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Smart Contracts in Traditional Contract Law, Or: The Law of the Vending Machine

Jonathan Rohr
University of Tennessee College of Law

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Recommended Citation

SMART CONTRACTS AND TRADITIONAL CONTRACT LAW, OR: THE LAW OF THE VENDING MACHINE

JONATHAN G. ROHR[*]

ABSTRACT

Smart contracts are the new norm, yet state legislatures and courts have not developed set rules and answers to legal disputes that these contracts create. Is traditional contract law sufficient? Or should we create an entirely new legislative or common law scheme to deal with these disputes? The common law has proven to be successful in dealing with new technologies and contracts, particularly because of its flexibility. Although a major overhaul may be in the future, there are still solutions that we can find today with the current legal landscape given the state of contract law and its evolution over time. One particularly analogous body of case law is instructive; the law of the vending machine. In the end, thinking about smart contracts as vending machines may be fruitful for the future of this evolving area of the law.

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> "Here the age of the machine is no mere abstraction; it presents itself in the shape of an instrument for the mass distribution of standard contracts."[1]

I. INTRODUCTION

In a relatively short period of time, "smart contracts" have entered the mainstream. Gone are the days in which excitement over blockchains and their ability to store code for automatic, future execution was the sole province of cypherpunks and other cryptography enthusiasts. Major players in a variety of sectors are beginning to consider the myriad ways that smart contracts, and distributed ledger technology more generally, can change the ways in which they transact business. A consortium of major banks—including HSBC, Barclays, and Credit Suisse—are collaborating on the development of a blockchain and smart contract based "settlement coin" designed to allow banks to clear and settle transactions between each other instantaneously.[2]

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[*] Assistant Professor of Law, University of Tennessee College of Law.

[1] Steven v. Fid. & Cas. Co. of N.Y., 377 P.2d 284, 298 (Cal. 1962).

[2] Michael Del Castillo, *Barclays, HSBC Join Settlement Coin as Bank Blockchain Test Enters New Phase*, COINDESK (Aug. 31, 2017), https://www.coindesk.com/hsbc-barclays-join-utility-settlement-coin-as-bank-blockchain-test-enters-final-phase/.

Meanwhile, logistics experts are exploring the potential for smart contracts to streamline and automate supply chain management.[3]

"Smart contract" is an unfortunate name for something that is not necessarily smart, or necessarily a contract. There is no official or universally accepted definition of the term,[4] but everyone agrees that there is "code" involved and that this code will be self-executing upon the occurrence of certain conditions. Smart contracts are most commonly identified with the Ethereum blockchain, a public blockchain which supports a Turing-complete coding language,[5] Solidity.[6] For purposes of this Essay, I use the term "smart contract" in a general sense to refer to a computer protocol (code) that is stored on a blockchain (or distributed ledger) and which will be automatically executed by the nodes on the blockchain's network upon the occurrence of specified conditions.[7] Although they can be, smart contracts are not necessarily *legal* contracts,[8] a distinction I will discuss below. Because of blockchain's immutability, smart contracts that have been uploaded to the blockchain take on a life of their own: they cannot be unilaterally stopped, delayed, or modified absent a fundamental change to the protocol of the blockchain on which the code resides or an "out" that was incorporated into the code from the outset.[9]

Given the sudden and very recent rise of blockchain technology and the close relationship between smart contracts and blockchain, smart contracts have a patina of newness. At least on a theoretical level (if not with regard to actual execution), smart contracts are a few decades old.[10] Nick Szabo, a legal scholar, software programmer, and cryptographer, first theorized and described smart contracts in a series of articles

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[3]   J. Dax Hansen et al., *More Legal Aspects of Smart Contracts Application*, PERKINSCOIE (March 13, 2018), https://www.perkinscoie.com/en/news-insights/more-legal-aspects-of-smart-contract-applications.html; *Blockchain Smart Contracts for Supply Chain*, GLOB. TRADE MAG. (July 24, 2017), http://www.globaltrademag.com/global-logistics/blockchain-smart-contracts-supply-chains.

[4]   *See* Hansen et al., *supra* note 3.

[5]   "[A] Turing-complete programming language lets you specify any functionality that is possible to program into a Turing machine, an abstract model of a computer that is believed to be capable of computing any function that can be computed at all." ARVIND NARAYANAN, ET AL., BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES: A COMPREHENSIVE INTRODUCTION 263 (2016).

