platform was developed in 1983 by the cooperation of Intertanko and the Chase Manhattan Bank specifically for the oil sector. Given the crucial role of bills of lading in international trade, it is not surprising the participation of banks in financing and promoting these experiments, like in the case of Blockchain technology. The certainty of authorship and security is reached by public/private key cryptography. However, this system was not able to provide a real e-bill of lading, because the paper bills were kept by the central register that managed the platform. Another weakness of this system, which would be found also in subsequent experiences, was to be limited only to subscribers and centralized. The same flaw could be found in the Bill Of Lading Electronic Registry Organization, also known as BOLERO, and CargoDocs Electronic Bills of Lading – *essDOCS*.¹⁵ According to its website,¹⁶ the latter should be able to issue a true e-bill of lading, which could be negotiated and endorsed through e-signatures.

The same result was, on the contrary, not achieved with another of the first experiences, the Cargo Key Receipt system, created by Atlantic Container Line, because the e-bill of lading was not negotiable.¹⁷

Therefore, the above-mentioned systems share in common the issues of being closed and centralized: the main reason is that their technology was not able to create an electronic transferable record autonomously and directly enabling the identification of the lawful holder, requiring access to the central register for this purpose. It is also not possible to avoid double spending, that was reached

¹³ N. Gaskell, 'Bills of Lading in an electronic age' [2010] 2 *Lloyds Maritime and Commercial Law Quarterly* 233, 244 ff. This is the case, for example, of BIMCO's Idea CargoSmart, INTTRA, My Maersk.

¹⁴ M.-M. Comenale Pinto, 'I documenti elettronici del trasporto' [2012] I *Rivista del diritto della navigazione* 33, 53 ff; Nicholas Gaskell, 'Bills of Lading in an electronic age' [2010] 2 *Lloyds Maritime and Commercial Law Quarterly* 233, 260 ff.

¹⁵ Also known as *essDOCS-Databridge*TM.

¹⁶ < <https://www.essdocs.com> > (visited on 15 September 2018).

¹⁷ On this system, K. Grönfors, *Cargo Key Receipt and Transport Document Replacement* (Akademiförlaget, 1986).

only by the central administrator.¹⁸ The central register is meant, also, to keep records of holdership of the electronic bill of lading for future reference.¹⁹

Moreover, in the absence of a specific general regime, especially at the international level, the equivalence between the traditional bill of lading and the e-bill of lading is based on contracts between the system operator and the user and among the users enrolled in the system.²⁰ The legal basis has been found on novation and attornment, which however do not perfectly fulfil the features of a bill of lading, in particular the abstractness of the relationship there incorporated from the underlying contract and the transfer of rights to third parties.²¹

On the contrary, a true e-bill of lading should, as the paper one, be potentially transferable to the order of any potential endorsee. This requires that any technology enabling its creation and transfer should be open and not restricted to the subscribers of a closed centralized system and allow the e-bill of lading to be accessible for its entire life.

The characteristics above described are considered the main reason that prevented them to achieve a wide success.²²

E-title™ is a recent peer-to-peer non-centralized system, which has, as legal basis for its operation, a multilateral contract among the company operating it and its users, called The Electronic Title User Agreement.²³ The system is based on a back-end technology provided to the single users and on digital signature in order to confirm authenticity of the electronic document. The system is however

¹⁸ K. Takahashi, 'Blockchain technology and electronic bills of lading (2016) 22 *Journal of International Maritime Law*, p. 203; E. Ogg, *Blockchain bills of lading* (CML working paper series, NUS Law18/07 August 2018), p. 9, <<https://law.nus.edu.sg/cml/pdfs/wps/CML-WPS-1807.pdf>> (visited on 27 April 2019).

¹⁹ J. Tan, L. Starr and Ch. Wu, UK P&I Club, 'Legal Briefing' (May 2017), p. 4. <https://www.ukpandi.com/fileadmin/uploads/uk-pi/Documents/2017/Legal_Briefing_e_bill_of_Lading_WEB.pdf> (visited on 30 May 2017).

²⁰ For example, the 1999 Bolero International Ltd Rulebook/Operating Procedures, the essDOCS' Databridge Services & User Agreement and the Electronic Title User Agreement. J. Tan, L. Starr and Ch. Wu, UK P&I Club, 'Legal Briefing' (May 2017), p. 4.

