

MITIGATING RISKY BUSINESS: MODERNIZING LETTERS OF CREDIT WITH BLOCKCHAIN, SMART CONTRACTS, AND THE INTERNET OF THINGS

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ABSTRACT

The letter of credit continues to serve as an important trade finance mechanism, particularly for international transactions involving parties that do not trust one another. The independence principle and the strict compliance principle preclude the bank from looking to the nature of the goods in the underlying sales contract. Consequently, the obligation to pay is solely dependent on pieces of paper, rather than the actual status of the goods being shipped.

With the advent of technologies like blockchain, smart contracts, and the Internet of Things, there is no reason why the buyer and seller cannot make informed decisions to ensure the goods get from Point A to Point B. Real-time data means the letter of credit is no longer simply a stand-alone mechanism, and instead, can effectuate the underlying sales contract without violating the independence principle or the strict compliance principle. Therefore, the financial industry should embrace these technologies in order to harmonize letters of credit with supply chain practices. This Comment explores the numerous benefits of blockchain, smart contracts, and the Internet of Things, and how these technologies make the letter-of-credit process—from creation to payment—more efficient.

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TABLE OF CONTENTS

INTRODUCTION	930
I. OVERVIEW OF LETTER-OF-CREDIT LAW.....	935
A. Sources of Law.....	937
B. The Typical Letter of Credit Scenario	940
1. <i>Applying for and Creating the Letter of Credit</i>	941
2. <i>Presentation, Documentary Compliance, and the Strict Compliance Principle</i>	943
3. <i>Payment</i>	945
C. Independence Principle	947
1. <i>The Sales Contract Between the Applicant and the Beneficiary</i>	947
2. <i>The Reimbursement Contract Between the Applicant and the Issuer</i>	950
3. <i>The Letter of Credit Between the Issuer and the Beneficiary</i>	951
4. <i>Fraud Exception</i>	952
II. BLOCKCHAIN, SMART CONTRACTS, AND IOT	955
A. Overview of FinTech and Trade Finance	957
B. Blockchain and Smart Contracts.....	958
1. <i>Blockchain</i>	959
2. <i>Smart Contracts</i>	962
C. IOT and the Internet of Everything.....	964
1. <i>Defining IOT and IOE</i>	966
2. <i>RFID</i>	967
3. <i>Sensors, Actuators, and Oracles</i>	969
III. MODERNIZING LETTERS OF CREDIT.....	971
A. Creating the Letter of Credit	971
B. Situation One: Using Blockchain, Smart Contracts, and IOT for Documentary Compliance	973
C. Situation Two: Help, the Temperature Went Out of Range	977
D. The Modified Sight Draft.....	979
CONCLUSION.....	983

INTRODUCTION

Importers and exporters traditionally use letters of credit to facilitate international trade transactions.¹ Almost every imported

1. See Keith A. Rowley, *Anticipatory Repudiation of Letters of Credit*, 56 SMU L. REV. 2235, 2235 (2003) (“L[etters] of credit have been facilitating commercial transactions since at least the 1100s, and quite

good—in any country—has been financed by a letter of credit, possibly many times over the course of its supply chain.² When the parties do not trust one another, the seller does not want to ship the goods without knowing the buyer will pay.³ Similarly, the buyer does not want to pay without knowing the seller has shipped the goods.⁴ Using a letter of credit to finance trade mitigates risk in an international trade transaction because a bank takes on the responsibility of paying the seller, thus serving as an intermediary⁵ between the buyer, also known as the applicant, and the seller, also known as the beneficiary.⁶ The beneficiary must provide documents showing it has shipped goods that meet the terms provided in the letter of credit; otherwise, the issuer will not pay the beneficiary.⁷ Therefore,

possibly for hundreds, if not thousands, of years more.”); *see also* Carl A. Mead, *Documentary Letters of Credit*, 22 COLUM. L. REV. 297, 297 (1922) (“Payment for practically all commodities, which are the subject of foreign trade, is made through the banks, and in most instances by means of a banker’s letter of credit.”). A letter of credit is where a third party, usually a bank, acts as an intermediary to facilitate payment between parties in commercial dealings. *See* Christopher Leon, *Letters of Credit: A Primer*, 45 MD. L. REV. 432, 432 (1986).

2. *See* Mead, *supra* note 1, at 297-98 (“A banker’s letter of credit is not a subject with which the ordinary individual is familiar and yet there is hardly an hour of his life when he does not come in contact with something, the purchase of which has been financed through these instruments.”).

3. *See* Ronald J. Mann, *The Role of Letters of Credit in Payment Transactions*, 98 MICH. L. REV. 2494, 2516-17 (2000).

4. *See id.*

5. *See* Laura K. Austin, Note, *Letters of Credit: Gold Bullion?*, 45 LA. L. REV. 927, 929 (1985); *see also* *The Future of Financial Infrastructure: An Ambitious Look at How Blockchain Can Reshape Financial Services*, WORLD ECON. F. 75 (Aug. 2016), http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf [<https://perma.cc/5MMD-6E4B>] (describing the role of the letter of credit in the future of trade finance). In a letter of credit, the importer is often called the “applicant,” and the exporter is often called the “beneficiary.” *See* Mann, *supra* note 3, at 2499-2500.

6. *See* Rowley, *supra* note 1, at 2237.

7. *See* John F. Dolan, *Insolvency in Letter of Credit Transactions (Part I)*, 132 BANKING L.J. 195, 197 (2015) (“The first is the rule that the issuer’s obligation to honor the beneficiary’s draft or demand for payment arises only if the beneficiary presents documents that comply strictly with the terms and conditions of the credit.”). This Comment does not address clean letters of credit, where the issuer is obligated to pay simply when the beneficiary presents a draft. *See* Leon, *supra* note 1, at 449. The “issuer” is a

on the surface, a letter of credit appears to be equally favorable for the applicant and beneficiary.⁸

However, the applicant or the beneficiary bears more risk depending on when the issuer is required to pay the beneficiary under the letter of credit.⁹ A typical letter-of-credit transaction specifies immediate payment against a sight draft, which shifts the risk of nonperformance from the beneficiary to the applicant¹⁰ because the beneficiary generally gets paid before the goods reach the applicant.¹¹ In contrast, if the letter of credit specifies payment against a time draft or deferred payment obligation, the applicant is generally able to inspect the goods before the issuer pays the beneficiary.¹² However,

bank that is responsible for paying the amount of the letter of credit to the beneficiary. See Rowley, *supra* note 1, at 2237.

8. See *Trade Finance Guide: A Quick Reference for U.S. Exporters*, U.S. DEP'T COM., INT'L TRADE ADMIN. 7 (Apr. 2008), <https://www.trade.gov/publications/pdfs/tfg2008.pdf> [<https://perma.cc/G5SG-JH6R>].

9. See Jack B. Justice, *Letters of Credit: Expectations and Frustrations (Part I)*, 94 BANKING L.J. 424, 429 (1977).

10. See Richard F. Dole, Jr., *The Effect of UCP 600 Upon U.C.C. Article 5 with Respect to Negotiation Credits and the Immunity of Negotiating Banks from Letter-of-Credit Fraud*, 54 WAYNE L. REV. 735, 745-46 (2008); see also Michael Sandler & Barbara Di Ferrante, *Primer on Trade Finance: Export Drafts, Letters of Credit, and Banker's Acceptances*, 11 N.C. J. INT'L L. & COM. REG. 613, 629 (1986). A sight draft means the beneficiary is paid immediately after the issuer determines documentary compliance. See Dole, Jr., *supra* at 745. In contrast, there is a time lapse between when a beneficiary is paid under a time draft or deferred payment obligation. See *id.* at 745-46; Rolf Eberth & E.P. Ellinger, *Deferred Payment Credits: A Comparative Analysis of Their Special Problems*, 14 J. MAR. L. & COM. 387, 389 (1983) ("The characteristic feature of a deferred payment credit is that the beneficiary does not obtain payment when he tenders the documents, but at some later point of time stipulated in the letter of credit.").

11. See Eberth & Ellinger, *supra* note 10, at 389. Under a sight draft, the independence principle is underlying reason the issuer is obligated to pay before the applicant inspects the goods. See Gerald T. McLaughlin, *Letters of Credit and Illegal Contracts: The Limits of the Independence Principle*, 49 OHIO ST. L.J. 1197, 1201-02 (1989). The independence principle states that the letter of contract is separate from the contract between the buyer and seller; it is also separate from the issuing bank and the seller. See *id.* at 1199-1200.

12. See Dole, Jr., *supra* note 10, at 747; see also George A. Hisert, *Uniform Commercial Code: Does One Size Fit All?*, 28 LOY. L.A. L. REV. 219, 229-30 (1994) (comparing sight drafts to time drafts and deferred payment obligations).

these delayed payment obligations mean that the beneficiary has to discount the draft to get paid earlier.¹³ Furthermore, if the applicant refuses to pay after inspecting the goods, the issuer is still obligated to pay the beneficiary.¹⁴ The pitfall is that, in all three payment obligations, if the applicant is not satisfied with the quality of the goods, the applicant must sue the beneficiary for compensatory damages, which is often in the beneficiary's jurisdiction.¹⁵ For these reasons, neither the sight draft, time draft, nor deferred payment obligation are ideal because they fail to fully link payment with the underlying contract for the sale of goods.¹⁶

This Comment explores how blockchain, smart contracts, and the Internet of Things (IOT) solves this “pay now, argue later” idea.¹⁷ First, blockchain and smart contracts allow for a more flexible payment arrangement.¹⁸ In a modified sight draft, a smart contract would automatically issue out an installment payment after each document is verified and has met the terms under the letter of credit.¹⁹ Second, IOT allows parties to know the condition of goods throughout

13. Cf. Dole, Jr., *supra* note 10, at 774 (explaining that a nominating bank could discount the draft).

14. See Malgorzata Karolina Chmielewska, *Documentary Letter of Credit: A Pivotal Case for the Inefficiency of the Law of Contract*, 35 REV. GEN. 487, 495 (2005) (explaining that an unjustified reason for not paying would open the door for the exporter to sue the bank).

15. See *Maurice O'Meara Co. v. Nat'l Park Bank*, 146 N.E. 636, 639 (N.Y. 1925).

16. See Justin Pritchard, *LC at Sight - Quick Payment Under a Letter of Credit*, BALANCE, <https://www.thebalance.com/lc-at-sight-quick-payment-under-a-letter-of-credit-315038> [<https://perma.cc/9D9P-JDVP>] (last updated Mar. 11, 2018) (explaining that under all letters of credit, payment is specifically tied to the documents the beneficiary provides). Even if the beneficiary provides an inspection certificate, it only reflects the status of the goods prior to shipment. See *id.*; see also Laurel Delaney, *All About Inspection Certificates*, BALANCE SMALL BUS., https://www.thebalancesmb.com/what-is-an-inspection-certificate-1953512?_ga=2.149576502.1455331731.1535918238-1174572947.1535918233 [<https://perma.cc/C4BJ-D9XD>] (last updated May 7, 2018).

17. See Gerald T. McLaughlin, *Exploring Boundaries: A Legal and Structural Analysis of the Independence Principle of Letter of Credit Law*, 119 BANKING L.J. 501, 530 (2002).

18. See Marco Iansiti & Karim R. Lakhani, *The Truth About Blockchain*, HARV. BUS. REV. (Jan.–Feb. 2017), <https://hbr.org/2017/01/the-truth-about-blockchain> [<https://perma.cc/A92Q-7YCS>]

19. See *infra* Section III.D.

the shipment, from basic characteristics like quantity²⁰ all the way to more complex characteristics like temperature or moisture.²¹ Therefore, if a problem arises, the applicant and beneficiary can make an informed decision on how to proceed before the goods arrive at the final destination.²² For example, parties can correct a temperature problem before the goods spoil.²³ Given these comprehensive technologies, blockchain, smart contracts, and IOT should be applied to letter-of-credit transactions to better allocate risk between the applicant, beneficiary, and issuer.²⁴

20. See *The Internet of Things*, INT’L TELECOMM. UNION 82 (Nov. 2005), <https://www.itu.int/net/wsis/tunis/newsroom/stats/The-Internet-of-Things-2005.pdf> [<https://perma.cc/S5DL-RJ5R>].

21. *The Internet of Things: Exploring the Next Technology Frontier: Hearing Before the Subcomm. on Commerce, Manufacturing, and Trade of the H. Comm. on Energy and Commerce*, 114th Cong. 10 (2015) [hereinafter *Exploring the Next Technology Frontier*] (statement of Daniel Castro, Vice President, Information Technology and Innovation Foundation, Director, Center for Data Innovation) (“Manufacturers can also use sensors to collect real-time data such as temperature and moisture about their shipments to help ensure quality and optimize logistics.”); see also IBM Watson Internet of Things, *IBM Watson IOT Platform and Blockchain: A Trade Finance Example*, YOUTUBE (Oct. 28, 2016), <https://www.youtube.com/watch?v=vWnFei-ugT8> [<https://perma.cc/J53G-HVBS>].

22. See Matthew Lacey et al., *Shipping Smarter: IOT Opportunities in Transport and Logistics*, DELOITTE U. PRESS 2 (2015), https://www2.deloitte.com/content/dam/insights/us/articles/iot-in-shipping-industry/DUP1271_IoT_Transportation-and-Logistics_MASTER.pdf [<https://perma.cc/SGT6-WJAC>]. IOT allows individuals to predict and respond to problems with goods, thus making the shipment process more efficient; see also Nicholas Fearn, *Intel and Honeywell Partner to Make Logistics Smarter*, INTERNET BUS. (May 19, 2017), <https://internetofbusiness.com/intel-honeywell-logistics/> [<https://perma.cc/L86H-FMDA>].

23. *Four Ways the Food and Beverage Industry Can Reduce Food Waste*, PENSKE, <https://www.penskelogistics.com/industries/food-and-beverage/reduce-food-waste/> [<https://perma.cc/GD2U-PV7A>] (last visited Nov. 19, 2018) (“[E]ven slight fluctuations in temperatures can affect a product’s shelf life. For example, raising the temperature of bagged salad from 34 to 42 degrees Fahrenheit during a shipment makes bagged salad go bad five days faster even though the product will be delivered perfectly intact.”).

24. See Chris Skinner, *Applying Blockchain to Trade Finance*, BANKNXT (Aug. 18, 2016), <https://banknxt.com/57674/blockchain-trade-finance/> [<https://perma.cc/LN8Q-9QJY>] (suggesting that real-time visibility and identifying events that would trigger payment faster “can create a level playing field for all parties involved in a trade transaction”).

Part I of this Comment provides a detailed overview of letter-of-credit law with a focus on the Uniform Commercial Code (UCC) and the Uniform Customs and Practice for Documentary Credits (UCP).²⁵ In particular, Part I highlights two important concepts in a letter of credit—the strict compliance principle and the independence principle.²⁶ Part II of this Comment discusses three key technologies for trade finance—blockchain, smart contracts, and IOT.²⁷ Finally, Part III of this Comment examines how applying blockchain, smart contracts, and IOT makes the letter-of-credit process more efficient.²⁸ In doing so, it outlines how the traditional letter-of-credit process should be modified to accommodate these technologies—including the creation of a modified sight draft—and argues that these changes can be made without violating the independence principle or the strict compliance principle.²⁹

I. OVERVIEW OF LETTER-OF-CREDIT LAW

Letters of credit have been used to facilitate international trade transactions since the twelfth century.³⁰ There are two major types of letters of credit: a commercial letter of credit and a standby letter of credit,³¹ both of which are different from bank guarantees.³² Revised

25. See *infra* Part I.

26. See Amy D. Ronner, *Destructive Rules of Certainty and Efficiency: A Study in the Context of Summary Judgment Procedure and the Uniform Customs and Practice for Documentary Credits*, 28 LOY. L.A. L. REV. 619, 624-25 (1995).

27. See *infra* Part II.

28. See *infra* Part III.

29. See *id.*

30. See Leon, *supra* note 1, at 433; see also Boris Kozolchyk, *The Legal Nature of the Irrevocable Commercial Letter of Credit*, 14 AM. J. COMP. L. 395, 395 (1965) (explaining the early form of a letter of credit was a bill of exchange).

31. See Rowley, *supra* note 1, at 2244. This Comment solely addresses commercial letters of credit. The primary difference is that in a commercial letter of credit, parties presume that payment will be issued; however, in a standby letter of credit, the issuer will only pay out if a party, usually the applicant, defaults. See Jim L. Banks, *The Standby Letter of Credit: What It Is and How to Use It*, 45 MONT. L. REV. 71, 73-74 (1984).

32. See Emmanuel T. Laryea, *Payment for Paperless Trade: Are There Viable Alternatives to the Documentary Credit?*, 33 L. & POL'Y INT'L BUS. 3, 30-31 (2001) (explaining that bank guarantees, performance bonds, and standby letters of credit are a bank's undertaking that differ from a documentary letter of credit).

UCC Article 5³³ and UCP 600³⁴ represent the most common bodies of law applied to commercial letters of credit.³⁵ The UCC Uniform Model Code is promulgated by two legal entities,³⁶ while the UCP is promulgated by one business entity.³⁷ Among the most important doctrines within letter-of-credit law are the strict compliance principle

33. See U.C.C. § 5-102 (AM. LAW INST. & UNIF. LAW COMM'N 1952) (“This Article deals with documentary credits and does not have relation to goods since the subject matter of a documentary credit transaction is documents.”). After almost forty years, Article 5 was overhauled to meet the needs of letter of credit practice. See U.C.C. § 5-101 cmt. (AM. LAW INST. & UNIF. LAW COMM'N 1995). Any version of the UCC, including Revised UCC Article 5, is called the Uniform Model Code. See James E. Byrne, *Contracting Out of the Uniform Commercial Code: Contracting Out of Revised UCC Article 5 (Letters of Credit)*, 40 LOY. L.A. L. REV. 297, 299 n.1 (2006).

34. See INT'L CHAMBER OF COMMERCE (ICC), UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS 2007 REVISION 1 (ICC Pub. No. 600 2006) [hereinafter UCP 600] (“[The 39 articles of UCP 600] govern the operation of letters of credit.”); see also Byrne, *supra* note 33, at 301.

35. See Dole, Jr., *supra* note 10, at 737-38. In the case of a standby letter of credit, the parties may choose to be governed by the International Standby Practices, which specifically deals with standby letters of credit. See *id.*; see also John F. Dolan, *Security Interests in Letter-of-Credit Rights*, 74 CHI.-KENT L. REV. 1035, 1036 n.3 (1999).