[6]   PRIMAVERA DE FILIPPI & AARON WRIGHT, BLOCKCHAIN AND THE LAW 28 (2018); HENNING DIEDRICH, ETHEREUM: BLOCKCHAINS, DIGITAL ASSETS, SMART CONTRACTS, DECENTRALIZED AUTONOMOUS ORGANIZATIONS 211 (2016).

[7]   *See, e.g.*, DE FILIPPI & WRIGHT, *supra* note 6, at 3; Christopher D. Clack et al., *Smart Contract Templates: Foundations, Design Landscape and research directions*, ARXIV (Mar. 15, 2017), http://www.arxiv.org/abs/1608.00771; Josh Stark, *Making Sense of Blockchain Smart Contracts*, COINDESK (June 4, 2016), https://www.coindesk.com/making-sense-smart-contracts/.

[8]   *See, e.g.*, Hansen et al., *supra* note 3.

[9]   Jeremy M. Sklaroff, Note, *Smart Contracts and the Costs of Inflexibility*, 166 U. Pa. L. Rev. 263, 273 (2017); DIEDRICH, *supra* note 6, at 166–79.

[10]   Nick Szabo, *Formalizing and Securing Relationships on the Public Networks*, FIRST MONDAY (Sept. 1, 1997), http://firstmonday.org/ojs/index.php/fm/article/view/548/469-publisher=First.

he wrote in the mid-1990s.[11] In what has become a canonical piece of writing for blockchain enthusiasts—*Smart Contracts: Building Blocks for Digital Markets*—Szabo defined a smart contract as "a set of promises, specified in digital form, within which the parties perform on these promises."[12] In a subsequent essay—*Formalizing and Securing Relationships on Public Networks*—Szabo argued that smart contracts could "give[] us new ways to formalize and secure digital relationships which are far more functional than their inanimate paper-based ancestors."[13] Szabo's definition is sufficiently broad to capture smart contracts that are legal contracts, as well as those that are not (*e.g.*, gratuitous promises), but central to his conception is some feature that prevents a party from backing out of an obligation.[14] In Szabo's own words: "The basic idea behind smart contracts is that many kinds of contractual clauses (such as collateral, bonding, delineation of property rights, etc.) can be embedded in the hardware and software we deal with, in such a way as to make breach of contract expensive (if desired, sometimes prohibitively so) for the breacher."[15] For blockchain-based smart contracts, this feature is the blockchain itself. Because blockchains are immutable, once the smart contract code resides on the blockchain, it will be executed when the specified conditions are satisfied, and because there is no central party with control over the blockchain, there will likely be no way to stop a smart contract from executing after it has been triggered.[16] A party wanting to be sure that an obligation (contractual or not) will be performed, need only to verify that the necessary code exists on the blockchain.[17]

The idea that an obligation—whether contractual or otherwise—can be incorporated into a digital form that makes violation of that relationship or obligation impossible or prohibitively expensive is not as esoteric as it may seem. As Szabo himself explained, we are all familiar with the "ancestor of smart contracts," the "humble vending machine."[18] Anyone with an accepted means of payment can tender the stated price for a beverage. The machine itself has been coded with instructions to dispense specific outputs (certain beverages) in response to particular inputs (tender of payment and selection of the beverage).[19] Breach by the purchaser is effectively

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[11]   *See id.*

[12]   Nick Szabo, *Smart Contracts: Building Blocks for Digital Markets* (1996), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html.

[13]   Szabo, *supra* note 10.

[14]   *Id.*

[15]   Szabo, *supra* note 12. In this passage, Szabo is clearly thinking in terms of traditional, legal contractual obligations. His point, however, is equally applicable to obligations that the law would not recognize as contractual. If I make a gratuitous promise to transfer a certain amount of cryptocurrency to a friend in 30 days, I can program a smart contract to execute that transfer and rely on a blockchain network to automatically execute it, even if—from a legal perspective—there is no "contract."

[16]   DE FILIPPI & WRIGHT, *supra* note 6, at 75.

[17]   *Id.* at 74.

[18]   Szabo, *supra* note 10.