²¹ F. Stevens, *The Bill of Lading: Holder Rights and Liabilities* (Routledge 2017), 65 ff; M. A. Goldby, 'Legislating to facilitate the use of electronic transferable records: A case study. Reforming the law to facilitate the use of electronic bills of lading in the United Kingdom', p. 5 <[https://www.uncitral.org/pdf/english/colloquia/EC/Legislating_to_facilitate_the_use_of_electronic_transferable_recors_-_a_case_study_.pdf](https://www.uncitral.org/pdf/english/colloquia/EC/Legislating_to_facilitate_the_use_of_electronic_transferable_records_-_a_case_study_.pdf)> (visited on 27 April 2019).

²² P. Mallon and A. Tomlinson, 'Bolero: electronic "bills of lading" and electronic contracts of sale' [1998] *International Trade Law Quarterly*, p. 257; F. Stevens, *The Bill of Lading: Holder Rights and Liabilities*, (Routledge 2017), 67; E. Orrù, 'The Electronic Transport Record and Current Challenges of E-logistics and International Trade' in *2nd International Scientific Conference on Maritime Law 'Modern Challenges of Marine Navigation'* (Faculty of Law University of Split, 2018), p. 210.

²³ It has been created by E-Title Authority Pte Ltd. J. Tan, L. Starr and Ch. Wu, UK P&I Club, 'Legal Briefing' (May 2017), p. 3.

still based on the management of the electronic bills of lading by the system managers for maintaining secure logs and preventing fraud, but it is the E-title User Group, which is formed by all the system's members, to manage potential disputes between parties.²⁴

3.2. *The blockchain technology*

The most recent technology whose exploitation is being experimented to obtain a feasible e-transport record is blockchain. This technology was historically developed in order to enable trading with the so-called crypto-currencies,²⁵ but is actually experiencing a raising interest by the banking and shipping sectors because of the great opportunities there implied for furthering the logistics flows and documentary credit.²⁶

Blockchain platforms are open append-on decentralized peer-to-peer platforms, where each transaction is represented by a block holding batches of it and secured by the digital signature of the users.²⁷ This is obtained by synchronically recording the ledgers of the different participants. Where the economic and legal content of a block is to be transferred under a new transaction, the former block is the basis for the future transaction, giving rise to a chain of blocks, which cannot be altered. The platform grants integrity and incorruptibility of the transactions recorded on the distributed ledgers.²⁸ Therefore, the user can incorporate in a token an amount in bitcoins, but any other content having an economic value, such as constructive possession and title to goods, as in an electronic bill of lading. Considering specifically the creation of electronic bills of lading using blockchain technology, after having loaded the goods onboard the ship, the carrier would therefore create a new

²⁴ Unfortunately, it is not clear from its website <www.e-title.it> and other media, how should it actually work, in particular whether it is based on blockchain technology, which is discussed in the following paragraph.

²⁵ K. Takahashi, 'Blockchain technology and electronic bills of lading' (2016) 22 *Journal of International Maritime Law*, p. 202-211; E. Orrù, 'The Electronic Transport Record and Current Challenges of E-logistics and International Trade' in *2nd International Scientific Conference on Maritime Law 'Modern Challenges of Marine Navigation'* (Faculty of Law University of Split, 2018), p. 217.

²⁶ In particular, a e-b/l based on blockchain technology is being developed by Maersk with IBM and other stakeholders, including freight forwarder, logistics operators and port authorities <<https://port.today/maersk-and-ibm-introduce-blockchain-in-shipping/>> (visited on 14 June 2018) and <<https://newsroom.ibm.com/2018-08-09-Maersk-and-IBM-Introduce-TradeLens-Blockchain-Shipping-Solution>> (visited on 27 April 2019).

²⁷ K. Takahashi, 'Blockchain technology and electronic bills of lading', (2016) 22 *Journal of International Maritime Law*, p. 204; P. Cuccuru, 'Blockchain ed automazione contrattuale. Riflessioni sugli *smart contract*', [2017] 1 *La Nuova giurisprudenza civile commentata*, p. 107, 108.

²⁸ K. Takahashi, 'Blockchain technology and electronic bills of lading', (2016) 22 *Journal of International Maritime Law*, p. 202; E. Ogg, *Blockchain bills of lading, Blockchain bills of lading* (CML working paper series, NUS Law18/07 August 2018), p. 10. See also, for example, <<https://medium.com/gringotts-wizarding-banks-magic-coins/blockchain-vs-smart-contracts-horse-and-carriage-c33bfd517c1d>>; <<https://fichtelegal.com/news/legal-considerations-blockchain-based-bills-lading/>> (both visited on 14 June 2018).

block on the platform, incorporating the content of a traditional bill of lading, as a transaction with the shipper. The latter could transfer it as a new block built on the former one.