36. See Gao Xiang & Ross P. Buckley, *The Unique Jurisprudence of Letters of Credit: Its Origin and Sources*, 4 SAN DIEGO INT'L L.J. 91, 117 (2003). These two entities are the Uniform Law Commission, also referred to as the National Conference of Commissioners on State Laws (NCCUSL), along with the American Law Institute (ALI). See *id.*; *About the ULC*, UNIFORM L. COMM'N, <http://www.uniformlaws.org/Narrative.aspx?title=About%20the%20ULC> [<https://perma.cc/6KCL-G9FP>] (last visited Nov. 19, 2018).

37. See Janet Koven Levit, *A Bottom-Up Approach to International Lawmaking: The Tale of Three Trade Finance Instruments*, 30 YALE J. INT'L L. 125, 128, 135-36 (2005). This entity is the International Chamber of Commerce Commission on Banking Technique and Practice (Banking Commission). *Id.* at 136 (“[T]he Banking Commission drafts, disseminates, and revises the UCP.”). The Banking Commission is not a governmental organization, nor is related to any governmental organization; instead, the Banking Commission includes members from the industry. See *id.* (explaining that the Banking Commission “includes some of the largest companies, banks, and service providers in the world”). See generally *Business Expertise*, ICCWBO, <https://iccwbo.org/about-us/who-we-are/business-expertise/> [<https://perma.cc/6GPS-5LXG>] (last visited Nov. 19, 2018) (“At present, close to 3,000 experts make up the specialised working bodies that establish our business stance on a broad range of issues.”).

and the independence principle.³⁸ Without these two doctrines, the commercial viability of the letter of credit would diminish.³⁹

A. Sources of Law

UCC § 5-116 allows parties to select their governing law, regardless of whether the source jurisdiction has a relation to the transaction.⁴⁰ In particular, the UCC explicitly allows parties to adopt the UCP.⁴¹ While the default rule is that the UCC governs letters of credit issued within the United States,⁴² parties often select the UCP as the governing law for their transaction.⁴³ In that case, the UCP governs to the extent that the UCP does not conflict with UCC Article 5.⁴⁴ Under the UCC, if the governing law is not specified in the letter of credit, the parties are subject to the law of the jurisdiction where the issuer is located.⁴⁵

The UCC and UCP have gradually begun to permit making certain portions of the letters of credit electronic.⁴⁶ The UCC and UCP

38. See Xiang & Buckley, *supra* note 36, at 119, 122.

39. See *id.* at 124.

40. See Byrne, *supra* note 33, at 306-07. Prior to this new amendment, parties could only choose law that had a “reasonable relationship” with the forum. See *id.* at 306.

41. U.C.C. § 5-116(c) (“Except as otherwise provided in this subsection, the liability of an issuer, nominated person, or adviser is governed by any rules of custom or practice, such as the Uniform Customs and Practice for Documentary Credits, to which the letter of credit, confirmation, or other undertaking is expressly made subject.”). The principle that parties can expressly adopt the UCP is also found in the text of the UCP. See UCP 600, *supra* note 34, art. 1. Apart from Wisconsin, every state that has adopted UCC Revised Article 5 expressly states that parties can adopt the UCP. See Rowley, *supra* note 1, at 2241.

42. See Rowley, *supra* note 1, at 2240. It is worth noting that Revised UCC Article 5 slightly restrains the general idea that the UCC traditionally promotes the freedom of contract principle. See Byrne, *supra* note 33, at 323-25.

43. See Levit, *supra* note 37, at 141 (explaining that “exporters and importers almost universally identify the UCP . . . as their choice of law” and that many banks will not issue out a letter of credit unless it identifies the UCP as its choice of law).

44. U.C.C. § 5-116(c) (“[T]hose rules govern except to the extent of any conflict with the nonvariable provisions specified in Section 5-103(c).”).

45. See Byrne, *supra* note 33, at 303 n.13.

46. See *UCC Article 5, Letters of Credit (1995) Summary*, NAT'L CONF. COMM'RS ON UNIFORM ST. LS., <http://www.uniformlaws.org/>

recognize digital signatures⁴⁷ and documents in electronic form.⁴⁸ Most recently, in conjunction with the UCP, parties may also expressly adopt the Supplement to the Uniform Customs and Practice for Documentary Credits for Electronic Presentation (eUCP).⁴⁹ However, the eUCP is relatively new and does not have a high adoption rate.⁵⁰

ActSummary.aspx?title=UCC%20Article%205,%20Letters%20of%20Credit%20 [https://perma.cc/2KLC-68SE](1995); see also Alan Davidson, *Electronic Records in Letters of Credit*, UNIFORM NATIONS COMMISSION ON INT'L TRADE L., https://www.uncitral.org/pdf/english/colloquia/EC/UNCITRAL-paper_Feb2011-Alan-Davidson.pdf [https://perma.cc/7NTT-9QEM] (last visited Nov. 19, 2018). Banks began trying to issue letters of credit electronically in the 1970s. See Boris Kozolchik, *The Paperless Letter of Credit and Related Documents of Title*, 55 L. & CONTEMP. PROBS. 39, 77 (1992).

47. See U.C.C. § 5-104 (“A letter of credit, confirmation, advice, transfer, amendment, or cancellation may be issued in *any* form that is a record and is authenticated (i) by a signature or (ii) in accordance with the agreement of the parties or the standard practice referred to in Section 5-108(e).”) (emphasis added); UCP 600, *supra* note 34, art. 3 (“A document may be signed by handwriting, facsimile signature, perforated signature, stamp, symbol or any other mechanical or electronic method of authentication.”). UCC § 1-201 recognizes that a signature can be any mark intended to be a signature. See U.C.C. § 1-201(b)(37). The Uniform Electronic Transactions Act (UETA) or the Electronic Signatures in Global and National Commerce Act (E-Sign Act) both establish the legal equivalence of electronic signatures. See generally 15 U.S.C. §§ 7001-7006 (2012); UNIF. ELEC. TRANSACTIONS ACT 7A U.L.A. 26 (1999). Most states have enacted the UETA. See *Electronic Transactions Act*, NAT'L CONF. COMMISSIONERS ON UNIFORM ST. LS., <http://www.uniformlaws.org/Act.aspx?title=Electronic%20Transactions%20Act> [https://perma.cc/R4QJ-KQME] (last visited Nov. 19, 2018).

48. See U.C.C. § 5-102(a)(6) (explaining that a document for purposes of Article 5 can be “written or [in] other medium” as long as the issuer is able to review it for documentary compliance); see also UCP 600, *supra* note 34, art. 11(a) (“An authenticated teletransmission of a credit or amendment will be deemed to be the operative credit or amendment, and any subsequent mail confirmation shall be disregarded.”).

49. INT'L CHAMBER OF COMMERCE, SUPP. TO THE UNIF. CUSTOMS & PRACTICE FOR ELEC. PRESENTATION (ICC Pub. No. 500/3) [hereinafter eUCP] art. e1(b) (“The eUCP shall apply as a supplement to the UCP where the credit indicates that it is subject to eUCP.”).

50. See William Patrick Cronican, *Buyer Beware: Electronic Letters of Credit and the Need for Default Rules*, 45 MCGEORGE L. REV. 383, 391 (2013) (“At present, the eUCP flaunts an adoption rate of almost zero.”); see

There are many reasons parties select the UCP instead of Revised UCC Article 5 as governing law.⁵¹ In the event of litigation, companies may choose the UCP to avoid inconsistencies in letter-of-credit law that could exist between two different jurisdictions.⁵² Similarly, while all fifty states have adopted Revised UCC Article 5, some states have adopted it with minor differences.⁵³ Thus, international parties appreciate the predictability and consistency of the UCP.⁵⁴

Despite these structural differences, in most cases the UCC aligns with the UCP.⁵⁵ Most importantly, the UCP and Revised UCC Article 5 are intended to follow common business practices for letters of credit.⁵⁶ As the UCC notes, parties and courts may turn to the UCP for guidance on practice and custom.⁵⁷ Hence, it is often said that the UCP has a significant influence on letter-of-credit law, even in

also Hossein Bagherinia, *Electronic Letter of Credit Faces Struggles to Gain Global Recognition*, FIN. TRIB. (Feb. 18, 2017), <https://financialtribune.com/articles/economy-business-and-markets/59792/electronic-letter-of-credit-faces-struggles-to-gain> [<https://perma.cc/4TB7-Z3MS>] (explaining that the eUCP was a simple and important step, but has struggled to gain widespread acceptance). For this reason, the scope of this Comment will only reference the eUCP sparingly, and instead, focus on comparing the UCC and the UCP. The issue of whether the eUCP is an acceptable supplement to the UCP is a discussion for a different day. *See generally id.* (explaining the issues with the eUCP Articles e5 and e11). Nevertheless, this Comment takes the position that the eUCP provides good considerations when dealing with electronic letters of credit.

51. *See, e.g.,* Levit, *supra* note 37, at 140-44 (explaining the benefits of the UCP).

52. *See* UCP 600, *supra* note 34 (stating in the foreword to the UCP that the purpose of the law is “to alleviate the confusion caused by individual countries’ promoting their own national rules on letter of credit practice”).

53. *See* Byrne, *supra* note 33, at 311-14 (explaining that not all states have uniformly adopted Revised UCC Article 5).

54. *See* Levit, *supra* note 37, at 141 (explaining that the UCP provides a uniform set of law so that parties know what to expect regarding the governing law).

55. *See* Xiang & Buckley, *supra* note 36, at 119.

56. Byrne, *supra* note 33, at 304 (“[O]ne of the principal purposes of revising U.C.C. Article 5 was to resolve the concerns of the banking community and to harmonize letter of credit law with international letter of credit practice.”); *id.* at 309 n.35 (“On all counts, Revised U.C.C. Article 5 attempts to, and does, capture modern letter of credit law and align it with international letter of credit practice in a manner that Prior U.C.C. Article 5 was unsuccessful in accomplishing.”).

57. *See* U.C.C. § 5-103 cmt. 2.

transactions within the United States.⁵⁸ Therefore, if the eUCP gains more momentum in the industry, it is possible that the next revised version of UCC Article 5 will reflect electronic practices.⁵⁹ Until then, most letters of credit have yet to be digitized.⁶⁰

B. The Typical Letter of Credit Scenario

There are three key parties to a simple letter of credit,⁶¹ and the UCC and UCP identify their roles similarly, as displayed in the table below.⁶²

In each letter-of-credit transaction, the issuer's obligation to pay the beneficiary is conditioned on the beneficiary submitting documents that strictly comply with the letter-of-credit terms.⁶³ Therefore, documentary conditions and the strict compliance principle protect the applicant and issuer by providing a basis before paying the beneficiary.⁶⁴

58. See James J. White, *The Influence of International Practice on the Revision of Article 5 of the U.C.C.*, 16 NW. J. INT'L L. & BUS. 189, 190, 195 (1995) (explaining how the UCP influenced the language of Revised UCC Article 5).

59. See generally *id.*

60. See *Smart Contracts: 12 Use Cases for Business & Beyond*, CHAMBER DIG. COM. 22 (Dec. 2016), https://digitalchamber.org/wp-content/uploads/2018/02/Smart-Contracts-12-Use-Cases-for-Business-and-Beyond_Chamber-of-Digital-Commerce.pdf [<https://perma.cc/4R47-NBMS>] [hereinafter *Smart Contracts*].

61. Dolan, *supra* note 35, at 1036 n.4. More complex letter of credit transactions will have four parties. See *id.* at 1037 (“Commonly, the letter of credit involves four parties.”); see also Chmielewska, *supra* note 14, at 493-95 (2005).

62. To be consistent, this Comment will use the UCC terms throughout.

63. See Mead, *supra* note 1, at 299-300, 306.

64. See Xiang & Buckley, *supra* note 36, at 123-24.

UCC	UCP	Role
Applicant ⁶⁵	Applicant ⁶⁶	The importer ⁶⁷ applies for the letter of credit. ⁶⁸
Issuer ⁶⁹	Issuing bank ⁷⁰	Issues out the letter of credit to the applicant. ⁷¹
Beneficiary ⁷²	Beneficiary ⁷³	The exporter ⁷⁴ is the party that benefits from the letter of credit. ⁷⁵

1. Applying for and Creating the Letter of Credit

In a typical letter-of-credit transaction, the applicant goes to the issuer and fills out a formal application with the terms that the applicant and beneficiary want under the letter of credit.⁷⁶ These terms

65. U.C.C. § 5-102(a)(2).

66. See UCP 600, *supra* note 34, art. 2.

67. See Mann, *supra* note 3, at 2499 (explaining the applicant can also be thought of as the buyer or the importer).

68. See Xiang & Buckley, *supra* note 36, at 97 (explaining that the beneficiary agrees to ship goods while the applicant agrees to pay the beneficiary through the letter of credit).

69. U.C.C. § 5-102(a)(9).

70. See UCP 600, *supra* note 34, art. 2. This distinction is because the UCC applies to letters of credit issued by banks and non-banks while the UCP only applies to letters of credit issued by banks. McLaughlin, *supra* note 11, at 1199 n.10.

71. See Mead, *supra* note 1, at 301. In a more complex letter-of-credit transaction, the parties will usually specify a second bank, usually located in the beneficiary's country, as another participant in the transaction. See Chmielewska, *supra* note 14, at 494-95. This second bank is called the "confirming" in the UCC and the "confirming bank" in the UCP. See U.C.C. § 5-102(a)(4); see also UCP 600, *supra* note 34, art. 2. In that case, the beneficiary presents documents to the confirmer instead of the issuer. See Xiang & Buckley, *supra* note 36, at 122.

72. U.C.C. § 5-102(a)(3).

73. UCP 600, *supra* note 34, art. 2.

74. See Mann, *supra* note 3, at 2500 (explaining the beneficiary can also be thought of as the seller or the exporter).

75. See McLaughlin, *supra* note 11, at 1199 n.12.

76. Mead, *supra* note 1, at 297 ("Payment for practically all commodities, which are the subject of foreign trade, is made through the bank, and in most instances by means of a banker's letter of credit.").

align with the applicant and beneficiary's underlying sales contract.⁷⁷ When filling out the letter-of-credit application, the applicant must provide basic information such as the amount for the letter of credit and the documents the beneficiary must provide to trigger payment against the letter of credit.⁷⁸ A letter of credit often specifies that the beneficiary must include an invoice, a bill of lading, an insurance certificate, and possibly a certificate of weight or quality.⁷⁹ Especially in international transactions, third-party documents like a phytosanitary certificate may be required.⁸⁰ Given the number of details, the initial application must be accurate to avoid future disagreements.⁸¹

77. See Rowley, *supra* note 1, at 2236. This underlying contract will state that payment must be made under a letter of credit and list the documents the beneficiary will need to provide to trigger payment under the letter of credit. See Xiang & Buckley, *supra* note 36, at 97 (explaining the underlying sales contract will specify that the seller will agree to ship the goods and the buyer will agree to pay the seller through a letter of credit). In a documentary letter of credit, the beneficiary provides documentation to the issuer to show that the beneficiary has satisfied all of the requirements set forth in the letter of credit. See U.C.C. § 5-102(a)(6); UCP 600, *supra* note 34, art. 14.

78. See McLaughlin, *supra* note 11, at 1199.

79. See *id.* A bill of lading shows that the beneficiary shipped the goods. See Dolan, *supra* note 35, at 1037 n.5.

80. See IBM Research, *International Trade Solution on Blockchain*, YOUTUBE (May 16, 2016), <https://www.youtube.com/watch?v=r0LsnzAe1g> [<https://perma.cc/K2QU-7NJA>]. A phytosanitary certificate certifies that the plants or other related articles meet the standards for the importing country. See *Phytosanitary Certificates*, SECRETARIAT INT'L PLANT PROTECTION CONVENTION 5 (2016), https://www.ippc.int/static/media/files/publication/en/2016/01/ISPM_12_2014_En_2015-12-22_Reformatted.pdf [<https://perma.cc/ABK6-46FC>].

81. See Sandler & Di Ferrante, *supra* note 10, at 619, 624-25 (explaining that in an irrevocable letter of credit, all parties need to agree to an amendment for it to take effect). Most letters of credit are irrevocable rather than revocable. See Mead, *supra* note 1, at 299; see also McLaughlin, *supra* note 11, at 1198 n.7 ("Although revocable letters of credit do exist, they are not common.") (internal citations omitted). If the UCC governs, the letter of credit will be presumed to be irrevocable unless the parties expressly specify otherwise in the letter of credit. See U.C.C. § 5-106(a). Prior to the Revised Article 5, if parties did not specify whether a letter of credit was revocable or not, in the event of a dispute, the issue would be left to the court. See Rowley, *supra* note 1, at 2246 (explaining that the prior version of Article 5 was silent in regard to revocability). If the UCP governs, the letter of credit will be irrevocable. See UCP 600, *supra* note 34, art. 3 ("A credit is irrevocable even if there is no indication to that effect.").

Based on the letter-of-credit application, the issuer drafts the letter of credit.⁸² The letter of credit becomes enforceable once the issuer sends the letter of credit to the beneficiary.⁸³ Because the issuer has the predominant role of drafting, ambiguities in the letter-of-credit terms are resolved against the issuer.⁸⁴ The next step in the letter-of-credit process involves presentation and documentary compliance.⁸⁵

2. *Presentation, Documentary Compliance, and the Strict Compliance Principle*

The “presenter,” which is often the beneficiary,⁸⁶ must present all of the documents as required under the letter of credit to the issuer at some point before the expiration of the letter of credit.⁸⁷ The issuer evaluates whether, “on its face,” the document is in compliance with the terms of the letter of credit.⁸⁸ The UCC calls this the “strict compliance” standard.⁸⁹ Under the UCC and UCP, the issuer has the discretion to determine whether the documents comply with the terms of the letter of credit based on the standard practice of financial

82. See Boris Kozolchik, *Is Present Letter of Credit Law Up to Its Task*, 8 GEO. MASON U. L. REV. 285, 288 (1986).

83. See U.C.C. § 5-106(a). The UCP does not directly address when a letter of credit becomes enforceable. Regardless, it is clear that the UCC and UCP treat a letter of credit as a “definite undertaking” by the issuer. See U.C.C. § 5-102(a)(10); UCP 600, *supra* note 34, art. 2.