[19]   *Id.*

impossible. Breaking into a vending machine would require far more effort and involve far too much risk of detection than is justified by whatever would be gained from doing so. As Szabo explains:

> The vending machine is a contract with bearer: anybody with coins can participate in an exchange with the vendor. The lockbox and other security mechanisms protect the stored coins and contents from attackers, sufficiently to allow profitable deployment of vending machines in a wide variety of areas.[20]

Given their potential to change the way that value is exchanged and economic relationships are consummated, the potential for smart contracts to change the way people and businesses enter into and perform legal contracts has received considerable attention from academics, practitioners, and industry participants alike.[21] Unsurprisingly, the status of smart contracts under traditional contract law has emerged as a topic of interest and one which will certainly require further treatment as the use of smart legal contracts grows.

II. An Ongoing Role for Contract Law

In recent months, several state legislatures have turned their attention to smart contracts and have done so with an eye toward clarifying their validity under state law.[22] In March of 2018, for example, Governor Bill Haslam of Tennessee signed legislation providing, among other things, that "smart contracts may exist in commerce. No contract relating to a transaction shall be denied legal effect, validity, or enforceability solely because that contract is executed through a smart contract."[23] This language was adopted by Arizona in 2017.[24] Nevada also adopted legislation in 2017 that was intended to clarify the status of blockchain technology, including smart contracts.[25] Lawmakers in several other states, including California,[26] New York,[27]

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[20] *Id.*

[21] *See, e.g.*, Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 Duke L.J. 313, 315 (2017); Nick Szabo, *Smart Contracts: 12 Use Cases for Business & Beyond,* Chamber of Dig. Com. (Dec. 2016), https://digitalchamber.org/wp-content/uploads/2018/02/Smart-Contracts-12-Use-Cases-for-Business-and-Beyond_Chamber-of-Digital-Commerce.pdf; *Whitepaper: Smart Contracts and Distributed Ledger – A Legal Perspective*, Int'l Swaps & Derivatives Ass'n (Aug. 2017), https://www.isda.org/a/6EKDE/smart-contracts-and-distributed-ledger-a-legal-perspective.pdf.

[22] *See* Tenn. Code. Ann. § 47-10-202 (2018); Ariz. Rev. Stat. Ann. § 44-7061 (2018); S.B. 398, 2017 Leg., 79th Sess. (Nev. 2017); Assemb. B. 2658, 2018 Leg., Reg. Sess. (Cal. 2018); Assemb. B. 8780, 2018 Leg., Reg. Sess. (N.Y. 2018); H.B. 5553, 100th Gen. Assemb., Reg. Sess. (Ill. 2018); L.B. 695, 105th Leg., 2d Sess. (Neb. 2018).

[23] Tenn. Code. Ann. § 47-10-202 (2018).

[24] Ariz. Rev. Stat. Ann. § 44-7061 (2018).

[25] S.B. 398, 2017 Leg., 79th Sess. (Nev. 2017).

[26] Assemb. B. 2658, 2018 Leg., Reg. Sess. (Cal. 2018).

[27] Assemb. B. 8780, 2018 Leg., Reg. Sess. (N.Y. 2018).

Illinois,[28] and Nebraska,[29] have introduced legislation that is apparently intended to clarify the legal status of smart contracts.

The merits of such legislation are far from clear: some industry participants, including the Chamber of Digital Commerce (a blockchain-focused trade association), argue that state legislation is unnecessary in light of existing law and that the piecemeal approach to the validity of blockchain-based transactions that would result from a state-by-state approach is undesirable.[30] Together, the widely adopted Uniform Electronic Transactions Act (UETA) and the federal Electronic Signatures in Global and National Commerce Act (E-SIGN)[31] establish that electronic signatures will satisfy any signature requirements imposed by law and, similarly, that electronic records will satisfy any requirement that records be kept in writing.[32] These are technology-neutral statutes, and according to the critics of state-level smart contract legislation, these statutes already do the work of validating the use of blockchain technology and smart contract code for *legal* contracting.[33] These statutes already provide that an otherwise enforceable contract is not rendered unenforceable because it is recorded electronically or was signed electronically.[34] Critics of state-level smart contract legislation argue that a technology-specific formulation of this rule is unnecessary and potentially harmful.[35] The debate of the usefulness and potential negative consequences of these state-level legislative efforts is for another day. This Essay concerns something that the state legislation, UETA, and E-SIGN have in common: their contemplation of an ongoing role for traditional contract law when parties rely on smart legal contracts.