The flaw of blockchain platforms is that the real identity of users is not known, since the token's holders are identified by their usernames²⁹. To avoid this problem, also closed blockchain platforms have been developed, where prospective members are required to identify themselves. This solution, however, shares the above-mentioned problem common to other closed systems.³⁰

Therefore, for obtaining a true e-bill of lading it is necessary, from the one hand, to develop the proper technical infrastructure, improving blockchain technology to entirely fulfil the role of a traditional b/l, and the suitable legal framework.³¹ When this goal will be achieved, a new revolution would happen, consisting in a new dematerialization.³² As the paper bill of lading enabled the dematerialization of the (rights into the) goods, by the incorporation of their constructive possession in the document of title.³³ The e-bill of lading would furthermore entail a dematerialization of the document of title and of performance of its delivery.

With regard to the actual application of this technology, some of the systems that were described in the previous paragraph are exploring the possibility to use blockchain technology.³⁴ Apart from them, it is worth to mention also CargoX Smart B/L³⁵ and Wave.³⁶

4. Smart contracts

²⁹ K. Takahashi, 'Blockchain technology and electronic bills of lading', (2016) 22 *Journal of International Maritime Law*, p. 209.

³⁰ *Ibid*, p. 204.

³¹ See para 5.

³² L. Fedi, 'La dématérialisation du connaissance maritime: utopie ou réalité du XXIe siècle?', in C. Bloch (ed.), *Mélanges en l'honneur de Christian Scapel* (Presse Universitaire d'Aix-Marseille 2013), p. 219, 227; E. Orrù, 'The Electronic Transport Record and Current Challenges of E-logistics and International Trade', in *2nd International Scientific Conference on Maritime Law 'Modern Challenges of Marine Navigation'* (Faculty of Law University of Split, 2018), p. 218.

³³ 'A bill of lading stands as a substitute and a symbolic representation of the goods therein described and possession symbolized by a bill of lading is the same as the actual possession', W. Parent, 'Passage of Title under Bills of Lading' [1929] *Notre Dame Law Review* 91.

³⁴ S. Wass, 'Bolero's electronic bill of lading service to get blockchain upgrade' (GTR 11 October 2017) <<https://www.gtreview.com/news/fintech/boleros-electronic-bill-of-lading-service-to-get-blockchain-upgrade/>> (visited on 14 June 2018); S. Wass, 'EssODCs to integrate e-bill of lading with Voltron blockchain platform' (GTR 5 April 2019) <<https://www.gtreview.com/news/fintech/essdocs-to-integrate-e-bill-of-lading-with-voltron-blockchain-platform/>> (visited on 27 April 2019).

³⁵ <<https://cargox.io/solutions/Smart-BL/>> (visited on 14 June 2018).

³⁶ <<http://wavebl.com/>> (visited on 14 June 2018).

The most recent issues that are addressed by the shipping and banking sector concern a further development of the potentialities of blockchain technology: smart contracts.³⁷ The first definition of a smart contract was provided, years before the advent of blockchain, by Nick Szabo:

‘a Smart Contract is a computerized transaction protocol that executes the terms of a contract. The general objectives ... are to satisfy common contractual conditions (such as payment terms) ... and minimize the need for trusted intermediaries’³⁸. The simplest example of smart contracts is a vending machine, but the same author foresaw also their potentialities in the digital market.³⁹

With specific regard to their use with blockchain technology, smart contracts can be described as ‘self-executing digital transactions using decentralized cryptographic mechanisms for enforcement’.⁴⁰ In particular, one of their possible applications is to enable automatic enforcement of legal agreements, without the need to resort to judicial remedies,⁴¹ including cases of supervening events.⁴²

According to some scholars, smart contracts can allow also the conclusion of contracts, which are governed by the applicable (domestic or uniform) contract law, to be identified according to the nature of parties and the place of execution of the contract.⁴³ Other scholars, on the contrary, rule out the conclusion of a legal agreement by this instrument: its relevance under the law would not be a consequence of any agreement between the parties, but an *ex lege* effect.⁴⁴

From an analysis of this technology and of the scholars’ opinions, it seems correct to assert that smart contracts actually could not replace agreements between the parties as legal basis, but, at least in most cases, provide for a faster and simpler execution and performance of contracts.⁴⁵ Even where the execution of a contract is obtained through smart contracts, it should be constructed as being

³⁷ R. O’Shields, ‘Smart contracts: legal agreements for the blockchain’ [2017] 21 *North Carolina Banking Institute* 177.