84. *E. Girard Sav. Ass’n v. Citizens Nat’l Bank & Trust Co.*, 593 F.2d 598, 602 (5th Cir. 1979) (“Any ambiguity in a letter of credit must be resolved against the party drafting it.”); Kozolchik, *supra* note 82, at 288 (“The issuing bank plays the predominant role in the traditional pattern of preparing the text for the issuance of the letter of credit.”).

85. See Sandler & Di Ferrante, *supra* note 10, at 618.

86. See U.C.C. § 5-102(1)(m); UCP 600, *supra* note 34, art. 2 (explaining the presenter may be the beneficiary or someone who the beneficiary nominates).

87. See U.C.C. § 5-108 cmt. 1; UCP 600, *supra* note 34, art. 6(d)(1), (e).

88. See U.C.C. § 5-108(a); UCP 600, *supra* note 34, art. 14(a).

89. See U.C.C. § 5-108 cmt. 1. The strict compliance standard is different than the “substantial compliance” standard, which the UCC does not recognize. See *id.* The strict compliance principle is famously summarized as, “There is no room for documents which are almost the same, or which will do just as well.” *Ronner*, *supra* note 26, at 631 n.52. See also *Courtaulds N. Am., Inc. v. North Carolina Nat’l Bank*, 528 F.2d 802, 806 (4th Cir. 1975) (citing *Equitable Trust Co. of N.Y. v. Dawson Partners, Ltd.*, 27 Lloyd’s List Law Rpts. 49, 52 (1927)).

institutions.⁹⁰ The issuer may not apply nondocumentary standards; thus, any attempt to examine the quality of the goods or other measures of performance not apparent from the face of the documents is prohibited.⁹¹ However, defining “strict compliance” is often unclear, which leads to the unintended consequence of giving the issuer more discretionary latitude when determining documentary compliance.⁹²

After receiving the required documents from the beneficiary, the issuer has a limited, “reasonable” time to determine compliance or noncompliance and notify the presenter, which is not to exceed seven business days under the UCC⁹³ or up to five business days under the UCP.⁹⁴ Reasonableness is based on numerous considerations, including how many documents the issuer must review.⁹⁵ The issuer either “honors” the presentation of complying documents⁹⁶ or informs the presenter of any discrepancies between the documents presented and the letter of credit requirements.⁹⁷ If the documents are not in compliance, the issuer *may* allow the applicant to waive the discrepancies.⁹⁸ Either way, the beneficiary will attempt to cure the problem so it can still get paid.⁹⁹

90. See U.C.C. § 5-108(e); UCP 600, *supra* note 34, art. 14(d).

91. Roger J. Johns & Mark S. Blodgett, *Fairness at the Expense of Commercial Certainty: The International Emergence of Unconscionability and Illegality as Exceptions to the Independence Principle of Letters of Credit and Bank Guarantees*, 31 N. ILL. U. L. REV. 297, 300 (2011) (“[P]roper demand means formally proper demand, not necessarily substantively proper demand.”).

92. See Byrne, *supra* note 33, at 393 (noting that the issuer will generally accept any “reasonable interpretation” if any terms in the letter of credit are ambiguous).

93. U.C.C. § 5-108(b) (explaining the issuer has “a reasonable time after presentation, but not beyond the end of the seventh business day of the issuer after the day of its receipt of documents” to make a decision).

94. See UCP 600, *supra* note 34, art. 14(b).

95. U.C.C. § 5-108 cmt. 2. *But see* Byrne, *supra* note 34, at 348 (arguing the UCC does not define or explain reasonableness).

96. See U.C.C. § 5-108(b)(1); UCP 600, *supra* note 34, art. 7. To honor means the issuer pays the beneficiary. See U.C.C. § 5-102(a)(8); UCP 600, *supra* note 34, art. 33.

97. See U.C.C. § 5-108(b)(3); UCP 600, *supra* note 34, art. 16c.

98. U.C.C. § 5-108 cmt. 2 (“[The issuer] has no duty to seek a waiver from the applicant.”); *see also* UCP 600, *supra* note 34, art. 16(b) (explaining that the bank has the discretion to do so “in its sole judgment”).

99. See Margaret L. Moses, *Letters of Credit and the Insolvent Applicant: A Recipe for Bad Faith Dishonor*, 57 ALA. L. REV. 31, 33-34 n.14 (2005). The UCP does not definitively address curing discrepancies. See NEW DEVELOPMENTS IN INTERNATIONAL COMMERCIAL AND CONSUMER LAW:

3. *Payment*

The time at which the beneficiary gets paid differs depending on whether the letter of credit provides for a sight draft, a time draft, or a deferred payment obligation.¹⁰⁰ Most letters of credit provide for sight drafts, likely because the beneficiary wants to get paid sooner rather than later.¹⁰¹ Time drafts and deferred payment obligations delay payment to the beneficiary.¹⁰² In time drafts, the issuer will remit payment after a specified number of days after sight,¹⁰³ such as sixty or ninety days, whereas in a deferred payment obligation the issuer will remit payment on a specified date after sight.¹⁰⁴ Given this delay, the beneficiary may seek to discount the draft in exchange for receiving the funds before maturity.¹⁰⁵ Theoretically, the strict

PROCEEDINGS OF THE 8TH BIENNIAL CONFERENCE OF THE INTERNATIONAL ACADEMY OF COMMERCIAL AND CONSUMER LAW 151 (Jacob S. Ziegel ed., 1998). However, allowing a beneficiary to cure defects is considered to be one of the reasons UCP Article 16 requires the issuer to notify the beneficiary if the documents do not comply. *See* Ronner, *supra* note 26, at 661, 669.

100. *See* Dole, Jr., *supra* note 10, at 746. A draft is defined as the beneficiary's demand for payment under the letter of credit. *See* Sandler & Di Ferrante, *supra* note 10, at 614. The beneficiary includes the draft along with the presentation of documents. *See* Dolan, *supra* note 35, at 1041. The UCP explicitly accounts for a deferred payment obligation, unlike the UCC. *See* Gerald T. McLaughlin, *U.C.C. Article 5 Symposium: Should Deferred Payment Letters of Credit Be Specifically Treated in a Revision of Article 5?*, 56 BROOK. L. REV. 149, 155-56 (1990).

101. *See* John F. Dolan, *Strict Compliance with Letters of Credit: Striking a Fair Balance*, 102 BANKING L.J. 18, 18 (1985).

102. *See* Hisert, *supra* note 12, at 229-30; *see also* Dole, Jr., *supra* note 10, at 746.

103. *See* John F. Dolan, *Letter of Credit Litigation Under UCC Article 5: A Case of Statutory Preemption*, 57 WAYNE L. REV. 1269, 1272 n.14 (2011).

104. *See* Dolan, *supra* note 35, at 1046. Deferred payment obligations are also sometimes referred to as "usance." *See id.* n.61. Deferred payment obligations are not popular among banks in the United States. *See* McLaughlin, *supra* note 100, at 155-56.

105. *See* Sandler & Di Ferrante, *supra* note 10, at 635. The beneficiary might be more likely to do this especially in cases where the applicant will allege fraud, so it is more difficult for the applicant to seek an injunction. *See* Hisert, *supra* note 12, at 230 ("After acceptance it is very probable that a true fraudster will immediately discount its accepted time draft or deferred payment obligation to an innocent party. Thus, promptly after acceptance, the likelihood of enjoining a true fraudster diminishes significantly. At the same time, applicants usually do not receive goods until after acceptance.").

compliance principle stands, and the beneficiary is entitled to payment once the issuer determines there is documentary compliance.¹⁰⁶ Regardless of when the beneficiary is paid, all three methods share the concept that payment is conditioned upon such documentary compliance.¹⁰⁷

In time drafts or deferred payment obligations, the applicant is able to inspect the goods before the issuer pays the beneficiary.¹⁰⁸ However, the applicant's judgment of the goods has no effect on whether the beneficiary gets paid.¹⁰⁹ If the applicant refuses to pay, the issuer still has the obligation to pay the beneficiary.¹¹⁰

Detailed letter-of-credit terms serve to clearly outline the requirements that the beneficiary must meet.¹¹¹ In particular, the applicant must specifically list documentary conditions with which the beneficiary must strictly comply to be guaranteed payment.¹¹² Thus, the strict compliance principle, which focuses on the prescribed roles of the issuer and beneficiary, represents the first primary mechanism underlying every letter of credit.¹¹³

106. See Boris Kozolchyk, *Commercial Law: The Immunization of Fraudulently Procured Letter of Credit Acceptances: All Services Exportacao, Importacao Comercio, S.A. v. Banco Bamerindus do Brazil, S.A. and First Commercial v. Gotham Originals*, 58 BROOK. L. REV. 369, 373 (1992).

107. See UCP 600, *supra* note 34, art. 7.

108. See Dole, Jr., *supra* note 10, at 747.

109. See Mann, *supra* note 3, at 2495 (emphasizing that conditioned upon documentary compliance, the beneficiary "can rest assured that it will be paid even if the buyer would not pay voluntarily"); see also McLaughlin, *supra* note 100, at 160 ("[I]t is not supposed to be a mechanism for allowing a buyer to inspect the goods and based on the results of that inspection, approve or disapprove of the bank's letter of credit payment.").

110. See McLaughlin, *supra* note 11, at 1206.

111. See Kozolchyk, *supra* note 30, at 399-400.

112. Mann, *supra* note 3, at 2496 ("Under the standard payment-assurance account, the whole transaction hinges on the seller having a reliable right to payment by the bank that issues the letter of credit. But if the seller often does not submit documents that conform to the letter of credit, then the seller has no right to payment at all, just a request for a payment that will be honored only if the buyer waives the defects in the seller's presentation.").

113. See Moses, *supra* note 99, at 46-47; see also Ronner, *supra* note 26, at 624 ("One of the most fundamental doctrines in the law of letters of credit is the so-called independence principle.").

C. Independence Principle

The other fundamental principle of a letter of credit—the independence principle—expands upon the strict compliance principle and encompasses other contractual relationships that exist in a letter-of-credit transaction.¹¹⁴ According to the independence principle, which is found in the UCC and UCP,¹¹⁵ a letter-of-credit transaction comprises three separate undertakings: (1) the contract between the applicant and beneficiary; (2) the contract between the issuer and applicant; and (3) the contract between the issuer and beneficiary.¹¹⁶ Courts strictly enforce the independence principle with the exception of fraud, which is explicit in the UCC but which the UCP intentionally does not address.¹¹⁷

1. *The Sales Contract Between the Applicant and the Beneficiary*

According to the independence principle, the underlying contract for the sale of goods is separate from the letter of credit.¹¹⁸ For example, when the issuer reviews documents, it cannot look to the

114. Ronner, *supra* note 26, at 624 (“There is another fundamental doctrine in the law of letters of credit—that of strict compliance.”); *see also* Moses, *supra* note 99, at 46-47.

115. Byrne, *supra* note 33, at 330-31 (“Section 5-103(d) is Revised UCC Article 5’s clearest formulation of the independence principle, which is central to the notion of what constitutes a letter of credit.”); *see also* UCP 600, *supra* note 34, art. 4.

116. McLaughlin, *supra* note 11, at 1199 (“[A] typical commercial letter of credit is part of a three-contract structure composed of the contract for the sale of goods, the contract to issue the credit, and the letter of credit itself.”).

117. Ronner, *supra* note 26, at 625 (“Most significantly, one of the only real exceptions to the independence principle is for fraud.”); Xiang Gao, *The Fraud Rule Under the UN Convention on Independent Guarantees and Standby Letters of Credit: A Significant Contribution from an International Perspective*, 1 GEO. MASON J. INT’L COM. L. 48, 58-60, 62 (2010) (“[T]he UCP is silent with respect to the fraud rule As the fraud issue is traditionally considered as the province of the applicable law and of the courts of the forum, the drafters of the UCP, who are aware of the fraud issue, have deliberately left it out.”).

118. U.C.C. § 5-108(f)(1) (“An issuer is not responsible for the performance or nonperformance of the underlying contract, arrangement, or transaction”); UCP 600, *supra* note 34, art. 4 (“A credit by its nature is a separate transaction from the sale or other contract on which it may be based.”).

nature and quality of the goods shipped.¹¹⁹ Instead, the applicant should require an inspection certificate to safeguard against the chance of the beneficiary shipping fraudulent-quality goods.¹²⁰ Furthermore, in international transactions, depending on the International Commercial Term (INCOTERM) specified,¹²¹ the applicant will likely not bear the risk of loss throughout the entire shipment.¹²²

119. See Mead, *supra* note 1, at 300 (explaining that, for example, the issuer cannot look to the quality or location of goods).

120. Cf. Rocco D'Ascenzo, *The Supreme Court of Ohio's Decision in Mid-America Tire, Inc. v. PTZ Trading Ltd., and the Weakening of the Independence Principle*, 32 CAP. U. L. REV. 1097, 1122-23 (explaining that an inspection by a third-party should make the buyer feel more comfortable against any doubts about what the seller is shipping and that the inspection usually occurs before transporting to the buyer).

121. See John Linarelli, *Analytical Jurisprudence and the Concept of Commercial Law*, 114 PENN ST. L. REV. 119, 165 n.182 (2009). The most recent version of INCOTERMS is the 2010 version. See *Incoterms 2010*, INT'L CHAMBER COM. 1 (2010), <https://cdn.iccwbo.org/content/uploads/sites/3/2010/01/ICC-Introduction-to-the-Incoterms-2010.pdf> [<https://perma.cc/J2NZ-XEX2>]. INCOTERMS rules now give electronic documents the same treatment as paper documents, provided that the parties agree or that the jurisdiction accepts electronic documents. *Id.* at 2-3. The ICC is responsible for promulgating and interpreting INCOTERMS. See Levit, *supra* note 37, at 174 n.197. The UCC uses similar terms, but they could have different meanings. See Paul Casuccio, *Modernization of the Incoterms*, 7 GLOBAL TRADE & CUST. J. 70, 71 (2012). Therefore, parties engaging in international transactions are recommended to use INCOTERMS. See *id.*

122. See Linarelli, *supra* note 121, at 166. The most significant change to the 2010 version is that there are now eleven terms instead of thirteen. See Jacob Barron, *New Decade, New Upgrade: Incoterms 2010 Picks Up Where Incoterms 2000 Left Off*, 113 BUS. CREDIT 20, 20, 21 (Feb. 2011). See generally *Incoterms Rules 2010*, INT'L CHAMBER COM., <https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-rules-2010> [<https://perma.cc/T57E-PL3P>] (explaining the eleven terms and when the seller "delivers"). "Delivers" means the point in the transaction when the risk shifts from the beneficiary to the applicant. See Barron, *supra*, at 22. Among the rules that apply to any modes of transport, the rules most suitable for container shipments are: Free Carrier (FCA), Carriage Paid To (CPT), Carriage and Insurance Paid (CIP), Delivered at Terminal (DAT), Delivered at Place (DAP), and Delivered Duty Paid (DDP). See Barron, *supra*, at 21; Sherri Lane, *Incoterms 2010: What You Really Need to Know*, 114 BUS. CREDIT 8, 8, 9 (June 2012). Parties should avoid using the DDP term, which holds the beneficiary responsible for the risk throughout the shipment until the goods are delivered at the specified destination for the goods to be unloaded. See Barron, *supra*, at 21-22. Similar to the reason parties specify a

The leading case of the independence principle is *Maurice O'Meara Co. v. National Park Bank*.¹²³ In that case, the court refused to uphold the issuer's decision to dishonor the presentation of documents even though the beneficiary delivered newsprints that failed to meet the quality required under the letter of credit.¹²⁴ The court reasoned that the issuer was obligated to look only at the documents the beneficiary provided.¹²⁵ If the beneficiary delivered goods that were not what the applicant expected, the applicant could seek recourse by suing for damages.¹²⁶ While cases like *O'Meara* ultimately take the position that the issuer could inspect the goods if the letter of credit so specifies,¹²⁷ other commentators emphasize that allowing applicants to inspect goods violates the independence principle.¹²⁸

choice of law in the letter of credit, parties commonly include an INCOTERM to promote "harmonization" and predictability in the transaction. See Thomas O. Main, *The Word Commons and Foreign Laws*, 46 CORNELL INT'L L.J. 219, 278 (2013); William V. Roth, Jr. & William V. Roth III, *Incoterms: Facilitating Trade in the Asian Pacific*, 18 U.P.A. J. INT'L ECON. L. 731, 736 (1997) (explaining parties can easily identify the party that bears the risk or responsibility for a particular activity).

123. See Dolan, *supra* note 101, at 22 n.18. See generally 146 N.E. 636 (N.Y. 1925).

124. See *O'Meara*, 146 N.E. at 639. The letter of credit provided that the beneficiary should ship "1322 2/3 tons of newsprint paper in 72 1/2" and 36 1/2" rolls to test 11-12, 32 lbs. at 8 1/2 cents per pound net weight." *Id.* at 637.

125. *Id.* at 639 ("If the drafts, when presented, were accompanied by the proper documents, then it was absolutely bound to make the payment under the letter of credit, irrespective of whether it knew, or had reason to believe, that the paper was not of the tensile strength contracted for.").

126. See *id.*

127. *Id.* ("A provision giving it such right, or imposing such obligation, might, of course, be provided for in the letter of credit."); see also *Intraworld Indus., Inc. v. Girard Trust Bank*, 332 A.2d 316, 323 (Pa. 1975) ("Absent its agreement to the contrary, the issuer is, under the general rule, not required or even permitted to go behind the documents to determine if the beneficiary has performed in conformity with the underlying contract."). Nevertheless, even the court in *O'Meara* acknowledged that the issuer inspecting goods fundamentally goes against the independence principle. See *O'Meara*, 146 N.E. at 639 (refusing to "impose upon a bank a duty which in many cases would defeat the primary purpose of such letters of credit" because the primary purpose of a letter of credit is to pay the beneficiary upon proper presentation of documents).