Despite bullish predictions from tech enthusiasts about the displacement of contract law, the ongoing role of humans in both formation and performance, when performance cannot be completely digitized, makes an ongoing role for contract law (and other legal regimes) likely if not unavoidable. Although there can be no doubt that smart contracts, especially as they become more sophisticated, are likely to "bring clarity, predictability, auditability, and ease of enforcement to contractual relations"[36] to some degree, they do not solve the fundamentally human limitations that preclude

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[28]   H.B. 5553, 100th Gen. Assemb., Reg. Sess. (Ill. 2018).

[29]   L.B. 695, 105th Leg., 2d Sess. (Neb. 2018).

[30]   UNIF. L. COMM'N, JOINT STATEMENT IN RESPONSE TO STATE "SMART CONTRACTS" LEGISLATION, [hereinafter ULC WHITE PAPER], https://digitalchamber.org/wp-content/uploads/2018/04/Joint-Ltr-State-Smart-Contracts-Legislation.pdf. This "Joint Statement" is signed by The Chamber of Digital Commerce, the Electronic Signature and Records Association, and one individual, Patricia Fry, who formerly chaired the Uniform Electronic Transactions Act Drafting Committee.

[31]   15 U.S.C. §§ 7001–7006.

[32]   *See* UNIF. ELEC. TRANSACTIONS ACT, NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS (1999) [hereinafter UETA]..

[33]   ULC WHITE PAPER, *supra* note 30.

[34]   *See* 15 U.S.C. § 7001; UETA, *supra* note 32.

[35]   *See* ULC WHITE PAPER, *supra* note 30; Amy Davine Kim & Perianne Boring, *State-by-State Smart Contract Laws? If It Ain't Broke, Don't Fix It*, COINDESK (Feb. 26, 2018), https://www.coindesk.com/state-state-smart-contract-laws-aint-broke-dont-fix/.

[36]   Hansen et al., *supra* note 3; *see also* DE FILIPPI & WRIGHT, *supra* note 6, at 81.

complete contracting, prevent the perfect memorialization of parties' agreement, and lead human actors to fail to follow through on their obligations.[37] Although some smart contracts will be "negotiated" by algorithms, many will not, and common strategies for dealing with the uncertainty of the future—such as reliance on open-ended standards phrased in general terms (*i.e.*, reasonableness, best efforts, etc.)—do not necessarily lend themselves to representation in code.[38] And, even when it may be possible to express a deal in only determinate, code-friendly terms, contracting parties might not want to, on account of strategic reasons for preferring to "specify contract terms at a high level of generality to allow for flexibility and discretion . . . ."[39] Put simply, agreements that are sufficiently complete and specific to be expressed completely in code and executed completely on a blockchain network are not yet a serious possibility outside relatively simple and straightforward situations. Until artificial intelligence and other technologies make more complete contracting and the coding of open-ended terms possible, smart contracts are instead likely to arise as parts of larger contractual relationships in which only components have been coded as smart contracts.[40] The world of perfectly complete contracts that are truly immune to breach is not here yet. Until it arises, disputes will arise and traditional contract law will provide at least one potential framework for their resolution.[41] As discussed below, jurisdictional issues, difficulties related to the pseudonymity of the blockchain, as well as other consequences of the technology may make recourse to the courts difficult, but not impossible (at least as of yet). The application of traditional contract law to smart contracting technology will have to be worked out.

There is no doubt that reliance on smart contracting technology as a substitute for traditional contracting will present a variety of issues under traditional contract law. Some commentators have gone so far as to argue that smart contracts will eventually displace contract law as it exists today.[42] Nevertheless, as I argue in the remainder of this Essay, our traditional body of contract law has confronted many of the issues that smart contracts present—questions related to immutability, the inaccessibility of terms, the potential mismatch of terms as presented to the offeree, and how those terms are actually memorialized are all issues that have arisen in the context of earlier advancements in contracting technology.

As several commentators have demonstrated, it is easy to conceive of a smart contract that meets the basic requirements of enforceability and is therefore a legal

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[37] DE FILIPPI & WRIGHT, *supra* note 6, at 83.

[38] Harry Surden, *Computable Contracts*, 46 U.C. DAVIS L. REV. 629, 683 (2012).