³⁸ N. Szabo, ‘Smart contracts’ (1994, unpublished manuscript). See also N. Szabo, ‘The Idea of Smart Contracts’ (1997) <fon.hum.uva.nl> (visited on 27 April 2019).

³⁹ Ibid.

⁴⁰ K. Werbach and N. Cornell, ‘Contracts Ex Machina’ [2017] 67 *Duke Law Journal* 313 <<https://ssrn.com/abstract=2936294>> (visited on 21 June 2018). See also R. O’Shields, ‘Smart contracts: legal agreements for the blockchain’, [2017] 21 *North Carolina Banking Institute* 179.

⁴¹ J. M. Sklaroff, ‘Smart Contracts and the Cost of Inflexibility’ [2017] 166 *University of Pennsylvania Law Review*, 263, 291 <<https://ssrn.com/abstract=3008899>> (visited on 21 June 2018).

⁴² D. Di Sabato, ‘Gli smart contracts: robot che gestiscono il rischio contrattuale’ [2017] 2 *Contratto e impresa* 378.

⁴³ Ibid, p. 393.

⁴⁴ Ibid, p. 394.

⁴⁵ Ibid, p. 386-387; P. Cuccuru, ‘Blockchain ed automazione contrattuale. Riflessioni sugli smart contract’, [2017] 1 *La Nuova giurisprudenza civile commentata*, p. 111.

concluded through the parties' behaviour⁴⁶ or based on the acceptance of the other party's general conditions of contract.⁴⁷ Moreover, they would not entirely rule out the risk of future disputes and the need to resort to judicial remedies.⁴⁸ The reduction of the risk of litigation would be based on the ability of the parties to envisage in detail the different possible occurrences, like in ordinary contracts. In particular, given the absence of a uniform legal framework for blockchain technology and smart contracts, it is important that the parties provide for the contract to be governed by a legal system expressly recognizing their equivalence to ordinary contracts and provide for a forum choice in favour of the Courts of that Country or for arbitration. In the latter case, the choice could be also for *Lex Mercatoria* as regime for the relationship, provided that it recognizes the equivalence of an electronic bill of lading to the traditional one.⁴⁹

Regarding electronic bills of lading, smart contracts could simplify and speed up the execution of the different contracts requiring its submission with one single platform. However, attention should be paid to the duties or burdens of the parties under the different contracts, in particular to their duties to examine the goods or the documents with the due diligence. As for the contract of carriage, the carrier must check the apparent conditions of the goods. With regard to documentary credit, for example, the issuing, the nominated or the confirming banks (if any) have the duty towards the principal to check the documents submitted by the beneficiary under the letter of credit. If blockchain technology could enable the incorporation of all the relevant information in the documents required by the specific letter of credit, grant their authenticity and avoid alterations and frauds, their inspection could be obtained through instructions coded in a smart contract.

5. The issues related to the applicable regime

Apart from the construction of a successful technologic infrastructure, the main issue is the identification of a proper legal framework granting the equivalence of an electronic bill of lading to the paper one and providing for its regime. Moreover, this potential uncertainty is increased by the variety of technologies. In fact, whereas some of the recent State provisions or contract terms are constructed with a neutral approach towards the actual technologic solutions, others limit their scope to certain specific instruments.

⁴⁶ D. Di Sabato, 'Gli *smart contracts*: robot che gestiscono il rischio contrattuale', [2017] 2 *Contratto e impresa* 395 ff.

⁴⁷ *Ibid.*

⁴⁸ *Ibid.*, p. 401; J. M. Sklaroff, 'Smart Contracts and the Cost of Inflexibility', [2017] 166 *University of Pennsylvania Law Review*, p. 291, <<https://ssrn.com/abstract=3008899>> (visited on 21 June 2018).

⁴⁹ See para 5.