128. Mead, *supra* note 1, at 309 ("No doubt the parties to such a transaction might agree that the bank should inspect and test the goods, if

As a practical matter, while the applicant and beneficiary are likely knowledgeable about the product being shipped, the issuer only has knowledge about reviewing documentation and issuing payment.¹²⁹ Consequently, the issuer should not look to whether the beneficiary performed according to the underlying sales contract.¹³⁰ But, even if the parties wanted the issuer to have such a responsibility and assuming issuers could even acquire such expertise, this would increase the price of the letter of credit and would be impracticable given that an issuer's customers come from a variety of industries.¹³¹ This separation of the applicant and beneficiary from the issuer circles back to the steadfast rule of the strict compliance principle—the issuer can only evaluate compliance based on the face of the document.¹³²

2. *The Reimbursement Contract Between the Applicant and the Issuer*

In the second undertaking of a letter of credit, the applicant agrees to reimburse the issuer for the amount distributed to the beneficiary under the letter of credit.¹³³ This principle is explicit in the UCP and implicit in the UCC.¹³⁴ Before issuing a letter of credit, the

they chose; but a bank would be going outside the bounds of ordinary banking business if it should undertake to do this.”)

129. See McLaughlin, *supra* note 11, at 1201.

130. See Chmielewska, *supra* note 14, at 493 (explaining that if the issuer was able to determine whether the beneficiary properly performed its duties in the underlying sales contract, this would undermine the reliability of a letter of credit). Theoretically, due to the freedom of contract principle, parties could require that the issuer look beyond the documents to determine whether the beneficiary performed in accordance with the underlying contract. See *Intraworld*, 332 A.2d at 323. However, this would be considered a nondocumentary condition that would be so fundamental to the issuer's obligation that the condition may be taken out of the scope of Article 5 entirely. See U.C.C. § 5-108 cmt. 9; see also *id.* at § 5-102 cmt. 6.

131. See McLaughlin, *supra* note 11, at 1201-02.

132. See Sandler & Di Ferrante, *supra* note 10, at 621 (explaining that the value and efficiency of the letter of credit would be reduced if the issuer had the responsibility of distinguishing minor versus material discrepancies).

133. Rowley, *supra* note 1, at 2237 (“The second undertaking is between the buyer (in this context, the ‘applicant’) and the letter of credit issuer . . . to reimburse the issuer for any amount the issuer disburses to the beneficiary on the letter of credit.”). The contract between the applicant and issuer is sometimes called the “reimbursement agreement.” See Dole, Jr., *supra* note 10, at 748.

134. See McLaughlin, *supra* note 11, at 1207.

issuer takes precautions to ensure the applicant has sufficient funds to reimburse the issuer. At a minimum, the issuer will confirm that the applicant has sufficient credit.¹³⁵ The issuer may also take an additional step by holding collateral.¹³⁶

Because the issuer takes a security interest in the goods,¹³⁷ should the buyer default, the issuer is generally still obligated to pay the amount on the letter of credit.¹³⁸ For example, if the applicant files for bankruptcy subsequent to the issuer granting the letter of credit, the issuer would still be obligated to pay the beneficiary, so long as the requirements under the letter of credit are satisfied.¹³⁹ The justification for this principle is that the beneficiary is relying on the solvency of the issuer, not the applicant.¹⁴⁰

3. *The Letter of Credit Between the Issuer and the Beneficiary*

The final undertaking is the letter of credit, which requires the issuer to pay the beneficiary the amount provided for as long as the beneficiary provides complying documentation.¹⁴¹ In a typical sales

135. See Mead, *supra* note 1, at 302 (explaining that the applicant will usually go to its own bank, which is familiar with its financial standing). Sometimes the bank will charge the reimbursement contract from an existing line of credit with the applicant. See John F. Dolan, *The Correspondent Bank in the Letter-of-Credit Transaction*, 109 BANKING L.J. 396, 415 (1992).

136. See Rowley, *supra* note 1, at 2237 (“Issuers often require applicants to pledge collateral to secure their promise to reimburse the issuer if the issuer has to honor the letter of credit.”).

137. See Dolan, *supra* note 35, at 1043 (explaining that in a documentary letter of credit, “the issuer has a security interest in [the] letter of credit”). Thus, the issuer is subject to UCC Article 9. See *id.*

138. See McLaughlin, *supra* note 11, at 1206.

139. See *id.* However, there is much debate surrounding the intersection of letter of contract law and bankruptcy, which is outside the scope of this Comment. Byrne, *supra* note 33, at 368-69 (“Perhaps the most important non-UCC statutory scheme that regularly intersects with letter of credit issues is that related to insolvency, and bankruptcy in particular.”). See generally John F. Dolan, *Insolvency in Letter of Credit Transactions (Part III)*, 132 BANKING L.J. 287 (2015) (explaining how bankruptcy law is treated when an applicant is insolvent in a letter of credit).

140. See McLaughlin, *supra* note 11, at 1207.

141. Rowley, *supra* note 1, at 2237 (“The third undertaking, the letter of credit itself, is the issuer’s promise to pay the beneficiary when the beneficiary presents certain required documents . . .”). Determining compliance might not always be so black and white, as most letter of credit litigation has to do with whether the documents were in compliance. See

contract the buyer usually has the obligation to pay the seller, conditioned upon tender of conforming goods.¹⁴² In contrast, in a typical documentary sale against a commercial letter of credit, the issuer bears the responsibility to pay, conditioned upon the beneficiary submitting documents that comply with the terms of the letter of credit.¹⁴³ Solely giving the issuer this responsibility of payment is what underlies the basis for a letter of credit—mitigating risk between the applicant and beneficiary.¹⁴⁴ Despite these three separate agreements, the fraud exception is the one and only case that does not trigger the independence principle.¹⁴⁵

4. *Fraud Exception*

Under the UCC, the independence principle is strictly enforced unless there is fraud in the transaction or in the documents.¹⁴⁶ The party that is most likely to allege fraud is the applicant that wishes to stop payment of the letter of credit until issues regarding the underlying

Arthur Fama, Jr., *Letters of Credit: The Role of Issuer Discretion in Determining Documentary Compliance*, 53 *FORDHAM L. REV.* 1519, 1522 (1985).

142. See U.C.C. § 2-601 (1963) (noting that if the goods do not perfectly align with the terms of the contract, the buyer can reject the shipment in whole or in part). As an alternative to the UCC, an applicant and beneficiary from different countries can agree to be governed by the United Nations Convention on Contracts for the International Sale of Goods (CISG). See John F. Coyle, *The Canons of Construction for Choice-of-Law Clauses*, 92 *WASH. L. REV.* 631, 665 (2017). Under the CISG, a buyer is only able to avoid performing if the seller's actions constitute a "fundamental breach." See U.N. COMM'N ON INT'L TRADE L., U.N. CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS, at 22, U.N. Sales No. E.10.V.14 (2010).

143. See Levit, *supra* note 37, at 134. Thus, a letter of credit "has a high degree of commercial utility." Austin, *supra* note 5, at 929.

144. See Levit, *supra* note 37, at 134. A letter of credit is particularly advantageous when the applicant and beneficiary have little or no course of dealing and thus, are unfamiliar with each other's credit standing. See Mead, *supra* note 1, at 298.

145. See Dole, Jr., *supra* note 10, at 750.

146. See Edward L. Symons, Jr., *Letters of Credit: Fraud, Good Faith and the Basis for Injunctive Relief*, 54 *TUL. L. REV.* 338, 353-54 (1980). These two types of fraud are almost indistinguishable because they are so interrelated. *Id.* at 361 ("[T]he fraudulent nature of the documents and the fraudulent nature of the goods are inextricably intertwined."). Therefore, this Comment will use the term "fraud" broadly to encompass both fraud in the transaction and fraud in the documents.

contract are resolved.¹⁴⁷ The leading case on the fraud exception¹⁴⁸ is *Sztejn v. J. Henry Schroder Banking Corp.*,¹⁴⁹ and the ruling is codified in UCC § 5-109.¹⁵⁰ If there is fraud, the issuer may refuse to honor the draft.¹⁵¹ However, because it is not always easy to determine

147. See Jack B. Justice, *Letters of Credit: Expectations and Frustrations (Part II)*, 94 BANKING L.J. 493, 495-96 (1977).

148. See Mark S. Blodgett & Donald O. Mayer, *International Letters of Credit: Arbitral Alternatives to Litigating Fraud*, 35 AM. BUS. L.J. 443, 449 (1998); see also Justice, *supra* note 147, at 495-96. The *Sztejn* case has influenced the fraud exception in jurisdictions all over the world. Gao Xiang & Ross P. Buckley, *A Comparative Analysis of the Standard of Fraud Required Under the Fraud Rule in Letter of Credit Law*, 13 DUKE J. COMP. & INT'L L. 293, 295 (2003) ("The seminal case on the fraud rule in letter of credit law was *Sztejn v. J. Henry Schroder Banking Corp.*[.] . . . [which] has influenced and shaped the fraud rule in virtually all jurisdictions worldwide.").

149. See generally 31 N.Y.S.2d 631 (N.Y. Sup. Ct. 1941). In that case, the beneficiary was to ship a certain amount of bristles. See *id.* at 633. The beneficiary presented documents that aligned with this requirement, but in reality, shipped fifty crates of cowhair and other useless materials. See *id.* The court held the issuer was not required to honor the presentation or issue payment "where the merchandise [was] not merely inferior in quality but consist[ed] of worthless rubbish." See *id.* at 635. Here, the beneficiary failed to ship any goods that conformed to the letter of credit. See *id.* at 634-35 (explaining at least "some goods" needed to align).

150. See Rowley, *supra* note 1, at 2238 n.24 (explaining that *Sztejn* was "pre-Code common law"). If there is fraud, the issuer can reject the presentation of documents or the applicant can request enjoinder of payment or presentation. Ross P. Buckley & Xiang Gao, *The Development of the Fraud Rule in Letter of Credit Law: The Journey So Far and the Road Ahead*, 23 U. PA. J. INT'L ECON. L. 663, 686 (2002). Therefore, UCC § 5-109 provides:

If a presentation is made that appears on its face strictly to comply with the terms and conditions of the letter of credit, but a required document is forged or materially fraudulent, or honor of the presentation would facilitate a material fraud by the beneficiary on the issuer or applicant[] . . . the issuer, acting in good faith, may honor or dishonor the presentation.

U.C.C. § 5-109(a). The exception to this rule is if a holder in due course demands payment. Clayton P. Gillette, *Holder in Due Course in Documentary Letter of Credit Transactions*, 1 ANN. REV. BANKING L. 21, 28-29 ("If honor is demanded by a holder in due course . . . the issuer [must honor] even where the transaction is tainted by fraud or where a document is alleged to have been forged.").

151. Justice, *supra* note 9, at 425-26.

whether there is fraud, the issuer may, in good faith, still honor the draft.¹⁵²

The UCP remains silent on the fraud exception.¹⁵³ The argument against applying the fraud exception to the UCP is that the UCP is designed to reflect banking practices, not legal practices.¹⁵⁴ Despite this argument, the Ohio Supreme Court noted in a recent case that many transactions governed by the UCP are still subject to the fraud exception, as the UCP's independence principle does not directly conflict with the UCC's fraud exception.¹⁵⁵

Summarily, fundamental principles such as documentary strict compliance and the independence principle are similar between the UCC and UCP.¹⁵⁶ Both codes require the issuer to deal only with documents¹⁵⁷ and require that the letter of credit remain separate from the contractual relationships between the applicant and beneficiary or

152. See *id.* at 427.

153. Janet Koven Levit, *Bottom-Up Lawmaking Through a Pluralist Lens: The ICC Banking Commission and the Transnational Regulation of Letters of Credit*, 57 EMORY L.J. 1147, 1178-79 (2008) (“[T]he UCP dodges the issue of documentary fraud . . . leav[ing] the task to domestic legislatures and international lawmaking institutions dedicated to harmonizing local trade law.”).

154. See John W. Head, *How Letters of Credit Operate in International Commercial Transactions: An Introduction to the UCP*, 77 J. KAN. B. ASS'N 16, 23 (2008) (noting that fraud is a legal issue, not a banking issue). Perhaps this explains why the UCP emphasizes that the letter of credit is a “definite undertaking” by the issuer. See UCP 600, *supra* note 34, art. 2.

155. See *Mid-America Tire, Inc. v. PTZ Trading Ltd.*, 768 N.E.2d 619, 635 (2002).

156. See Joseph D. Gustavus, *Letter of Credit Compliance Under Revised UCC Article 5 and UCP 500*, 114 BANKING L.J. 55, 71 (1997) (explaining the UCC and UCP both identify that banks are primarily responsible for evaluating whether discrepancies exist in documents); McLaughlin, *supra* note 17, at 505 (“Both the UCC Article 5 definition of the independence principle and the definitions of the independence principle in the rules of the UCP . . . emphasize that the obligation of a letter of credit issuer is separate from the other contracts and arrangements out of which the credit arises or which underlie it.”).

157. U.C.C. § 5-108(g) (“If an undertaking constituting a letter of credit under Section 5-102(a)(10) contains nondocumentary conditions, an issuer shall disregard the nondocumentary conditions and treat them as if they were not stated.”); UCP 600, *supra* note 34, art. 5 (“Banks deal with documents and not with goods, services or performance to which the documents may relate.”); see also Mead, *supra* note 1, at 300 (“It is obvious that this instrument contemplates payment only against documents.”).

the issuer and applicant.¹⁵⁸ Additionally, regardless of whether the letter of credit is governed by the UCC or the UCP, both codes aim to align with letter-of-credit practice.¹⁵⁹ For example, both laws account for the related concepts of the strict compliance principle and the independence principle, which seek to facilitate prompt payment to the beneficiary.¹⁶⁰ Even with the fraud exception and its elasticity,¹⁶¹ commentators emphasize the fact that it can pose a threat to the purpose of a letter of credit.¹⁶² Therefore, in the future, the key will be to strive for the proper balance between ensuring efficiency while preserving the commercial viability of the letter of credit.¹⁶³ Striking this proper balance requires a firm understanding of key financial technologies (FinTech)—mainly blockchain, smart contracts, and IOT.¹⁶⁴

II. BLOCKCHAIN, SMART CONTRACTS, AND IOT

Importers and exporters often lack mutual trust, especially when it comes to payment.¹⁶⁵ Therefore, FinTech is propelling the financial

158. See *supra* note 115 and accompanying text.

159. See *supra* notes 52, 54, 56 and accompanying text.

160. See McLaughlin, *supra* note 17, at 529 (“[T]he strict compliance standard and the relatively short time frame within which the issuer must honor its letter of credit/confirmation are only realistic because of the independence principle.”).

161. See Xiang & Buckley, *supra* note 148, at 308 (noting that the fraud exception has expanded throughout the years based on commercial practice).

162. See Guy W. Lewin Smith, *Irrevocable Letters of Credit and Third Party Fraud: The American Accord*, 24 VA. J. INT’L L. 55, 96 (1983).

163. See Ronner, *supra* note 26, at 624, 631 (explaining that the doctrines of strict compliance and the independence principle are both designed to ensure “certainty and efficiency”).

164. See Rob Marvin, *Blockchain: The Invisible Technology That’s Changing the World*, PCMAG (Aug. 29, 2017, 1:38 PM), <https://www.pcmag.com/article/351486/blockchain-the-invisible-technology-thats-changing-the-wor> [https://perma.cc/VL3C-X2NJ] (explaining that blockchain begins with FinTech, followed by the understanding that “[y]ou can’t talk about the future of blockchain without explaining the role smart contracts will play” and “[a] sleeping giant in this conversation is the effect smart contracts could have on the Internet of Things”).

165. See *Countertrade, Import & Export Strategy*, ECON. WATCH (June 29, 2010), <http://www.economywatch.com/international-trade/export-import-countertrade-finance-and-strategy.html> [https://perma.cc/7PVX-FZX8].

industry to modernize trade finance, particularly with blockchain and smart contracts, which help ensure transparency throughout the transaction.¹⁶⁶ Businesses regularly apply IOT to business logistics like supply chain.¹⁶⁷ For example, businesses are using IOT to aid in transporting perishable goods or to detect equipment failure.¹⁶⁸ However, fewer cases apply IOT to FinTech.¹⁶⁹

166. Wolfgang Lehmacher & Jesse McWaters, *How Blockchain Can Restore Trust in Trade*, WORLD ECON. F. (Feb. 1, 2017), <https://www.weforum.org/agenda/2017/02/blockchain-trade-trust-transparency/> [<https://perma.cc/LSQ4-JZ7F>] (“[I]ncreased visibility in parts of the supply chain promotes an unprecedented level of trust.”). According to the World Economic Forum, “[b]lockchain has the potential to become the new gold standard of business and trade.” *Id.* For example, Barclays executed the first blockchain letter of credit in September 2016. See *ZIM Trials Blockchain Bill of Lading*, MAREX (Nov. 20, 2017, 6:41 PM), <https://maritime-executive.com/article/zim-trials-blockchain-bill-of-lading> [<https://perma.cc/4ZQL-8BFH>] (explaining how the company executed electronic bills of lading).

167. See *Fostering the Advancement of the Internet of Things*, DEP’T COM. INTERNET POL’Y TASK FORCE & DIG. ECON. LEADERSHIP TEAM 7-8 (2017), https://www.ntia.doc.gov/files/ntia/publications/iot_green_paper_01122017.pdf [<https://perma.cc/8DYS-K9PT>].

168. See *Logistics 4.0: How IOT Is Transforming the Supply Chain*, FORBES (June 14, 2018, 11:34 A.M.), <https://www.forbes.com/sites/insights-inteliot/2018/06/14/logistics-4-0-how-iot-is-transforming-the-supply-chain/#3d5451ff880f> [<https://perma.cc/2PDB-2HEX>].

169. See *Trading Up: Applying Blockchain to Trade Finance*, BARCLAYS 3 (Feb. 2016), <https://www.barclayscorporate.com/content/dam/corppublic/corporate/Documents/product/Banks-Trading-Up-Q1-2016.pdf> [<https://perma.cc/7SCG-EWJ2>] (explaining that IOT “is still in the early stages of application to trade finance”); see also *The Seven Steps to a Blockchain-Based Letter of Credit (LC) Transaction*, ANGLO AFR. (May 11, 2017), <http://infosystems.mu/the-seven-steps-to-a-blockchain-based-letter-of-credit-lc-transaction> [<https://perma.cc/3YMZ-QULF>]. There is evidence, however, that the industry is looking towards how IOT can improve trade finance. See Sofia Lotto Persio, *Connect Everything: Trade Finance and the Internet of Things*, GLOBAL TRADE REV. (Aug. 31, 2016), <https://www.gtreview.com/magazine/volume-15-issue-1/connect-everything-trade-finance-and-the-internet-of-things/> [<https://perma.cc/2DWT-2ABV>].