[39] *Id.*

[40] DE FILIPPI & WRIGHT, *supra* note 6, at 77; Josh Stark, *How Close Are Smart Contracts to Impact Real-World Law?*, COINDESK (April 11, 2016), https://www.coindesk.com/blockchain-smarts-contracts-real-world-law/; *Whitepaper: Smart Contracts and Distributed Ledger – A Legal Perspective*, *supra* note 21, at 14.

[41] Mark Giancaspro, *Is a 'Smart Contract' Really a Smart Idea? Insights from a Legal Perspective*, 33 COMPUT. L. & SEC. REV. 825, 835 (2017) ("It is not yet entirely clear whether smart contracts are a smart idea, but there is little doubt the question will soon be tested in the courts."); DE FILIPPI & WRIGHT, *supra* note 6, at 78–79.

[42] *See, e.g.*, Alexander Savelyev, *Contract Law 2.0: 'Smart' Contracts as the Beginning of the End of Classic Contract Law*, 26 INFO. & COMMC'N TECH. L. 116 (2017).

contract.[43] There can be no doubt, however, that the legal decision makers faced with deciding disputes that arise from actual uses of smart contracts will face difficulties when applying traditional contract law to specific sets of real-world facts.[44] This should come as no surprise. After all, "traditional contract law was based on the assumption that parties negotiate and sign paper contracts in face-to-face transactions, or after the exchange of offer and acceptance through the regular mail[.]"[45] Nevertheless, it is important not to overstate the possible tensions between contract law and its application to blockchain technology and smart contracts. This is not the first time that contract law has been confronted with innovations in the way that contracts are formed and performed: contracts of adhesion, "shrinkwrap" software licenses, and Internet contracting have all presented contract law with challenges, and in many instances, traditional contract law has been "more than resilient enough to handle the problems of the new era with ease."[46] As professors Moringiello and Reynolds show, the way that judges have responded to disputes involving Internet contracting is a particularly strong example of that resilience. Much litigation concerned situations where parties enter into contracts by clicking on an "I Agree" button or taking a similar action online. Then, one party claims that certain terms were not binding because he or she did not know about the terms at the time of contracting. Courts faced with determining whether such terms were binding initially looked to a framework that classified the formation into either "browsewrap" or "clickwrap," depending on where the terms appeared and the steps that the offeree had to take to access the terms.[47] In other words, courts developed technology-specific rules. More recently, however, courts have stepped away from this approach in favor of one that is more consistent with traditional contract law, focusing instead on unconscionability and the actual way that terms were presented to the offeree.[48]

   Contract law's ability to incorporate new technology demonstrates the foundational concepts that do much of contract law's heavy lifting—offer, acceptance, assent, etc. These concepts are flexible, *especially* in the hands of common law judges. When disputes that implicate new technology and contracting methods wind up in front of common law judges, the generality and flexibility of these doctrines give them the ability to make choices as to how the concepts apply to new technology or contracting methods.[49] This was evident in the context of "shrinkwrap" software licenses. For example, early cases reached different conclusions as to when the contract came into existence and, therefore, whether terms that were available only after the point of sale were part of the parties' bargain.[50] Judges who confront smart

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[43]   DE FILIPPI & WRIGHT, *supra* note 6, at 78–79; Stark, *supra* note 40.

[44]   *See generally* Giancaspro, *supra* note 41.

[45]   Juliet M. Moringiello & William L. Reynolds, *From Lord Coke to Internet Privacy: The Past, Present and Future of the Law of Electronic Contracting*, 72 MD. L. REV. 452, 458 (2013).

[46]   *Id.* at 470.

[47]   *Id.* at 460.

[48]   *Id.* at 467–69.

[49]   *Id.* at 480.

[50]   *Compare* ProCD, Inc. v. Zeidenberg, 86 F.3d 1447, 1453 (7th Cir. 1996) *with* Lively v. IJAM, Inc., 114 P.3d 487, 492 (2005) (Okla. Civ. App. 2005).

contracts will have similar flexibility to apply foundational contract law in different ways. The importance of this task is hard to understate, for it is the application of these principles to particular cases that will generate the legal rules relevant to the process by which parties utilize smart contracts in the context of legal contracting.