5.1. *Hard law sources*

First of all, there is neither any uniform regime of electronic bills of lading nor any express provision in an international convention in force providing for the equivalence of e-bills of lading to the paper ones. In particular, bills of lading are expressly excluded from the scope of the only international convention in force, which is the UN Convention on the Use of Electronic Communications in International Contracts, signed in New York in 2005.⁵⁰

At the regional level, within the extensive action undertaken for establishing a Digital Single Market, the EU issued the so-called eIDAS regulation,⁵¹ which plays a significant role in the implementation and adaptation of the relevant law to new ICTs instruments and relationships. However, eIDAS does not expressly concern the relevant problems relating to the role of bill of lading with regard to both the contracts of carriage and of sale, in particular as a transferable and negotiable document of title.

As for the uniform conventions specifically dealing with carriage of goods by sea, the Hague-Visby Rules⁵² provide for a definition of a bill of lading as ‘document of title’⁵³: the express reference to the word ‘document’ without any further specification to the means the document can be issued and transferred (which is coherent with the period when the convention and its protocols were drafted), does not provide a clear solution preventing any issues on their application to electronic bills of lading. The answer to the problem of the functional equivalence of an e-bill of lading to the paper one has to be found in other law sources, such as the eIDAS regulation or the domestic law.

On the contrary, the Hamburg Rules⁵⁴ allow the carrier to sign the bill of lading by different means, including electronic means, ‘if not inconsistent with the law of the country where the bill of lading is issued’⁵⁵. Under the Hamburg Rules, therefore, the regime for the equivalence between a bill of lading signed in writing on paper and one electronically signed is still left to the applicable domestic law, therefore without any uniformity of regime. Moreover, the Rules do not expressly deal with the issuance of a bill of lading with electronic means.

⁵⁰ Art. 2.2.

⁵¹ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC. The acronym stands for ‘electronic Identification Authentication and Signature’.

⁵² See note 5.

⁵³ Art. 1, let. b).

⁵⁴ The United Nations Convention on the Carriage of Goods by Sea (Hamburg, 1978).

⁵⁵ Art. 14.3.

Finally, the 2008 Rotterdam Rules⁵⁶ move from the previous experiences on e-bills of lading, in particular BOLERO, and expressly provide for the functional equivalence of the electronic transport record to bill of lading. The former is defined as ‘information in one or more messages issued by electronic communication⁵⁷ under a contract of carriage by a carrier, including information logically associated with the electronic transport record by attachments or otherwise linked to the electronic transport record contemporaneously with or subsequent to its issue by the carrier, so as to become part of the electronic transport record’.⁵⁸

Despite not being in force, the Rotterdam Rules are particularly important, because they are the first source to explicitly deal with the specific features of bills of lading, in particular the issues related to the identification of its holder and its transferability.⁵⁹ The solution has the virtue of being technically neutral⁶⁰ and consists in the concept of ‘exclusive control [over the e-record] from its creation until it ceases to have any effect or validity’.⁶¹ Therefore, the endorsement of an electronic transport record is achieved by the transfer of the exclusive control over it according to the procedure outlined in art. 9.1⁶² and to the requirements of a specific electronic system.

At the national level, several Countries adopted or are drafting statutes dealing with the equivalence of e-records to traditional documents. This is, for example, the case of Italy. According to art. 8-ter of the decree-law No 135 of 14 December 2018, as modified by the law No 12 of 11 February 2019, smart contracts based on distributed ledgers satisfy written form requirements under the law, provided that the parties are electronically identified. The above-mentioned decree-law however does not address any further issue and moreover has the flaws to demand the definition of the technical requirements that must be possessed by smart contracts to further rules and standards to be issued by the Agency for Digital Italy (AgID). This approach therefore prevents uniformity at the international level.

⁵⁶ The UN Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea (New York, 2008).

⁵⁷ According to art. 1.17, an ‘Electronic communication’ is an ‘information generated, sent, received or stored by electronic, optical, digital or similar means with the result that the information communicated is accessible so as to be usable for subsequent reference’.

⁵⁸ Art. 1.18.

⁵⁹ G. Van der Ziel, ‘Delivery of Goods, Rights of the Controlling Party and Transfer of Rights’ (2008) 14 *Journal of International Maritime Law* 602.

⁶⁰ S. Zunarelli, ‘Transfer of Rights’, in A. von Ziegler, J. Schelin, S. Zunarelli (eds), *The Rotterdam Rules 2008* (Kluwer Law International, 2010), p. 241.