A. Overview of FinTech and Trade Finance

FinTech is the practice of bringing technology into banking and other financial industries.¹⁷⁰ FinTech is not a new concept; instead, FinTech has long been incorporated into financial industries and continues to evolve with the times.¹⁷¹ The global financial crisis of 2008 propelled the most recent progress of FinTech as modern technologies focus on the need for speed.¹⁷² The 2008 financial crisis not only compromised consumers' trust of the banking industry,¹⁷³ but the crisis also negatively affected international trade.¹⁷⁴ In the aftermath of the financial crisis, international trade fell from \$16.1 trillion in 2008 to \$12.1 trillion in 2009—the largest decline since the Great Depression.¹⁷⁵

Since the 2008 financial crisis, banks have been increasingly interested in modernizing trade finance between global importers and exporters, particularly with digitalization.¹⁷⁶ The use of paperless documents could save up to \$50 million per year.¹⁷⁷ Accordingly,

170. Douglas W. Arner, János Barberis, & Ross P. Buckley, *The Evolution of FinTech: A New Post-Crisis Paradigm?*, 47 GEO. J. INT'L L. 1271, 1272 (2016) (“Financial technology,” or “FinTech,” refers to the use of technology to deliver financial solutions.”).

171. *See id.* at 1272-74.

172. *See id.* at 1286.

173. *See id.* at 1287-88.

174. *See* David Henna & Ben Jarrold, *The Digitisation of Trade*, in 2017 RETHINKING TRADE & FINANCE 226, <https://cdn.iccwbo.org/content/uploads/sites/3/2017/06/2017-rethinking-trade-finance.pdf> [<https://perma.cc/P9FN-CZT2>]. This report reflects responses by 255 banks in ninety-eight countries, making this report “the most extensive gauge of the trends and outlook of the global trade finance industry.” *2017 Rethinking Trade & Finance*, INT’L CHAMBER COM., <https://iccwbo.org/publication/2017-rethinking-trade-finance/> [<https://perma.cc/VC68-43GL>] (last visited Nov. 19, 2018).

175. John M. Herrmann, *The Global Financial Crisis: Impact on International Trade & Matters Potentially Coming Before the U.S. Court of International Trade*, KELLEY DRYE & WARREN LLP (2010), https://www.cit.uscourts.gov/Judicial_Conferences/16th_Judicial_Conference/16th_Jud_Conf_papers/Herrmann%20Paper.pdf [<https://perma.cc/Y4S6-A4E9>].

176. *See* Henna & Jarrold, *supra* note 174, at 226 (explaining the benefits of digitizing trade documents). Digitalization could lead to more businesses, thus generating an additional \$29 trillion for the digital economy in the next ten years. *Id.*

177. *Id.* at 227; *see also* Jeff Tennenbaum, *Blockchain Practical Usage Around the World*, IBM (2016), <https://www-01.ibm.com/events/ww/>

digitizing international trade will ensure banks remain competitive in the financial industry.¹⁷⁸

B. Blockchain and Smart Contracts

Blockchain and smart contracts are hot topics among the federal government,¹⁷⁹ state and local governments,¹⁸⁰ and the financial industry.¹⁸¹ These two technologies can modernize trade finance,

grp/grp304.nsf/vLookupPDFs/Jeff%20Tennenbaum%20Presentation/\$file/Jeff%20Tennenbaum%20Presentation.pdf
[<https://perma.cc/MMA9-L3VQ>].

178. See Henna & Jarrold, *supra* note 174, at 226-27; see also Jonathan Saul, *Commodities Trade Finance Goes Electronic After Centuries of Paper*, REUTERS (June 1, 2015, 9:30 AM), <https://www.reuters.com/article/trade-finance-electronic/commodities-trade-finance-goes-electronic-after-centuries-of-paper-idUSL5N0YK35320150601> [<https://perma.cc/4HG8-XCVZ>] (“[I]f a trade changes in the current paper world, it’s an administrative nightmare. But in a digital world, it’s a few clicks of a mouse.”).

179. See Aaron Stanley, *Trump White House Doubles Down on US Commitment to Blockchain*, COINDESK (Sept. 28, 2017, 12:00 UTC), <https://www.coindesk.com/trump-white-house-doubles-us-commitment-blockchain/> [<https://perma.cc/QZG8-FC26>] (explaining President Trump’s support for blockchain technology). In particular, the Congressional Blockchain Caucus, founded in the 114th Congress, is dedicated to studying blockchain and how it will impact the nation. See *Our Vision*, CONG. BLOCKCHAIN CAUCUS, <https://www.congressionalblockchaincaucus.com> [<https://perma.cc/CPT3-KMQ3>] (last visited Nov. 19, 2018). The United States Office of the Comptroller of the Currency argues positive development must come through “responsible innovation.” See *generally Supporting Responsible Innovation in the Federal Banking System: An OCC Perspective*, OFF. COMPTROLLER CURRENCY, <https://www.occ.treas.gov/topics/responsible-innovation/occ-innovation-general-brochure.pdf> [<https://perma.cc/NLP7-NW43>] (last visited Nov. 19, 2018).

180. See, e.g., ARIZ. REV. STAT. ANN. § 44-7061 (2017) (recognizing that records, signatures, and contracts obtained via blockchain are legal); see also NEV. REV. STAT. § 244.3535 (2017); *id.* § 268.0979 (prohibiting local governments from taxing blockchain transactions).

181. See Manoj Kashyap, Steve Davies, & Haskell Garfinkel, *Redrawing the Lines: FinTech’s Growing Influence on Financial Services*, PwC 8 (2017), <https://www.pwc.com/gx/en/industries/financial-services/assets/pwc-fintech-exec-summary-2017.pdf> [<https://perma.cc/6KKN-L753>] (explaining that as the financial industry is becoming more familiar with blockchain, more firms are incorporating the technology into their practice). Seventy-seven percent of financial institutions expect to invest in blockchain by 2020. *Id.*

particularly with important tasks like documentary management and payment.¹⁸² Therefore, blockchain and smart contracts are prime candidates for modernizing letters of credit.¹⁸³

1. Blockchain

Blockchain—a subset of distributed ledger technology—is a comprehensive, chronological database of transactions.¹⁸⁴ Transactions are grouped into individual “blocks,” which are time stamped and then connected to the previous block.¹⁸⁵ Blockchains generally fall into two broad categories: “open blockchains” which allow public access, or “permissioned blockchains” which allow access to only specified individuals.¹⁸⁶ Thus, parties can tailor blockchain technology to their needs.¹⁸⁷

182. See Sanne Wass, *CGI Integrates Blockchain with Conventional Trade Finance Platform*, GLOBAL TRADE REV. (Oct. 18, 2017), <https://www.gtreview.com/news/fintech/cgi-integrates-blockchain-with-conventional-trade-finance-platform/> [<https://perma.cc/KMT8-8T92>] (explaining how CGI teamed up with three international banks to use blockchain and smart contracts to create and deliver electronic documents); *How Blockchain Can Revitalize Trade Finance*, COGNIZANT 5 (Aug. 2017), <https://www.cognizant.com/whitepapers/how-blockchain-can-revitalize-trade-finance-part1-codex2766.pdf> [<https://perma.cc/W8LA-5Y5A>].

183. *Smart Contracts in Financial Services: Getting from Hype to Reality*, CAPGEMINI CONSULTING 2 (2016), https://www.capgemini.com/consulting-de/wp-content/uploads/sites/32/2017/08/smart_contracts_paper_long_0.pdf [<https://perma.cc/YZ93-QNTA>] (“Smart contracts, enabled by blockchain or distributed ledgers, have been held up as a cure for many of the problems associated with traditional financial contracts, which are simply not geared up for the digital age.”); see also *Smart Contracts*, *supra* note 60, at 21-22.

184. See Carla L. Reyes, *Moving Beyond Bitcoin to an Endogenous Theory of Decentralized Ledger Technology Regulation: An Initial Proposal*, 61 VILL. L. REV. 191, 197-98 (2016).

185. See *id.* at 197; see also Fiammetta S. Piazza, *Bitcoin and the Blockchain as Possible Corporate Governance Tools: Strengths and Weaknesses*, 5 PENN. ST. J.L. & INT’L AFF. 262, 275 (2017).

186. See Angela Walch, *The Path of the Blockchain Lexicon (And the Law)*, 36 REV. BANKING & FIN. L. 713, 720 (2017). Parties can add multiple individuals to the blockchain and customize what each party can view. See IBM Research, *supra* note 80.

187. See Heather Fraser, *How Blockchains Can Provide New Benefits & Business Models for Healthcare*, FORBES (Feb. 21, 2017, 9:00 AM), <https://www.forbes.com/sites/ibm/2017/02/21/how-blockchains-can-provide-new-benefits-business-models-for-healthcare/#356106183cc8>

There are many fundamental components to blockchain technology.¹⁸⁸ One of the core features is its decentralization, meaning neither a single person nor entity controls the blockchain.¹⁸⁹ Instead, each computer—or “node”—is connected to the same peer-to-peer network that runs under the same rules, or “protocol.”¹⁹⁰ After a participant updates the ledger,¹⁹¹ each computer checks the transaction via “consensus” before the change is written into the blockchain.¹⁹² These changes can be thought of as additions to current blocks, as previous versions of the blockchain remain unaltered: this is why blockchain is often mistakenly considered to be “immutable.”¹⁹³ The

[<https://perma.cc/93H9-KS8B>] (suggesting blockchain allows parties to customize who and when individuals can see information).

188. See J. Steven Perry, *What Is Blockchain? A Primer on Distributed Ledger Technology*, IBM: DEVELOPERWORKS BLOG (Jan. 4, 2017), <https://developer.ibm.com/dwblog/2017/what-is-blockchain-hyperledger-fabric-distributed-ledger/> [<https://perma.cc/HJS7-Y6UT>] (introducing the fundamental concepts of blockchain for beginners).

189. See Sloane Brakeville & Bhargav Perepa, *Blockchain Basics: Introduction to Distributed Ledgers*, IBM: DEVELOPER, <https://www.ibm.com/developerworks/cloud/library/cl-blockchain-basics-intro-bluemix-trs/index.html> [<https://perma.cc/8ULK-U6QS>].

190. See Josias N. Dewey & Michael D. Emerson, *Beyond Bitcoin: How Distributed Ledger Technology Has Evolved to Overcome Impediments Under the Uniform Commercial Code*, 47 UCC L.J. 105, 107-08 (2017).

191. See Scott J. Shackelford & Steve Myers, *Block-by-Block: Leveraging the Power of Blockchain Technology to Build Trust & Promote Cyber Peace*, 19 YALE J.L. & TECH. 334, 342 (2017) (explaining that participants continually update the ledger); William Mougayar, *If You Understand Google Docs, You Can Understand Blockchain*, COINDESK (Sept. 8, 2016, 14:51 UTC), <https://www.coindesk.com/understand-google-docs-can-understand-blockchain/> [<https://perma.cc/8UMS-PG35>] (analogizing blockchain to Google Docs in that multiple participants can update the ledger at the same time).

192. See Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia* 7 (Mar. 12, 2015) (unpublished manuscript), <https://ssrn.com/abstract=2580664> [<https://perma.cc/L2R8-5G27>]. Without blockchain, a central authority would need to verify that the data is authentic and secure. See *id.* at 5.

193. See Walch, *supra* note 186, at 719. In fact, “the attribute of immutability is one of the primary selling features of blockchain technology.” *Id.* at 736. In theory, if blockchain was absolutely immutable, it promises the utmost transparency. See Jeremy Bellamy & Chris Hill, *Can the Blockchain Make Our Contracts Smarter?*, KEMP LITTLE (Oct. 25, 2016), http://www.kemplittle.com/site/articles/kl_bytes/can-the-blockchain-make-our-contracts-smarter [<https://perma.cc/Q8R3-TJXS>]. However, as demonstrated by the “decentralized autonomous organization” (DAO)

system automatically updates on each node so that every participant of the blockchain has the most current information.¹⁹⁴ Due to the high degree of transparency, blockchain is often described as “trustless.”¹⁹⁵ Therefore, a key feature of blockchain is that multiple accurate copies can be maintained on separate servers.¹⁹⁶

For these reasons, blockchain helps parties in documentary management.¹⁹⁷ Documents are stored on the blockchain and verified

situation in 2016, the code can be overridden. *See* David Siegel, *Understanding the DAO Attack*, COINDESK (June 25, 2016, 16:00 UTC), <https://www.coindesk.com/understanding-dao-hack-journalists/> [<https://perma.cc/Y6P6-ZTYZ>]. The DAO project was a venture capital effort, which resulted in someone taking \$50 million in virtual currency. Klint Finley, *A \$50 Million Hack Just Showed that the DAO Was All Too Human*, WIRED (June 18, 2016, 4:30 AM), <https://www.wired.com/2016/06/50-million-hack-just-showed-dao-human/> [<https://perma.cc/9RPA-YHA5>]. Management decided to execute a “hard fork” to reverse the attack and thus, restore the currency, instead of a “soft fork,” which would have only invalidated future attempts to take the currency. *See* Siegel, *supra*. The decision to override the “immutable” code was controversial as some commentators argued that if the code is the law, then nothing technically went wrong. *See* Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 337 (2017) (explaining that this “loophole . . . was clearly within the letter of the law, but not within its spirit”).

194. *See* Wright & De Filippi, *supra* note 192, at 10-11. A study by Cognizant found that respondents believe data management and transparency are blockchain’s top two most powerful benefits. *See* COGNIZANT, FINANCIAL SERVICES: BUILDING BLOCKCHAIN ONE BLOCK AT A TIME 8 (2017), <https://www.cognizant.com/whitepapers/financial-services-building-blockchain-one-block-at-a-time-codex2742.pdf> [<https://perma.cc/PV6D-BUSQ>].

195. *See* Walch, *supra* note 186, at 722 n.36. “At its root, a blockchain is a ‘shared, trusted, public ledger that everyone can inspect, but which no single user controls.’” Shackelford & Myers, *supra* note 191, at 342 (quoting *The Trust Machine*, ECONOMIST (Oct. 31, 2015), <https://www.economist.com/leaders/2015/10/31/the-trust-machine> [<https://perma.cc/BQ2T-BRSM>]).

196. *See* Raskin, *supra* note 193, at 308. However, there is an update gap where all nodes might not reflect the most current information. *See* Wright & De Filippi, *supra* note 192, at 7 (explaining that the blockchain “periodically synchronize[s]”).

197. *See* Arnab Shome, *BBVA Is Using Blockchain to Streamline International Trade Transactions*, FIN. MAGNATES (Nov. 27, 2017, 15:22 GMT), <https://www.financemagnates.com/cryptocurrency/news/bbva-using-blockchain-streamline-international-trade-transactions/> [<https://perma.cc/293H-RY8M>].

through consensus.¹⁹⁸ More recently, blockchain has also been used to generate documents like bills of lading in letter-of-credit transactions.¹⁹⁹ Because international transactions involve many documents—potentially with multiple phases of correspondence—blockchain is an easy way to store, organize, and verify documents.²⁰⁰ Furthermore, blockchain can be used in tandem with smart contracts to further automate international transactions.²⁰¹

2. Smart Contracts

Nick Szabo first coined the term “smart contracts” in 1996, and they can be defined as a written set of mathematical rules that, once triggered, automate certain promises between parties.²⁰² While a smart contract may actually be a legally binding contract, more often the term means that the “smart” code is verified and stored on the

198. See *id.* (explaining how parties used a software called Wave for a letter of credit transaction). For example, parties can upload pictures of damaged goods to speed up the insurance process. See Larsen & Toubro Infotech Ltd., *What is Trade Finance- Letter of Credit Trade Finance Using Blockchain*, YOUTUBE (Mar. 5, 2017), <https://www.youtube.com/watch?v=5wkklaemSw4&t=83s> [<https://perma.cc/6DV6-Y2VP>].

199. See Jon Southurst, *How Blockchain Contracts and IoT Could Save Global Shipping Billions*, BITCOIN (Nov. 10, 2016), <https://news.bitcoin.com/blockchain-save-global-shipping-billions/> [<https://perma.cc/3GF4-JQMS>] (explaining how sensors collect data to generate a “Smart Bill of Lading”).

200. See *ZIM Trials Blockchain Bill of Lading*, *supra* note 166 (explaining how the company executed electronic bills of lading).

201. See Reggie O’Shields, *Smart Contracts: Legal Agreements for the Blockchain*, 21 N.C. BANKING INST. 177, 181-82 (2017); see also *Smart Contracts*, *supra* note 60, at 8.

202. *Smart Contracts*, *supra* note 60, at 8 (“In 1996, Nick Szabo described a smart contract as ‘a set of promises, specified in digital form, including protocols within which the parties perform on these promises.’”); see also Carla L. Reyes, *Conceptualizing Cryptolaw*, 96 NEB. L. REV. 384, 398 (2017) (explaining that smart contracts run automatically without human involvement). Due to the lack of technology at that time to support smart contracts, it was not until 2009 when the first form of a smart contract was developed. See J. DAX HANSEN, LAURIE ROSINI, CARLA L. REYES, *MORE LEGAL ASPECTS OF SMART CONTRACT APPLICATIONS 1* (2018), <https://www.perkinscoie.com/images/content/1/9/v3/199672/2018-More-Legal-Aspects-of-Smart-Contract-Applications-White-Pa.pdf> [<https://perma.cc/XY73-TZ2L>].

blockchain.²⁰³ The most basic example of a smart contract is a vending machine purchase.²⁰⁴ After an individual selects an item and inserts the appropriate amount of money, the vending machine automatically dispenses the corresponding item.²⁰⁵

Smart contracts are commonly used to facilitate payment in international transactions.²⁰⁶ In particular, parties use smart contracts to automate payment when a certain condition is met, such as delivery.²⁰⁷ Thus, smart contracts execute the parties' agreement securely and quickly, without the need for a middleman or an invoice.²⁰⁸

Blockchain and smart contracts are complementary technologies that can help improve trade finance, including letters of credit.²⁰⁹ Blockchain and smart contracts have the opportunity to act as a power-

203. See, e.g., Josh Stark, *Making Sense of Blockchain Smart Contracts*, COINDESK (June 4, 2016, 18:39 UTC), <https://www.coindesk.com/making-sense-smart-contracts/> [<https://perma.cc/46EW-3TMJ>].