By way of illustration, consider the "humble vending machine," our prototypical smart contract. How would traditional contract formation concepts apply to this early smart contract as a legal contract? Clearly, a contract of sale has been formed and fully performed. It may seem silly to think of vending machine transaction in this way, but when, for example, someone is sickened by a defective can of Coke and issues arise relating to warranties that apply to the sales of goods, the legal status of these ubiquitous, small-potatoes transactions matters. In *Chaffin v. Atlanta Coca Cola Bottling Co.*,[51] for example, the court held that because there was a contract of sale between a supermarket and the purchaser of a contaminated beverage from a vending machine placed by the supermarket on its premises, the implied warranty of merchantability was enforceable against the supermarket.[52] That warranty was an implied term in a contract that was formed and performed through a vending machine.[53]

As *Chaffin* makes clear, by the time the purchaser pops open the can of Coke, a valid contract of sale has been formed and performed, but what's the offer and what's the acceptance? At what point did anyone become bound? Or did anyone truly become bound in a meaningful sense? Perhaps, the buttons on the machine which display a beverage logo and price are each offers for the particular beverage displayed. If that's the case, then perhaps the buyer's acceptance occurs when he inserts the stated price and presses the right button. The machine performs by dispensing the can. At least one prominent practitioner has taken this position vis-à-vis offer and acceptance, explaining that if the machine took his dollar without providing a soda in return, there would be legal recourse for the lost dollar under a garden variety breach of contract claim.[54]

No doubt, restitution (here return of the lost dollar) would be appropriate, but it is not the only measure of damages that would be available under traditional contract law. As was made clear in *Hawkins v. McGee*,[55] plaintiffs with meritorious breach of contracts claims are typically entitled to be put in the same position they would have been in had the contract been performed.[56] If you can manage to suspend your disbelief even further, suppose the disappointed purchaser would only be able to find a substitute beverage at a higher price than that advertised on the vending machine (say $1.50 whereas the non-performing machine displays a price of $1.00). If the contract is formed when the purchaser inserts the dollar (such that delivery of the goods pursuant to the contract), then the seller of the machine would be liable for the

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[51]   Chaffin v. Atlanta Coca Cola Bottling Co., 194 S.E.2d 513, 515 (Ga. Ct. App. 1972).

[52]   *Id.*

[53]   *Id.*

[54]   David M. Adlerstein, *Are Smart Contracts Smart? A Critical Look at Basic Blockchain Questions*, COINDESK (June 26, 2017) https://www.coindesk.com/when-is-a-smart-contract-actually-a-contract/.

[55]   Hawkins v. McGee, 146 A. 641, 643 (N.H. 1929).

[56]   This is, of course, an expectation measure of damages.

difference between the substitution price and the price advertised in the offer *even if the machine returned the dollar*. This is the consequence of assigning particular legal significance (offer and acceptance) to those particular acts. It is not hard to imagine that a judge faced with deciding this issue could conclude that this result would be ridiculous and, instead, find that the display of the machine with prices and buttons is not an offer, but is instead a solicitation of offers to buy. Under this view, when a buyer inserts a dollar and makes a selection, he is making an offer to buy through the tender of payment. Acceptance occurs through performance—when the machine delivers the beverage, the contract is both formed and fully performed. Under this conception, if the machine has sold out of a particular beverage and it therefore returns the dollar when a purchaser selects that beverage, no breach has occurred because no contract was formed. Instead, the machine has rejected the offer.

To the degree there is ever a need to fit the process by which someone buys a soda from a vending machine into the formal framework of contract formation (and there probably is not), the latter conception seems to comport with how people view their interactions with a vending machine—it is only when the machine retains the money without delivering the product that the purchaser views the machine and its owner as having some obligation that remains unfulfilled. My point, however, is that both of these approaches are possible under the traditional rules governing contract formation. Those rules, which were "based on the assumption that parties negotiate and sign paper contracts in face-to-face transactions, or after the exchange of offer and acceptance through the regular mail,"[57] are malleable, especially when applied outside the factual contexts in which they were formulated.

III. VENDING MACHINE CONTRACTING

Consideration of the vending machine as a prototypical smart contract is not as silly as the example above makes it seem. Throughout its history, the vending machine has acted as much more than a delivery mechanism for junk food and other sundries. Instead, a variety of high-value contracts have been, and still are, concluded through vending machines or similar automated machine-based processes.[58] Take, for example, contracts between parking lot/garage owners and car owners seeking parking. These are routinely formed through a form of vending machines that dispense tickets. These are common transactions, but significant when you remember what they are: contracts of bailment in which valuable property is placed in the possession of someone other than its owners in exchange for payment. And, they are formed and primarily performed through what is fundamentally a very basic smart contract.