⁶¹ Art. 1.21. J. A. Estrella Faria, ‘Electronic Transport Records’ in A. von Ziegler, J. Schelin, S. Zunarelli (eds), *The Rotterdam Rules 2008* (Kluwer Law International, 2010) 58 ff and 190 ff.

⁶² Art. 1.19 and 57.2 of the Rotterdam Rules.

5.2. *Soft law sources and contract terms*

With regard to soft law instruments, an important role is played by UNCITRAL in drafting model laws on electronic communications. The first model law is the 1996 Model Law on Electronic Commerce (also known as MLEC), which was revised in 1998: as the Rotterdam Rules, the law is based on the principle of functional equivalence and technological neutrality.⁶³ Art. 16 and 17 MLEC, in particular, provide for the equivalence of actions undertaken action in connection with, or in pursuance of a contract of carriage by using one or more data messages, to those traditionally performed with paper documents. The non-exhaustive examples listed in art. 16 can apply also to bills of lading. Despite the express reference to ‘acquiring or transferring rights and obligations under the contract’ among the actions therein listed, it does not specifically address either this issue or the role of bill of lading under an international sale.⁶⁴ Another model law is that Electronic Signatures, issued in 2001, which, on the contrary, do not specifically address bills of lading or transport documents.

More important is the Model Law on Electronic Transferable Records (also known as MLETR), which was adopted in July 2017. It can apply to e-bills of lading, because they fall under the definition of ‘transferable document or instrument’. It consists in ‘a document or instrument issued on paper that entitles the holder to claim the performance of the obligation indicated in the document or instrument and to transfer the right to performance of the obligation indicated in the document or instrument through the transfer of that document or instrument’.⁶⁵ However, the model law does not address the negotiability of an electronic transferable record, which is left to the substantive law governing the contract. However, according to the ‘Explanatory note’ to the MLETR drafted by the UNCITRAL itself, the definition of electronic transferable record does not include straight bills of lading and other documents whose ‘transferability may be limited due to other agreements’.⁶⁶

Like the Rotterdam Rules, the delivery of a transferable record is based on the concept of transfer of exclusive control ‘as the functional equivalent of transfer of possession and thus of delivery’⁶⁷. For

⁶³ A. Möllmann, *Delivery of Goods under Bills of Lading* (Routledge, 2016), p. 158.

⁶⁴ J. A. Estrella Faria, ‘Electronic Transport Records’, in A. von Ziegler, J. Schelin, S. Zunarelli (eds), *The Rotterdam Rules 2008* (Kluwer Law International, 2010) p. 60, 53.

⁶⁵ Art. 2, para 3. See the UNCITRAL’s *Explanatory Note to the UNCITRAL Model Law on Electronic Transferable Records* (UN publication No. E.17.V.5, 2019) para 38 <http://www.uncitral.org/pdf/english/texts/electcom/MLETR_ebook.pdf> (visited on 2 April 2019).

⁶⁶ *Ibid*, para 88.

⁶⁷ Art. 7 and 11.2 MLETR. UNCITRAL’s *Explanatory Note to the UNCITRAL Model Law on Electronic Transferable Records*, (UN publication No. E.17.V.5, 2019) para 38 <http://www.uncitral.org/pdf/english/texts/electcom/MLETR_ebook.pdf> (visited on 2 April 2019), para 121.

this purpose, the MLETR requires the use of reliable methods for ensuring the integrity of the record, the identification of the person holding the exclusive control over the record and its accessibility further reference⁶⁸.

However, the Model Law focuses on the transferability of the record and not on its negotiability on the understanding that negotiability relates to the underlying rights of the holder of the instrument, which fall under substantive law.

At the EU level, within the strategy *Digitising European Industry*,⁶⁹ in September 2018 the CEN-CENELEC Focus Group on Blockchain and Distributed Ledger Technologies (FG-BDLT) adopted the White Paper *Recommendations for Successful Adoption in Europe of Emerging Technical Standards on Distributed Ledger/Blockchain Technologies*. The guidelines focus on the issues concerning the compatibility of blockchain and distributed ledger technologies with the provisions of GDPR⁷⁰ and eIDAS.

With regard to contract terms, since the 1990s international organizations and associations have been drafting standard clauses. An example are the CMI's *Rules for electronic bills of lading*, which were based on the 1987 *Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission*, (UNCID) and could be now considered superseded by the new ICTs described in the previous paragraphs. In May 2014, BIMCO published the 'Electronic bill of lading clause' that can be included in charterparties. The clause enables the charterer to issue, sign and transfer bills of lading, waybills and delivery orders in electronic form and provides for their equivalence to paper documents.