204. See *Smart Contracts*, *supra* note 60, at 3; see also Raskin, *supra* note 193, at 306.

205. See Raskin, *supra* note 193, at 306.

206. See Nicolette Kost De Sevres, Bart Chilton & Bradley Cohen, *The Blockchain Revolution, Smart Contracts and Financial Transactions*, DLA PIPER (Apr. 26, 2016), <https://www.dlapiper.com/en/us/insights/publications/2016/04/the-blockchain-revolution/> [<https://perma.cc/QRX6-KFX4>]. Using smart contracts to facilitate payment ensures parties are not able to breach the contract. Jeremy M. Sklaroff, Comment, *Smart Contracts and the Cost of Inflexibility*, 166 U. PA. L. REV. 263, 279 (2017) ("Smart contracts are useful because they eliminate the possibility of breach, forcing parties to honor their original agreements.").

207. See Sukand Ramachandran, et al., *Evolving Trade Flows and Trade Corridors, Reconfiguration of Global Supply Chains and Sourcing Patterns*, in 2017 RETHINKING TRADE & FINANCE 52, 61, <https://cdn.iccwbo.org/content/uploads/sites/3/2017/06/2017-rethinking-trade-finance.pdf> [<https://perma.cc/P9FN-CZT2>].

208. See Brian Hughes, *Smart Contracts: Here Are the Practical Applications of This Exciting Blockchain Technology*, ENTREPRENEUR (Sept. 24, 2018), <https://www.entrepreneur.com/article/320467> [<https://perma.cc/S8X2-4ULD>].

209. *The Future of Trade Finance?*, TREASURY TODAY (Nov. 2016), <http://treasurytoday.com/2016/11/the-future-of-trade-finance-tti> [<https://perma.cc/WWH9-4KYH>] ("The interplay between blockchain, smart contracts and the Internet of Things is a significant development towards revolutionising trade transactions that could deliver considerable benefits throughout the global supply chain.").

duo to automate portions of letters of credit, such as payment.²¹⁰ Blockchain could disrupt trade finance and letters of credit, changing how letters of credit traditionally function.²¹¹ IOT represents another key technology that could transform the financial industry.²¹²

C. IOT and the Internet of Everything

The Internet has changed the way people seek information and interact with others.²¹³ Despite the dramatic increase in connectivity, it is estimated that 99.4% of physical objects are still unconnected.²¹⁴

210. See Stephen M. McJohn & Ian McJohn, *The Commercial Law of Bitcoin & Blockchain Transactions* 16-17 (Suffolk Univ. Law Sch. Legal Studies Research Paper Series, Research Paper 16-13, 2016) (explaining that a smart contract will release payment if the conditions in the blockchain are met). Among the benefits of blockchain and smart contracts is mitigating risks. See *CGI's Trade Innovation Lab: Bringing Blockchain to Trade Finance*, CGI 1 (Aug. 30, 2016), https://www.cgi.com/sites/default/files/pdf/cgi-sponsored-editorial-in-xf-2016_cgi-trade-innovation-lab_bringing-blockchain-to-trade-finance.pdf [https://perma.cc/7EUK-CAEF] [hereinafter *Bringing Blockchain to Trade Finance*].

211. See *Trade Finance to Fuel Blockchain's Rise This Year*, Says IBM, PYMNTS (May 4, 2017), <https://www.pymnts.com/news/b2b-payments/2017/ibm-blockchain-mizuho-letter-credit-global-trade-disruption/> [https://perma.cc/PF2M-QVXW].

212. See Jim Eckenrode, *The Derivative Effect: How Financial Services Can Make IOT Technology Pay Off*, DELOITTE INSIGHTS (Oct. 13, 2015), <https://www2.deloitte.com/insights/us/en/focus/internet-of-things/iot-in-financial-services-industry.html?id=us:2el:3dc:dup1166:eng:fsi:iot:dcpromo> [https://perma.cc/HM6X-HHFW].

213. Roy Want, Bill N. Schilit & Scott Jenson, *Enabling the Internet of Things*, 48 COMPUTER 28, 28 (2015) (“The conventional Web is a convenience we enjoy as we search for information, respond to email, shop, and engage in social networking.”).

214. JOSEPH BRADLEY, JOEL BARBIER & DOUG HANDLER, CISCO, EMBRACING THE INTERNET OF EVERYTHING TO CAPTURE YOUR SHARE OF \$14.4 TRILLION: MORE RELEVANT, VALUABLE CONNECTIONS WILL IMPROVE INNOVATION, PRODUCTIVITY, EFFICIENCY & CUSTOMER EXPERIENCE 1 (2013), https://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoE_Economy.pdf [https://perma.cc/U8YL-V5NY]. However, it is expected that the number of IOT devices connected to the Internet will exceed the amount of people in the world. See FRANCIS DACOSTA, RETHINKING THE INTERNET OF THINGS: A SCALABLE APPROACH TO CONNECTING EVERYTHING 3 (2013).

While IOT is most commonly associated with consumer goods,²¹⁵ businesses have also begun to take advantage of technologies like IOT,²¹⁶ radio-frequency identification (RFID),²¹⁷ and complementary technologies like sensors, actuators, and oracles²¹⁸ in order to transform the “Internet of Things” to the “Internet of Everything” (IOE).²¹⁹

215. See generally Scott R. Peppet, *Regulating the Internet of Things: First Steps Toward Managing Discrimination, Privacy, Security, & Consent*, 93 TEX. L. REV. 85 (2014) (explaining that IOT is used for goods like the Amazon Echo, fitness devices like Fitbit, and smart homes).

216. Mauricio Paez & Mike La Marca, *The Internet of Things: Emerging Legal Issues for Businesses*, 43 N. KY. L. REV. 29, 29 (2016) (“While the IoT is still in the nascent stage of development, businesses have taken notice.”).

217. See ECONOMIST INTELLIGENCE UNIT, *THE INTERNET OF THINGS BUSINESS INDEX: A QUIET REVOLUTION GATHERS PACE* 10 (2013), https://www.arm.com/files/pdf/EIU_Internet_Business_Index_WEB.PDF [<https://perma.cc/VA86-WPJG>] (explaining sensors and actuators can use RFID technology to connect to the internet).

218. See Sarbani Roy & Chandreyee Chowdhury, *Integration of Internet of Everything (IoE) With Cloud*, in *BEYOND THE INTERNET OF THINGS* 199, 202-03 (Jordi Mongay Batalla et al. eds., 2017); *What Is a Blockchain Oracle?*, BLOCKCHAIN HUB, <http://blockchainhub.net/blockchain-oracles/> [<https://perma.cc/T2PX-FCJQ>] (last visited Nov. 19, 2018) (explaining how hardware oracles help link RFID sensors to smart contacts).

219. See Dave Evans, *Beyond Things: The Internet of Everything, Explained in Four Dimensions*, HUFFINGTON POST (Sept. 24, 2013, 9:20 AM), https://www.huffingtonpost.com/dave-evans/cisco-beyond-things-the-interne_b_3976104.html [<https://perma.cc/6BYC-7SH5>]; *The Internet of Things: A Technical Primer*, DELOITTE INSIGHTS (Feb. 8, 2018), <https://www2.deloitte.com/insights/us/en/focus/internet-of-things/technical-primer.html> [<https://perma.cc/NX6Y-SFVZ>] (showing the progression of how sensors can help lead to decision making).

1. Defining IOT and IOE

While there is no consensus on how to define IOT,²²⁰ IOT is often described in terms of devices that connect to the Internet.²²¹ In general, IOT can be described as physical objects that use technology to connect in real-time with the surrounding environment, devices, and external information systems.²²² However, the Department of Commerce takes the position that IOT should not be restricted to a certain label or definition as this restriction might impede growth.²²³

A related concept, IOE, expands upon IOT.²²⁴ Four things work together to form IOE—people, processes, data, and things.²²⁵ For example, sensors can generate more data in order to help humans and machines make better decisions.²²⁶ Thus, IOE is more than just

220. See *Fostering the Advancement of the Internet of Things*, *supra* note 167, at 5-6. Kevin Ashton coined IOT in 1999 when he used the term as a presentation title during a presentation to Proctor and Gamble. See Kevin Ashton, *That 'Internet of Things' Thing*, RFID J. (June 22, 2009), <http://www.rfidjournal.com/articles/pdf?4986> [<https://perma.cc/3445-NMWP>].

221. See *Fostering the Advancement of the Internet of Things*, *supra* note 167, at 6.

222. Paez & Marca, *supra* note 216, at 31 (“[T]he IoT refers to the growing number of everyday physical objects or ‘things’ that have been embedded with technology to enable them to interact with the physical environment, people, and other devices in real-time.”).

223. *Fostering the Advancement of the Internet of Things*, *supra* note 167, at 5 (“[T]he Department agrees with the commenters that emphasized the need to allow the IoT environment to grow without the restrictions of labels or specific definitions that could inadvertently limit the applications, innovations, and overall potential of IoT.”).

224. Evans, *supra* note 219 (“The fact is, the Internet of Things is just one of four dimensions — people, process, data, and things — we talk about in the Internet of Everything.”). IOE is a less commonly used term, however. See *id.* Therefore, this Comment will use IOT to encompass both IOT and IOE.

225. See *id.* IOE can increase revenue and lower costs, potentially creating \$14.4 trillion of value. BRADLEY, BARBIER & HANDLER, *supra* note 214, at 3.

226. See Matos et al., *Context-Aware Systems: Technologies and Challenges in Internet of Everything*, in BEYOND THE INTERNET OF THINGS 3, 8 (Jordi Mongay Batalla et al. eds., 2017); see also COGNIZANT, BLOCKCHAIN FOR TRADE FINANCE: PAYMENT METHOD AUTOMATION (PART 2) 9 (2017), <https://www.cognizant.com/whitepapers/blockchain-for-trade-finance-payment-method-automation-part-2-codex3071.pdf> [<https://perma.cc/W83X-HRJU>] [hereinafter BLOCKCHAIN FOR TRADE

connecting items to the Internet; it is about how people, process, data, and things can work together to create value.²²⁷

2. RFID

At its most basic level, RFID is a tagging system that provides the means to track physical goods and deliver the information to an electronic database.²²⁸ RFID is a wireless system that tracks the location of tagged objects via a GPS device,²²⁹ which can be tagged by item or by pallet.²³⁰ Each tag has a unique Electronic Product Code (EPC).²³¹ An EPC is similar to a bar code but can hold more information, can be rewritten, and can function even if the tag is not easily visible.²³² An active tag has more capabilities than a passive tag.²³³ For example, an active tag contains a battery, which enables the data stored on the tag to reach the RFID reader over a greater distance than a passive tag.²³⁴ However, companies prefer to use passive tags because they are less expensive than active tags.²³⁵ Regardless of the

FINANCE]. IOE could also be described as “the confluence of people, process, data, and things.” See BRADLEY, BARBIER & HANDLER, *supra* note 214, at 2. Some scholars, however, still use the term IOT and IOE interchangeably. See, e.g., Peppet, *supra* note 215, at 89.

227. See Evans, *supra* note 219.

228. See *The Internet of Things*, *supra* note 20, at XI (defining RFID). RFID is not a new concept, as it can be traced to the 1970s. See Kristiana M. Willingham, *Innovative Products: Scanning Legislative Efforts: Current RFID Legislation Suffers from Misguided Fears*, 11 N.C. BANKING INST. 313, 314 n.9 (2007).

229. See V. DANIEL HUNT, ALBERT PUGLIA & MIKE PUGLIA, *RFID-A GUIDE TO RADIO FREQUENCY IDENTIFICATION 1* (2007); *Can RFID Be Used to Track the Movements of Goods Across the Country?*, RFID J. (Apr. 18, 2017), <http://www.rfidjournal.com/blogs/experts/entry?11860> [<https://perma.cc/25BS-RNV5>] (explaining the GPS device is what allows real-time tracking).

230. See Gary M. Gaukler & Ralf W. Seifert, *Applications of RFID in Supply Chains*, in *TRENDS IN SUPPLY CHAIN DESIGN AND MANAGEMENT: TECHNOLOGIES AND METHODOLOGIES* 29, 31 (Hosang Jung et al. eds., 2007).

231. See *RFID Position Statement of Consumer Privacy and Civil Liberties Organization*, PRIVACY RTS. CLEARINGHOUSE (Nov. 20, 2003), <http://www.privacyrights.org/ar/RFIDposition.htm> [<https://perma.cc/R6W7-7BE4>].

232. HUNT, PUGLIA & PUGLIA, *supra* note 229, at 20-21.

233. See *id.* at 6-7.

234. See *id.* at 21.

235. See Claire Swedberg, *Passive Sensor Tags to Surpass 5 Million Units This Year*, RFID J. (Nov. 14, 2017), <http://www.rfidjournal.com/>

type of tag used, these small powerhouses can transmit valuable information for companies throughout the supply chain.²³⁶

RFID is commonly used in shipping containers,²³⁷ and it allows companies to track the location and quantity of goods as they travel through commerce.²³⁸ Companies like IBM have developed applications that seamlessly display IOT data in a user-friendly way.²³⁹ Thus, RFID allows companies to track goods throughout the supply chain²⁴⁰ to gain valuable information that would otherwise be unknown or not discovered until the goods arrive at their final destination.²⁴¹

articles/view?16809/ [https://perma.cc/CU3H-WB6Q]. The price of passive tags decreases when a company buys in mass quantities, so in the future, a passive tag could cost as low as five cents. See Kevin Werbach, *Sensors and Sensibilities*, 28 CARDOZO L. REV. 2321, 2330 (2007).

236. See Lars S. Smith, *RFID and Other Embedded Technologies: Who Owns the Data?*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 695, 696 (2006) (explaining RFID tags could be as small as a grain of sand). As RFID tags become smaller and cheaper, they could entirely replace bar codes. See Jerry Kang & Dana Cuff, *Pervasive Computing: Embedding the Public Sphere*, 62 WASH. & LEE L. REV. 93, 98 (2005).

237. Charles J. Condon, *RFID and Privacy: A Look at Where the "Chips" Are Falling*, 11 APPALACHIAN J.L. 101, 101 (2011) ("[U]sing RFID technology for tagging pallets or shipping containers is fairly uncontroversial.").

238. See *id.* at 103 (explaining RFID captures the location of goods automatically even as they are loaded and unloaded multiple times throughout shipment); Mark Roberti, *How Is RFID Used in Shipping Containers?*, RFID J. (Jan. 23, 2015), <http://www.rfidjournal.com/blogs/experts/entry?11307> [https://perma.cc/8L6S-3VCM].

239. See Nick Ford, *How We Built an IoT Application in 10 Days Using Watson IOT and IBM Blockchain*, MENDIX (Jan. 31, 2018), <https://www.mendix.com/blog/built-iot-application-10-days-using-watson-iot-ibm-blockchain/> [https://perma.cc/HD5X-VSCC].

240. See Smith, *supra* note 236, at 696; see also Andrew Guthrie Ferguson, *The Internet of Things and the Fourth Amendment of Effects*, 104 CALIF. L. REV. 805, 814 (2016) ("A company could track a widget from production in China, to assembly in Indonesia, to sale in America.").

241. See Roberti, *supra* note 238 (explaining that companies usually have little knowledge of the status of goods throughout the shipment process). There is always the risk that the IOT technology could become faulty during shipment, such as a temperature sensor that goes bad. See generally Stephen Lawson, *Worm on the Sensor: What Happens When IoT Data Is Bad?*, COMPUTERWORLD (Dec. 16, 2016, 9:24 AM),

<https://www.computerworld.com/article/3151402/internet-of-things/worm-on-the-sensor-what-happens-when-iot-data-is-bad.html>
[https://perma.cc/F79E-2H9C].

3. Sensors, Actuators, and Oracles

Sensors and actuators enhance RFID and IOT capabilities.²⁴² Sensors collect information and data,²⁴³ which can be accompanied by actuators that are able to implement decisions.²⁴⁴ For example, actuators can react to things like weight, temperature, and moisture.²⁴⁵ A sensor can detect if the temperature goes out of range, and then the actuator can send a signal to cool the temperature back down.²⁴⁶ As a result, IOT can sense, process, and respond to data without the need for human intervention.²⁴⁷ Due to this continuous knowledge and situational awareness, companies can compare the current state of the physical environment with its predicted future state.²⁴⁸

Oracles are specifically designed to work with RFID sensors and smart contracts.²⁴⁹ Blockchain is limited to the data in its own network,

242. See Paez & La Marca, *supra* note 216, at 34 (explaining that devices like sensors enhances the traditional IOT capabilities).

243. *Frequently Asked Questions*, RFID J., <http://www.rfidjournal.com/site/faqs#Anchor-54325> [<https://perma.cc/65T9-MSHG>] (last visited Nov. 3, 2018) (“Some companies are combining RFID tags with sensors that detect and record temperature, movement, even radiation.”). Once this information is collected, the data can be transmitted to a computer. *See id.*

244. See *The Internet of Things*, *supra* note 20, at 21 (analogizing that sensors act as the “eyes” to collect information while actuators act as the “hands” to implement decisions).

245. Kang & Cuff, *supra* note 236, at 98-99 (“More important is that these systems, small enough to be unobtrusive, can detect sight, sound, weight, pressure, heat, moisture, acceleration, electromagnetic radiation, or the existence of specific particulates.”).

246. See Josias Dewey, *Lending & Secured Finance 2018 | Trade Finance on the Blockchain: 2018 Update*, INT’L COMP. LEGAL GUIDES (Nov. 4, 2018), <https://iclg.com/practice-areas/lending-and-secured-finance-laws-and-regulations/19-trade-finance-on-the-blockchain-2018-update> [<https://perma.cc/SK7S-SP7E>].

247. See Kang & Cuff, *supra* note 236, at 99.

248. See Sona R. Makker, *Overcoming ‘Foggy’ Notions of Privacy: How Data Minimization will Enable Privacy in the Internet of Things*, 85 UMKC L. REV. 895, 898 (2017).