Similarly, for several decades during the early years of the commercial air travel, insurance companies offered flight insurance to travelers wishing to secure life insurance for the possibility of a plane crash or other accident.[59] These policies became so popular that the insurance companies eventually began to offer them through

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[57] Moringiello & Reynolds, *supra* note 45, at 458.

[58] *See, e.g.*, Nick Wingfield, *Buying an iPod from a Vending Machine—Airports, Hotels Add Models That Dispense Pricey Electronics; Reebok's Sneaker Experiment*, WALL ST. J. (Sept. 1, 2005), https://www.wsj.com/articles/SB112553715483028640.

[59] *See* Paula Mejia, *Vending Machines in the U.S. Once Dispensed More Than Chips and Cookies*, ATLAS OBSCURA (Dec. 13, 2017), https://www.atlasobscura.com/articles/vending-machines-snacks-same-united-states.

vending machines placed next to the boarding gates in airports around the country.[60] Although the premiums paid for these policies were low, policy limits were not insignificant. Denials of coverage led to litigation which led to a body of case law in which common law judges grapple with the need to apply traditional contract law to an automated contracting process.

As I argue in this Section, despite the very real technological differences between vending machines and the smart contracts of today (and tomorrow), the issues that arise in many of the vending machine cases are surprisingly predictive of the types of issues that are certain to arise as judges attempt to apply foundational common law contract principles to smart contracts going forward. Immutability, timing of formation, incongruities between the terms that were advertised and the "actual" terms, and a variety of other issues related to intent all appear in these cases.

Take, for example, the famous English contracts case, *Thornton v. Shoe Lane Parking, Ltd.*,[61] which finds three members of the Court of Appeal, including the renowned Lord Denning, struggling with the implications of automated contract formation—that is to say contract formation that takes place through a type of vending machine. At issue in *Shoe Lane Parking* was whether a contract formed through a parking garage's ticket machine included a provision releasing the garage from liability for injuries suffered by patrons while on the premises.[62] The procedure is familiar to anyone who has parked at the airport: when someone drove into the garage, he or she would retrieve a ticket from the machine positioned at the gate. This ticket stated the time the person entered the garage, explained how payment should be made upon exit, and also stated that the ticket was subject to the "conditions of issue as displayed on premises."[63] These conditions were posted behind the ticket machine and also in the office where the cashier responsible for accepting payment was stationed.[64]

The plaintiff, Mr. Francis Charles William Thornton, a "free-lance trumpeter of the highest quality," parked his car at the garage to perform an engagement with the BBC.[65] When he returned to retrieve his car, he was severely injured in an accident that was found to be partly the garage's fault.[66] To avoid liability, the garage cited a condition which eliminated liability for personal injury to garage customers that was listed on the notices that were posted behind the ticket machine and in the cashier's office.[67] The garage argued that the contract between it and Mr. Thornton included the liability-eliminating term because the ticket dispensed by the machine stated that its issuance was subject to conditions.[68]

In his opinion, Lord Denning acknowledged the possibility of following the "ticket cases of former times [that] were concerned with railways, steamships, and

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[60]   *Id.*

[61]   Thornton v. Shoe Lane Parking, Ltd. [1971] 2 QB 163 at 165.

[62]   *Id.*

[63]   *Id.* at 168.

[64]   *Id.* at 168.

[65]   *Id.* at 167.

[66]   *Id.*.

[67]   *Id.* at 167–68.