With regard to the other contractual relationships where the bill of lading plays a significant role, since the 2002 the ICC introduced the so-called e-UCP, firstly as a supplement to UCP 500. Their latest version is the 1.1, supplement to UCP 600 of 2007. Through a neutral approach to technologic solutions, they are meant to 'permit UCP 600 terminology accommodating the electronic presentation of the equivalent of paper documents and provide necessary rules to allow both sets of rules to work

⁶⁸ Art. 8, 10 and 11.

⁶⁹ The strategy falls within the Digital Single Market package and was launched in 2016 (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Digitising European Industry Reaping the full benefits of a Digital Single Market*, COM(2016) 180 final).

⁷⁰ The Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119/1, 4.5.2016, p. 1–88.

together'.⁷¹ The same aim was pursued in the 2010 edition of the ICC Incoterms® Rules, which enable the parties to use any electronic record or procedure if agreed between them or customary.

Finally, as for insurance policies, whereas traditionally the risks related to the use of ICT technologies used to fall outside the coverage, in 2010, 2013 and 2015 the International Group of P&I Clubs has agreed to cover any liabilities arising in respect of the carriage of cargo under three approved electronic trading systems (BOLERO, essDOCS and E-title™), provided that such liability would also have arisen under a paper bill.⁷² On the contrary, P&I coverage does not extend to other systems, including those based on distributed ledgers.

6. Concluding remarks

The different technologies experimented for the issuance of an electronic bill of lading or transport record shows the actual interest of the shipping industry and trade sector. However, the current problems and uncertainties on the technological infrastructure go hand in hand with the lack of certainty as for the legal framework.

From the one side, there is an intense lawmaking both at the international, European and domestic level. With regard to hard law provisions in force, however, they have mainly regional or domestic scope and do not address the issues that specifically characterise the roles and features of bill of lading. Moreover, some of these laws are not technically neutral. As for soft law tools, UNCITRAL model laws have not been adopted by a sufficient number of Countries to ensure a uniform regime.⁷³

Following the analysis developed in para 5, it is also possible to conclude that some consensus is being reached on common principles concerning the functional equivalence of electronic transport records to paper bills of lading. In particular, these principles concern the equivalence of the exclusive control to the constructive possession of the document of title and the transfer of this control, by the technical procedures that are specific of each system, to the delivery of the bill of lading.

⁷¹ Introduction to *ICC Uniform Customs and Practice for Documentary Credits – UCP 600. Supplement to UCP 600 for Electronic Presentation* (Trilingual Edn English-Italian-French, ICC Publication No. 600LE 2007) 94.

⁷² Circular 16/10 of September 2010; Circular 6/13 *Electronic (Paperless) Trading Systems – Electronic Shipping Solutions and Bolero International Ltd – updated ESSDSUA Version 2013*; Circular 12/15 *Electronic (Paperless) Trading Systems*.

⁷³ See the UNCITRAL's *Explanatory Note to the UNCITRAL Model Law on Electronic Transferable Records*, (UN publication No. E.17.V.5, 2019) para 38 <http://www.uncitral.org/pdf/english/texts/electcom/MLETR_ebook.pdf> (visited on 2 April 2019), para 20.

However, the consensus on these principles seems far from having given rise to international usages and practices that could be considered applying *per se*, without any risk of uncertainty.

Whereas a uniform regime, based on international conventions or usages, would better grant certainty of the electronic bill of lading regime, the use of ICT solutions is therefore still based on (multi-lateral) agreements among the parties involved, which do not prevent disputes,⁷⁴ especially with regard to the technical systems that are used, since not all the provisions or contract terms opted for a neutral solution. Moreover, this contract approach is not able to fulfil the functions of bill of lading, especially with regard to third parties.

⁷⁴ M. A. Goldby, 'The Rising Tide of Paperless Trade: Analysing the Legal Implications', in B. Soyer and A. Tettenborn (eds), *International Trade and Carriage of Goods* (Informa Law, 2017), 156 ff; J. M. Sklaroff, 'Smart Contracts and the Cost of Inflexibility', [2017] 166 *University of Pennsylvania Law Review*, p. 299 <<https://ssrn.com/abstract=3008899>> (visited on 21 June 2018).