249. Gideon Greenspan, *Why Many Smart Contract Use Cases Are Simply Impossible*, COINDESK, <https://www.coindesk.com/three-smart-contract-misconceptions/> [<https://perma.cc/85NQ-KHX3>] (last updated Apr. 18, 2016, 16:41 UTC) (“Instead of a smart contract initiating the retrieval of external data . . . ‘oracles’ create[] a transaction which embeds that data in the chain.”); see also *Smart Oracles – How Blockchains Communicate With Outside World*, SOFOCLE TECH., <https://www.sofocle.com/smart-oracles->

but oracles provide the means to link outside IOT conditions to smart contracts.²⁵⁰ For example, an oracle could send information about the temperature of the goods to the smart contract.²⁵¹ Provided that the temperature meets the condition specified in the smart contract, the smart contract would automatically trigger an event, such as payment.²⁵² Following this logical chain, oracles enhance the benefits of smart contracts through their ability to connect with the outside world.²⁵³

Blockchain and smart contracts are helping to modernize trade finance, including potential applications involving letters of credit.²⁵⁴ Although IOT is a more recent development in the financial industry,²⁵⁵ 2016 marked the first successful international transaction that combined blockchain, smart contracts, and IOT.²⁵⁶ Importantly, this was a letter-of-credit transaction.²⁵⁷ Thus, parties should continue to utilize these technologies in letter-of-credit transactions to unveil further benefits and improve the letter-of-credit process.²⁵⁸

how-blockchains-communicate-outside-world/ [https://perma.cc/CS4F-XVGN] (last visited Nov. 19, 2018) [hereinafter *Smart Oracles*]. Oracles are sometimes called auditors. See *Case Study 3: Chain of Shipping*, CHAIN THINGS, <https://www.chainofthings.com/cs3chainofshipping/> [https://perma.cc/4VEW-APUP] (last visited Nov. 19, 2018).

250. See HANSEN, ROSINI & REYES, *supra* note 202, at 3; see also *What's a Blockchain Oracle?*, *supra* note 218.

251. See *Smart Oracles*, *supra* note 249.

252. See *id.*

253. See Greenspan, *supra* note 249.

254. See Lehmacher & McWaters, *supra* note 166 and accompanying text.

255. Abhi Ag, *Banking on the Internet of Things IoT*, FINEXTRA (Oct. 6, 2015), <https://www.finextra.com/blogs/fullblog.aspx?blogid=11676> [https://perma.cc/N4JD-JLLH].

(“While many industries may have already grasped and embraced its benefits, the financial services industry is just beginning to see how *IoT* can propel the industry to the next level.”)

256. See James Evers, *CBA Blockchain Deal Creates the Future of Trade Finance*, FIN. REV., <https://www.afr.com/technology/cba-blockchain-deal-creates-the-future-of-trade-finance-20161021-gs7w98> [https://perma.cc/G9XZ-WLMW] (last updated Oct. 24, 2016). In this transaction, Commonwealth Bank of Australia and Wells Fargo used blockchain, smart contracts, and IOT to track cotton. See *id.*; see also Carlo R.W. De Meijer, *Blockchain: Accelerated Activity in Trade Finance*, FINEXTRA (Jan. 26, 2017), <https://www.finextra.com/blogposting/13593/blockchain-accelerated-activity-in-trade-finance>.

257. See Evers, *supra* note 256.

258. See *The Future of Trade Finance?*, *supra* note 209.

III. MODERNIZING LETTERS OF CREDIT

Blockchain, smart contracts, and IOT make the letter-of-credit process more efficient; as such, the traditional letter-of-credit steps must correspondingly be modified.²⁵⁹ The applicant will be primarily responsible for drafting the terms of the letter of credit, which should also include the conditions IOT will track.²⁶⁰ The steps for determining documentary compliance should be dependent on whether a document is automatically generated or manually uploaded, along with whether IOT detects a problem with the condition of the goods.²⁶¹ Finally, a smart contract should issue installment payments to the beneficiary after each document is confirmed to meet documentary compliance.²⁶² These changes will give the applicant and beneficiary more control over the goods throughout the shipment process without overstepping the dual goals of the independence principle and the strict compliance principle.²⁶³

A. Creating the Letter of Credit

A blockchain and smart contract-based letter of credit diverge from a traditional letter of credit in two ways.²⁶⁴ First, the applicant no longer fills out the preliminary application that the issuer would traditionally use to draft the letter of credit.²⁶⁵ Instead, the applicant drafts the letter of credit using a standard template provided by the bank and puts it on the blockchain.²⁶⁶ Second, the applicant would also need to include IOT terms in the letter of credit.²⁶⁷ For example, the

259. See *The Seven Steps to a Blockchain-Based Letter of Credit (LC) Transaction*, *supra* note 169 (explaining seven steps to a blockchain letter of credit).

260. See *infra* Section III.A.

261. See *infra* Sections III.B-III.C.

262. See *infra* Section III.D.

263. See Fearn, *supra* note 22.

264. See *supra* Section I.B.1.

265. See Kozolchyk, *supra* note 82, at 288.

266. Cf. *id.* (explaining the applicant could draft and send the letter of credit to the issuer through a computer terminal).

267. Cf. McLaughlin, *supra* note 11, at 1199 (explaining the applicant will specify the conditions that must exist in order for the beneficiary to get paid). Similarly, because some of these terms will be used for smart contracts, it is crucial that the terms are drafted clearly and precisely. Sklaroff, *supra* note 206, at 277 (“As a result, the transactional relationship created by a smart contract between two firms must be completely formed and precisely defined, eliminating forms of flexibility that are crucial to the contracting process.”).

letter of credit might specify that the temperature of the container cannot exceed twenty degrees Fahrenheit.²⁶⁸ The letter of credit would also include the INCOTERM that governs the transaction, as the INCOTERM dictates who bears the risk of loss of goods that are tracked by IOT along the transaction.²⁶⁹ Thus, the applicant would have the primary control and responsibility of drafting the letter of credit, as the applicant is more knowledgeable than the issuer about the terms that need to be included in the letter of credit based on the underlying sales contract.²⁷⁰

After drafting the letter of credit, the applicant uploads the document on the blockchain for the issuer to approve, deny, or suggest changes.²⁷¹ International transactions involve third parties like customs, ports, and possibly even the United States Department of Agriculture.²⁷² Therefore, the issuer still plays an important role in ensuring the letter of credit accounts for these third parties and any related documents, such as federal phytosanitary inspection certificates.²⁷³

Once the letter of credit is finalized, the issuer adds the respective parties to the permissioned blockchain.²⁷⁴ Blockchain need not be limited to the applicant, beneficiary, and issuer;²⁷⁵ the bank can also include third parties that are not directly related to the letter-of-

268. See *Case Study 3: Chain of Shipping*, *supra* note 249.

269. See *supra* notes 121-22 and accompanying text (explaining INCOTERMS).

270. See McLaughlin, *supra* note 11, at 1198 (“This [sales] contract is the underlying transaction that will ultimately generate the letter of credit.”). This also means any ambiguities in the letter of credit would be resolved against the applicant, not the issuer. See *supra* note 84 and accompanying text (explaining ambiguities are resolved against the drafter).

271. See *The Seven Steps to a Blockchain-Based Letter of Credit (LC) Transaction*, *supra* note 169; cf. Kozolchyk, *supra* note 46, at 78 (suggesting that if the bank proposes changes the process would go back and forth until the parties agree on terms for the letter of credit).

272. See *International Affairs*, U.S. DEP’T. AGRIC., <http://www.fsis.usda.gov/internationalaffairs> [https://perma.cc/2SKL-6477] (last updated Nov. 27, 2018) (explaining that the Food Safety and Inspection Service within the USDA “insures that meat, poultry, and egg products imported to the United States are produced under standards equivalent to U.S. inspection system, and facilitates the certification of exported goods”); IBM Research, *supra* note 80.

273. See *supra* note 80 and accompanying text.

274. See Walch, *supra* note 186, at 720 (explaining that permissioned blockchain is private, rather than public).

275. See Dolan, *supra* note 35, at 1037.

credit transaction.²⁷⁶ Importantly, the issuer is able to control and limit the information available to third parties.²⁷⁷ For example, the issuer could ensure that the government entity that uploads the phytosanitary certificate is only able to see that part of the transaction and nothing before or after, such as the creation of the letter of credit.²⁷⁸ Accordingly, blockchain is particularly useful for transactions that involve multiple parties and communications.²⁷⁹

B. Situation One: Using Blockchain, Smart Contracts, and IOT for Documentary Compliance

A blockchain system eliminates the need for physical presentation.²⁸⁰ Before the beneficiary ships perishable goods to the applicant, each pallet or item²⁸¹ is equipped with an active RFID tag, a sensor,²⁸² and a GPS device.²⁸³ Once the goods are loaded onto the shipping container, a smart contract generates a bill of lading based on the RFID data.²⁸⁴ Parties should opt for documents that are generated by the blockchain because blockchain data is tamper-proof;²⁸⁵ pre-generated documents ensure the information reflects the reality of the

276. See BLOCKCHAIN FOR TRADE FINANCE, *supra* note 226, at 9.

277. See *supra* notes 186-87 and accompanying text.

278. See IBM Research, *supra* note 80.

279. See *ZIM Trials Blockchain Bill of Lading*, *supra* note 166 (explaining that Maersk discovered that shipping refrigerated goods from East Africa to Europe could involve thirty people and 200 interactions).

280. BLOCKCHAIN FOR TRADE FINANCE, *supra* note 226, at 12 (“Blockchain technology eliminates the need for physical presentation of documents, making the process faster and more transparent for trading parties. It also ensures that all participants have visibility into the process and can peruse the documents presented by the seller.”).

281. See Gaukler & Seifert, *supra* note 230, at 30. Due to its limited abilities, active tags are preferred over passive tags. See *Active RFID Tags in Data Center Asset Management: A Quick Overview*, RF CODE (Aug. 29, 2013), <https://www.rfcode.com/data-driven-data-center/bid/312417/active-rfid-tags-in-data-center-asset-management-a-quick-overview> [<https://perma.cc/G979-ZGU>] (explaining that Cisco opted to use active tags because a stationary reader could automatically transmit data, whereas passive tags would have required workers to manually scan tags due to their limited readability distance).

282. See Swedberg, *supra* note 235.

283. See *Can RFID Be Used to Track the Movements of Goods Across the Country?*, *supra* note 229 (explaining the GPS device is what allows real-time tracking).

284. See Southurst, *supra* note 199.

285. See Shackelford & Myers, *supra* note 191, at 355.

goods, therefore mitigating the risk that a document is fraudulent.²⁸⁶ However, when blockchain cannot pre-generate a document like a phytosanitary certification due to the limitations of IOT, the third party would need to manually upload the document to the blockchain.²⁸⁷

Regardless of whether a document is automatically generated or manually uploaded, a blockchain system reduces the issuer's role in determining documentary compliance because the issuer only gets involved if something goes wrong.²⁸⁸ Through consensus, the blockchain first verifies the information of the document with the terms of the letter of credit.²⁸⁹ If there are no discrepancies, the blockchain notes that the document is in compliance, and a smart contract would authorize the goods to proceed to the next step in the transaction without any interruption or involvement by the issuer.²⁹⁰ If there is a discrepancy that is not related to the temperature of the goods, the blockchain notifies the issuer.²⁹¹ The issuer has the final say on whether the document is in compliance, based on standard banking practices.²⁹² Should the issuer determine the document is not in compliance, the issuer has the discretion of allowing the applicant to waive the discrepancy.²⁹³ The issuer would favor having limited

286. Compare *Smart Contracts in Financial Services: Getting from Hype to Reality*, *supra* note 183, at 2 (“Reliance on physical documents leads to delays, inefficiencies and increases exposure to errors and fraud.”) with *Blockchain-Based Bill of Lading (B/L) Documents for Global Trade*, CARGO X, <https://cargox.io/welcome/> [<https://perma.cc/4WBJ-L5Z6>] (last visited Nov. 28, 2018) (explaining that a blockchain-based bill of lading is the equivalent to a paper-based bill of lading, but is more secure and becomes immediately available to the applicant once certain conditions are met). This is, of course, assuming that the IOT data is accurate. See *supra* note 241 and accompanying text.

287. See *Letter of Credit Trade Finance Using Blockchain*, *supra* note 198.

288. See Persio, *supra* note 169.

289. See Wright & De Filippi, *supra* note 192, at 7.

290. See Sklaroff, *supra* note 206, at 273 (arguing smart contracts with blockchain are ideal because they can “instantaneously effect an exchange of goods based on the satisfaction of specified conditions”).

291. See George Moakley, *Smart Freight Technology Powered by the Internet of Things*, INTEL 2 (2016), <https://www.intel.com/content/dam/www/public/us/en/documents/solution-briefs/smart-freight-technology-powered-by-the-internet-of-things.pdf> [<https://perma.cc/8AFK-TTA8>].

292. See U.C.C. § 5-108(e); UCP 600, *supra* note 34, art. 14(d).

293. Fama, Jr., *supra* note 141, at 1527 (“The bank *may* consult the customer when it has received documents that do not comply exactly.”) (emphasis added). However, especially in cases where the discrepancy is

involvement, as banks often express concern about exercising any degree of discretion when checking for documentary compliance.²⁹⁴

Similarly, the applicant is able to see the updated ledger, so the issuer no longer has to inform the beneficiary of whether the documents are in compliance.²⁹⁵ Therefore, the applicable question becomes: How long does the issuer have to make a decision of whether it will allow the applicant to waive the discrepancy?²⁹⁶ The issuer will be reviewing only one document at a time and will have fewer documents to review compared to a traditional, paper-based letter-of-credit transaction as an aggregate amongst all of its customers.²⁹⁷ Consequently, the issuer should not need seven days, or even five days, to determine whether the applicant will be able to waive the discrepancy.²⁹⁸ Reducing the amount of time the issuer has to make the decision further aids in making the letter-of-credit process more efficient.²⁹⁹

Arguably, incorporating conditions like temperature or weight violates the independence principle.³⁰⁰ When the issuer is able to review a document—either because IOT does not detect a problem or when a third party contract is involved—the issuer traditionally should

minor, the applicant should have the opportunity of waiving the discrepancy. See BLOCKCHAIN FOR TRADE FINANCE, *supra* note 226, at 5 (emphasizing that the issuer is generally able to deny payment for “trivial” discrepancies).

294. See Moses, *supra* note 99, at 45-46 (suggesting that because lower level clerks usually determine documentary compliance, the issuer prefers to have as little discretion as possible).

295. *How Blockchain Can Revitalize Trade Finance*, *supra* note 182, at 9 (“Blockchain technology also lends itself to easier dispute resolution as immutable contract information is preserved and made accessible to all parties on the blockchain.”).

296. See Moses, *supra* note 99, at 49 n.121 (noting that the issuer has two means of exercising discretion in a letter of credit, one of which is whether to allow the applicant the opportunity to waive a discrepancy).

297. See U.C.C. § 5-108 cmt. 2 (explaining the number of documents an issuer has to review plays a role in determining what is considered “reasonable”). For example, it would be unreasonable for a beneficiary to require the issuer to check the document while the beneficiary waited in the lobby. See *id.*

298. See *supra* notes 93-94 and accompanying text.

299. Persio, *supra* note 169 (“[S]peedier transaction times can allow greater efficiency in handling trade.”).

300. Moses, *supra* note 99, at 46 (“Application of the independence principle means that the agreement between the buyer and the seller (the underlying sale of goods contract) is not to be considered when the issuer determines whether the documents presented under the letter of credit strictly comply.”).

not get involved with the underlying contract.³⁰¹ As long as the documents reflect the letter-of-credit terms, it would be irrelevant whether the goods are at the correct temperature³⁰² or whether the seller shipped nonconforming goods.³⁰³ The issuer must honor the letter of credit, and the applicant would need to seek its own judicial remedy.³⁰⁴

As with traditional paper-based letter-of-credit transactions, the issuer is not making any investigation or inspection as to the quality of the goods.³⁰⁵ The issuer is not an expert in the many various industries its customers are in and would have to charge customers for this expertise, making the letter of credit inefficient and unnecessarily costly.³⁰⁶ IOT solves the concern that banks should not be compelled to investigate and verify facts outside their normal business.³⁰⁷ In the proposed model, IOT is the source of knowledge and requires no expertise from the bank.³⁰⁸

The strict compliance principle also still applies in the proposed model.³⁰⁹ The data from the blockchain are reflected in the documents, so the bank is still adhering to the rule about only dealing with documentary conditions.³¹⁰ In addition, the basis for the strict compliance principle is that the issuer should not impose its own

301. Leon, *supra* note 1, at 442 (“The key to all letters of credit and the essential reason they are so useful is that the issuer’s obligations are independent of the underlying contract.”).

302. Johns & Blodgett, *supra* note 91, at 300. (“[P]roper demand means formally proper demand, not necessarily substantively proper demand.”).

303. *See id.* at 301 (explaining one of the purposes of a letter of credit is to “keep such injunctions at bay”).

304. *Cf.* McLaughlin, *supra* note 100, at 160 (arguing that in a deferred letter of credit, the bank would accept the documents and if the importer ended up receiving fraudulent goods, it could sue the exporter and “attach the proceeds of the deferred payment credit as part of that suit”).

305. *See* McLaughlin, *supra* note 11, at 1201.

306. *See id.* at 1201-02.

307. Mead, *supra* note 1, at 300 (“The bank[ers] are not dealers in goods and may be wholly unfamiliar with the commodities for which they pay.”).

308. *See* Ford, *supra* note 239 (demonstrating how data can be displayed through a user-friendly timeline that allows non-experts, such as cargo employees, to understand data).

309. *See supra* notes 88-92 and accompanying text (explaining the strict compliance principle).

310. *See supra* note 91 and accompanying text; *see also* Mead, *supra* note 1, at 309.

subjective opinions on the underlying contract.³¹¹ The documents that are produced through the blockchain and IOT are objective facts.³¹² In fact, these technologies help the issuer adhere to the strict compliance principle because computers are more objective than humans.³¹³ Further, these technologies help parties detect potential documentary discrepancies.³¹⁴ When there is a discrepancy, parties should follow the traditional waiver process whenever possible, but letter-of-credit law should provide an exception when these technologies discover a discrepancy in the temperature of the goods.³¹⁵

C. Situation Two: Help, the Temperature Went Out of Range

Research shows that many discrepancies go beyond violating the letter-of-credit terms; they also violate the underlying sales contract.³¹⁶ IOT can detect a discrepancy in the temperature of goods at any point along the supply chain.³¹⁷ Take, for example, a mango shipment where the temperature goes out of range.³¹⁸ Without IOT, the applicant may not waive the discrepancy because the mangoes would spoil.³¹⁹ However, with IOT, the focus shifts from waiving the discrepancy to fixing the discrepancy.³²⁰ Therefore, it is crucial that once IOT detects

311. See Dolan, *supra* note 101, at 20 (explaining that with the strict compliance principle, “the function of the issuing bank is ministerial”).

312. See Paez & Marca, *supra* note 216, at 31.

313. R. David Whitaker, *Letters of Credit and Electronic Commerce*, 31 IDAHO L. REV. 699, 704 (1995) (“[A] computer is far less forgiving of discrepancies than a human document checker.”); see also BLOCKCHAIN FOR TRADE FINANCE, *supra* note 226, at 5 (explaining ambiguities may lead the issuer to deny documentary compliance even though the beneficiary complied with the underlying sales contract).

314. See BLOCKCHAIN FOR TRADE FINANCE, *supra* note 226, at 9.

315. See Moakley, *supra* note 291, at 2 (explaining the importance of goods maintaining a consistent temperature throughout the shipment process).

316. See Mann, *supra* note 3, at 2503.

317. See Moakley, *supra* note 291, at 2 (noting parties can deal with problems in real-time and change the order if necessary).

318. See *id.*

319. See *id.*

320. Compare Roy Becker, *Working with the Importer to Waive Letter of Credit Discrepancies*, SHIPPING SOLUTIONS BLOG (Apr. 2, 2018), <https://www.shippingsolutions.com/blog/working-with-the-importer-to-waive-letter-of-credit-discrepancies> (explaining that an individual will waive the discrepancy simply to get the goods) with Moakley, *supra* note 291, at 2 (explaining that for a mango shipment, it would be important for the food supplier to take action to ensure the mangoes do not spoil).

a discrepancy, the beneficiary is able to take immediate action if desired.³²¹

To take full advantage of blockchain, smart contract, and IOT technology, the blockchain should immediately send a notification to the issuer and beneficiary if the temperature goes out of range.³²² Assuming the beneficiary still bears the risk of loss at that point in the shipment,³²³ the beneficiary would have two options: wait for the issuer to decide whether to allow the applicant to waive the discrepancy³²⁴ or attempt to cure the defect before the applicant decides whether to waive or not.³²⁵ Although the latter option is untraditional, allowing a beneficiary to cure a defect is one of the goals in a letter of credit, particularly in the UCP.³²⁶

Alternatively, in combination with sensors, parties could use actuators to implement decisions.³²⁷ For example, instead of just sending a signal for someone to check on the goods if they go out of the specified temperature range, actuators would automatically change the internal temperature so that it is in compliance.³²⁸ Theoretically, this compliance should substantially reduce or even eliminate any discrepancies within the letter of credit.³²⁹

When IOT detects a problem, allowing the beneficiary to overstep the issuer by attempting to cure the defect yet again arguably violates the independence principle.³³⁰ Importantly, the applicant and beneficiary purposely entered into the letter of credit so that the issuer

321. See Moakley, *supra* note 291, at 2.

322. See Ford, *supra* note 239 (explaining that users could get push notifications for when an abnormal event, such as temperature, is detected by sensors).

323. See *supra* note 122 and accompanying text (explaining that based on the INCOTERM, the risk will shift to the applicant at a certain point in the transaction).

324. See *supra* note 98 and accompanying text.

325. See *supra* note 99 and accompanying text (explaining how a beneficiary can remedy the situation by curing a defect).

326. See Ronner, *supra* note 26, at 661.

327. See *The Internet of Things*, *supra* note 20, at 21.

328. See Dewey & Emerson, *supra* note 190, at 114.

329. See Walter Baker, *Dealing with Letter of Credit Discrepancies*, 102 BUS. CREDIT 42, 43 (2000).

330. See *supra* Section III.B (explaining the letter of credit is between the issuer and beneficiary, not the applicant and beneficiary).

would stand in as an intermediary.³³¹ If there is a problem with the goods, the applicant should sue the beneficiary in a contract claim.³³²

However, the temperature of the goods goes to the underlying sales contract, not the letter of credit.³³³ If the issuer had the right to ask the applicant whether it wants to waive the discrepancy, this would violate the independence principle, as the issuer is not allowed to consider the quality of the goods.³³⁴ Similarly, allowing the issuer to be involved would also violate the strict compliance principle because the sales contract is separate from the documents the beneficiary must provide per the letter-of-credit terms,³³⁵ such as the bill of lading in Situation One.³³⁶ Therefore, IOT simply gives the applicant and beneficiary more power to control what they contracted for in the underlying sales contract.³³⁷ Blockchain, smart contracts, and IOT can also help facilitate the final step in a letter of credit transaction—payment.³³⁸

D. The Modified Sight Draft

Because documentary compliance is directly tied to payment, both are treated as an all-or-nothing concept.³³⁹ If all of the documents are in compliance, under a sight draft, the beneficiary gets paid in full,

331. Chmielewska, *supra* note 14, at 497 (“[T]he issuing bank may be seen as an intermediary expert who — solely upon examination of the documents — ascertains whether the seller has duly performed his contractual obligations.”).

332. See McLaughlin, *supra* note 17, at 508-09 (explaining the applicant could sue the beneficiary for breach of warranty).

333. See Austin, *supra* note 5, at 930.

334. See Mead, *supra* note 1, at 300.

335. Sandler & Di Ferrante, *supra* note 10, at 621 (“Most importantly, there must be compliance in furnishing the *precise documents* specified in the letter of credit.”).

336. See *supra* note 79 and accompanying text.

337. See McLaughlin, *supra* note 17, at 505 (emphasizing that obligations arising under other contracts “constitute conditions precedent for the existence of the letter of credit”).

338. See *The Future of Trade Finance?*, *supra* note 209; BLOCKCHAIN FOR TRADE FINANCE, *supra* note 226, at 8.

339. Sandler & Di Ferrante, *supra* note 10, at 621 (“All parties should be certain that if the documents conform, the bank will pay, while if they do not conform, the bank will dishonor.”).

which often occurs before the applicant receives the goods.³⁴⁰ To safeguard against the risk that the beneficiary shipped fraudulent goods, the applicant is encouraged to require a pre-shipment inspection certificate to ensure the quality of the goods prior to shipping.³⁴¹ However, the applicant would not discover subsequent problems until it receives the goods³⁴² and likely after the applicant pays the full amount under the letter of credit.³⁴³

Although the applicant would likely be able to inspect the goods in a time draft or deferred obligation—before the obligation to pay under the letter of credit is triggered³⁴⁴—the beneficiary must await payment or discount the draft in order to get paid earlier.³⁴⁵ Moreover, a time draft or deferred payment obligation is risky for the issuer because if the applicant refuses to pay the beneficiary after inspecting the goods, the issuer is still obligated to pay the beneficiary under the letter of credit.³⁴⁶ Therefore, there is an inherent conflict between promptly paying the beneficiary and ensuring the applicant receives the goods that it contracted for.³⁴⁷

Blockchain, smart contracts, and IOT solve many of these competing interests and significantly increase the flexibility available to the parties in allocating risk of defective performance or risk of loss

340. *See id.* at 616 (explaining the buyer might have to pay before receiving the goods and thus, being able to inspect them). This is because payment against a letter of credit is usually by sight drafts. *See id.* at 629.

341. *Cf.* D’Ascenzo, *supra* note 120, at 1122-23 (explaining that an inspection by a third-party should make the buyer feel more comfortable against any doubts about what the seller is shipping and that the inspection usually occurs before transporting to the buyer).

342. *See* Ford, *supra* note 239 (“Whilst in transit, there are many factors that can adversely affect cargo, such as exposure to light, temperature increases and decreases, movement, and humidity to name a few.”); *see also* Roberti, *supra* note 238 (“Typically, companies have a pretty good sense of what they have in inventory, but once they put products into a shipping container and send it off, they have very little visibility into where those items are located and what is happening to them at any given time.”).

343. *See* Justice, *supra* note 9, at 429 (explaining that the applicant must pay the draft before receiving the shipping documents).

344. *See* Dole, Jr., *supra* note 10, at 746.

345. *See* Sandler & Di Ferrante, *supra* note 10, at 634-35.

346. *See supra* notes 137-138 and accompanying text.

347. *See* Dolan, *supra* note 101, at 18 (noting that the exporter wants “[p]rompt and certain payment”); Justice, *supra* note 147, at 506 (explaining that although an additional cost, the applicant should obtain an inspection certificate to prevent risk of loss).

in shipment.³⁴⁸ The applicant no longer needs to inspect the goods upon delivery because the applicant is able to track the goods in real time throughout the shipment process.³⁴⁹ Additionally, documentary compliance would be determined on a per-document basis,³⁵⁰ so the beneficiary no longer needs to get paid in one lump sum.³⁵¹

In combination with one another, blockchain, smart contracts, and IOT³⁵² can create a new payment obligation—a modified sight draft—that combines the benefits of a sight draft and the time draft or deferred payment obligation.³⁵³ In a modified sight draft, a smart contract would automatically issue an installment payment after each document is deemed to be in compliance.³⁵⁴ For example, if the letter of credit indicates that the beneficiary must provide four documents and the full letter of credit is \$40,000, each installment would be in the amount of \$10,000.³⁵⁵ Allocating an equal amount to each document would be the default rule unless the parties specify otherwise in the letter of credit.³⁵⁶ In total, this proposed modified sight

348. See Eyers, *supra* note 256 (explaining that parties can now determine in real-time who is responsible for the loss).

349. DACOSTA, *supra* note 214, at 23 (“Meaning may be extracted from data in real time.”).

350. See *supra* note 297 and accompanying text. Under the traditional steps to a letter of credit, the beneficiary would usually give the bank all of the documents along with the letter of credit, and once the beneficiary receives payment, would be done with its end of the bargain. See Mead, *supra* note 1, at 300.

351. See Sandler & Di Ferrante, *supra* note 10, at 614 (explaining that the issuer pays the “face amount”).

352. *The Future of Trade Finance?*, *supra* note 209 (“On their own, each of the three emerging technologies holds huge promise . . . [b]ut it is the interplay between emerging technologies where we see exponential possibilities.”).

353. See Sandler & Di Ferrante, *supra* note 10, at 616 (explaining that unlike in a sight draft, in a delayed payment situation, the applicant can inspect the goods before paying).

354. Cf. Meijer, *supra* note 256 (explaining that a case where companies shipped cotton from Texas to China, geographical location triggered a smart contract to release payment).

355. Cf. Eberth & Ellinger, *supra* note 10, at 389 (“Furthermore, in many [deferred obligation] cases payment is due in installments, e.g., 30% of the amount of the credit payable within 30 days after shipment, a further 30% 90 days after that date, and the remaining 40% after the actual delivery of the goods but not later than six months following the date of the bill of lading.”).

356. See U.C.C. § 5-101 cmt. 1 (stating the statute is intended to provide a framework for letters of credit while “preserving flexibility through variation by agreement in order to respond to and accommodate

draft provides a compromise between the timing of delivery versus payment.³⁵⁷

Blockchain, smart contracts, and IOT expand what a letter of credit is able to accomplish.³⁵⁸ IOT is not arbitrary data; it reflects the true condition of the goods as they move through commerce.³⁵⁹ Therefore, these technologies help the applicant and beneficiary accomplish the goals of the underlying sales contract;³⁶⁰ these technologies also aid in determining documentary compliance—a fundamental step in a letter of credit—all without violating the independence principle or the strict compliance principle.³⁶¹ Moreover, paying the beneficiary through installments satisfies the applicant's commitment to pay the beneficiary but not pay in full until the goods are delivered in accordance with the underlying sales contract.³⁶² Thus, this new letter-of-credit process strikes the right balance between increasing commercial efficiency and remaining true to the basic principles under a letter of credit.³⁶³

developments in custom and usage that are not inconsistent with the essential definitions and substantive mandates of the statute.”).

357. Cf. Eberth & Ellinger, *supra* note 10, at 396 (explaining that even in a deferred payment obligation where payment does not occur at the same time as the presentation of documents, the beneficiary is still assured it will be paid). For example, in the proposed modified sight draft, installment payments mean the beneficiary does not need to discount the draft to get paid earlier, which is present in time drafts and deferred payment obligations. See *supra* note 105 and accompanying text.

358. See *The Future of Trade Finance?*, *supra* note 209.

359. See Moakley, *supra* note 291, at 2.

360. *Fostering the Advancement of the Internet of Things*, *supra* note 167, at 9 (“IoT technologies will generate data that helps companies make more-informed decisions, which in turn can improve efficiency, productivity, management, and quality control, regardless of the industry.”); see also *Exploring the Next Technology Frontier*, *supra* note 21 (“More information can mean the difference between a recall and a successful shipment.”).

361. See *supra* Sections III.B-C.

362. See Dolan, *supra* note 101, at 27 (explaining that the beneficiary may be less willing to enter into agreements with the applicant if the beneficiary does not feel assured that it will receive prompt payment); Sklaroff, *supra* note 206, at 279 (“Smart contracts are useful because they eliminate the possibility of breach, forcing parties to honor their original agreements.”).

363. Ronner, *supra* note 26, at 622 (“The quest for certainty and efficiency also surfaces in a substantive area of the law, which governs particular disputes that arise out of letter of credit transactions.”); see also Chmielewska, *supra* note 14, at 498 (“[A]ny legal conceptualization of the documentary credit should preserve a sensitive balance between securing the

CONCLUSION

It is crucial that commercial actors and banks consider how FinTech can modernize trade finance, including letters of credit.³⁶⁴ Before technologies like blockchain, smart contracts, and IOT, the independence principle was rightfully steadfast, as the issuer could not inspect the goods.³⁶⁵ Consequently, the applicant and beneficiary were helpless, and the letter-of-credit system heavily relied on the applicant waiving discrepancies.³⁶⁶

Now, with blockchain, smart contracts, and IOT, the underlying sales contract can coexist alongside the letter of credit.³⁶⁷ These technologies help facilitate the documentary compliance step in the letter-of-credit process by linking compliance with performance.³⁶⁸ In addition, these technologies allow the applicant and beneficiary to make informed decisions about the goods throughout the shipment process.³⁶⁹ Meanwhile, there is little to no need for an issuer,³⁷⁰ as for the most part, blockchain, smart contracts, and IOT are mostly able to replace the issuer's main responsibility in a letter of credit—to act as an intermediary between the parties in effectuating payment.³⁷¹ A modified sight draft links payment with performance, thus

interests of all participants; otherwise, the credit would not operate efficiently.”).

364. See Meijer, *supra* note 256.

365. See Mead, *supra* note 1, at 300.

366. See Mann, *supra* note 3, at 2513 (stating that even when a discrepancy involved the underlying sales contract, in 365 cases, only one did not waive the defect).

367. *Cf. id.* at 2500 (explaining that currently, a letter of credit is “wholly abstracted from the underlying transaction”).

368. *Id.* at 2505 (“If the system worked perfectly, documentary presentations would sort transactions based on the beneficiary’s performance: the documents would comply when the beneficiary had performed as agreed and the documents would not comply when the beneficiary had not performed as agreed.”); see also *id.* at 2496 (explaining that when documents do not conform to the letter-of-credit terms, the beneficiary must place its trust in the applicant to waive the defects).

369. See *Fostering the Advancement of the Internet of Things*, *supra* note 167, at 9.

370. See Dolan, *supra* note 101, at 20 (explaining that in accordance with the strict compliance principle, the issuer should have as “ministerial” of a role as possible in determining documentary compliance). Nevertheless, human involvement will always be needed to a certain degree, and the system must allow for this. Persio, *supra* note 169 (“It’s not complete automation that we’re seeking, it’s smarter automation.”).

371. See McJohn & McJohn, *supra* note 210, at 2, 11, 15.

neutralizing the risk between the applicant and beneficiary.³⁷² Because the beneficiary gets paid in installments, it has the incentive to cure any problems with the underlying goods, rather than anxiously wait to see if the applicant will waive the defect.³⁷³ Similarly, the applicant no longer has to waive the defect and pay the beneficiary in full even though it knows the goods do not comply with the underlying sales contract.³⁷⁴ In sum, a modified sight draft shifts the focus to the beneficiary curing the defect, rather than the beneficiary waiving the defect.³⁷⁵

Seeing that the main reason parties seek a letter of credit is due to a lack of trust,³⁷⁶ it follows that the industry should move to a truly “trustless” system with the least human involvement possible.³⁷⁷ Therefore, it is crucial that the industry incorporates blockchain, smart contracts, and IOT to ensure letters of credit remain a viable commercial credit mechanism for many decades in the future.³⁷⁸ In particular, a modified sight draft harmonizes two seemingly disparate concepts—ensuring the beneficiary performed properly under the

372. See Mann, *supra* note 3, at 2505-06.

373. See Moses, *supra* note 99, at 33 (explaining that because the majority of documents contain discrepancies, the viability of the letter-of-credit depends on the buyer waiving discrepancies, which would be the only way the beneficiary would get paid).

374. See Mann, *supra* note 3, at 2502-05, 2513 (noting that the applicant invariably waives discrepancies, even discrepancies which suggested that the beneficiary did not comply with the underlying sales contract, perhaps even to the point of default).

375. Cf. Margaret L. Moses, *The Irony of International Letters of Credit: They Aren't Secure, but They (Usually) Work*, 120 BANKING L.J. 479, 482 (2003).

376. Cronican, *supra* note 50, at 387 (“The seller feels comfortable completing the transaction with an unknown buyer because he knows that if he meets the LOC requirements he will receive payment from a reputable financial institution.”); see also Mann, *supra* note 3, at 2518.

377. Bagherinia, *supra* note 50 (“[S]ystems that check the consistency of documents with total accuracy, without any human intervention, are needed. These systems should be able to supersede humans.”).

378. See *Recap and Selected Highlights*, 2017 RETHINKING TRADE & FINANCE 15, 21 <https://cdn.iccwbo.org/content/uploads/sites/3/2017/06/2017-rethinking-trade-finance.pdf> [<https://perma.cc/P9FN-CZT2>] (noting that “[t]raditional trade finance remains important and relevant despite the long-anticipated disappearance of the Documentary Letter of Credit,” but that 80% of participants still believe traditional trade finance mechanisms will experience either no growth, little growth, or actually decline).

underlying sales contract while still ensuring that the letter-of-credit serves as a guaranteed right of payment to the beneficiary.³⁷⁹

379. See Mann, *supra* note 3, at 2505 (“As industry observers recognize, the poor fit between discrepancies and default suggests a problem with the letter-of-credit system.”); Moses, *supra* note 99, at 39 (stating there is a “disconnect between the seller’s performance of the underlying sales contract and the seller’s right to be paid under the letter of credit”).