[68]   *Id.*

cloakrooms."[69] As Lord Denning explained, in those cases the company's issuance of a ticket through an employee constitutes the offer, and the customer's conduct in taking the ticket without lodging any objections as to the terms constitutes the acceptance of that offer.[70] These cases, however, have no "application ticket which is issued by an automatic machine."[71] The "former ticket cases" all involved tickets issued by a real-life human being—an employee of the company issuing the ticket. Lord Denning explained that those cases were predicated on the possibility that a customer could ask the ticketing agent questions, refuse the ticket, and demand a refund.[72] However, this same opportunity does not exist when an "automatic machine" issues the ticket:

> He [the customer] cannot get his money back. He may protest to the machine, even swear at it. But it will remain unmoved. He is committed well beyond recall. He was committed at the very moment when he put his money into the machine. The contract was concluded at that time.[73]

For this reason, the offer and acceptance framework of the "former ticket cases" should not apply. Instead, in the case of an automatic machine, the offer occurs when the owner of the machine makes it available to customers as ready to accept payment. The terms of the offer are those that are communicated through the sign that is placed on or close to the machine explaining what the customer will receive in exchange for payment. Acceptance occurs when the customer activates the machine and enters the garage.[74] Issuance of the ticket by the machine occurs after the contract is formed, so in the event the ticket conflicts with the terms that appeared on the sign or notice, the contents of the notice will control because it is the terms on the notice to which the customer assented. Under this framework, the relevant notice was the sign located at the entrance to the garage which listed the prices and said, "All cars parked at the owner's risk." because this was the sign that was displayed prior to Mr. Thornton's decision to proceed into the garage, which caused the machine to "thrust [the ticket] at him."[75] Conditions purportedly included in contract through incorporation by reference on the ticket could not be a part of the contract because those conditions were not part of the offer.[76]

Lord Denning's co-panelists were not prepared to reach a definitive answer as to the moment that a contract came into existence. For this reason, Lord Megaw (and also Lord Denning in another part of his opinion) addressed the issue under the framework provided by the "former ticket cases," which ultimately involved determining whether the garage took reasonably sufficient steps to give Mr. Thornton

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[69]   *Id.* at 169.

[70]   *Id.*

[71]   *Id.*

[72]   *Id.*

[73]   *Id.*

[74]   *Id.*

[75]   *Id.*

[76]   *Id.*

notice of the condition.[77] All judges agreed that, under the standard applicable to the ticket cases, it had not.[78]

Sir Willmer's short opinion is notable insofar as he directly addressed the significance of the vending machine, which he calls the "really distinguishing feature of this case."[79] Although he was not willing to say precisely when a contract arises, he acknowledged the distinction between contracting through a ticket agent (in which there is at least the "notional opportunity" for the customer to refuse once he learns of the conditions) and contracting through a machine, in which "there is something quite irrevocable about the process."[80] Like Lord Denning, Sir Willmer is attuned to the relationship between the timing of contract formation and the terms that are included in that contract in terms that have obvious implications for smart contracts: "[A]ny attempt to introduce conditions after the irrevocable step has been taken of causing the machine to operate must be doomed to failure."[81]

On this side of the pond, courts have confronted the significance of vending machine contracting most often in the context of aviation insurance coverage disputes.[82] During the early decades of commercial air travel insurance companies offered nervous passengers the opportunity to purchase flight insurance policies from vending machines stationed in airports.[83] A passenger seeking to purchase a policy would insert the premium into the machine, receive policy documentation in return, and then provides the required information (name, flight, etc.).[84] The [court] describes the process:

> The vending machine is so constructed that when a 25 cent coin is inserted in a slot provided for the purpose, it ejects an original policy and retains a duplicate for the company's record. The person operating the machine fills out a space provided on the machine, the name and address of the person who is operating it, the name and address of the beneficiary, the place of departure and the destination. The machine itself records the date when the policy is issued, the time of day and amount of coverage.[85]

As in *Shoe Lane Parking*, these cases focus on whether particular terms that are purportedly part of the contract are enforceable against a party who very likely had no notice of them prior to operating the vending machine.[86] Unsurprisingly for a body of insurance coverage cases, these disputes focus on attempts by aviation insurers to deny

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[77] *Id.* at 170.

[78] *Id.* at 174.

[79] *Id.*

[80] *Id.*

[81] *Id.*

[82] *See, e.g.*, Slater v. Fid. & Cas. Co., 98 N.Y.S.2d 28, 29 (N.Y. App. Div. 1950); Steven v. Fid. & Cas. Co., 377 P.2d 284, 298 (Cal. 1962).

[83] *See Slater*, 98 N.Y.S.2d at 29; *Steven*, 377 P.2d at 298.

[84] *Slater*, 98 N.Y.S.2d at 29.

[85] *Id.*

[86] *Id.* at 30.

coverage. Also consistent with *Shoe Lane Parking* is the importance of the steps taken to bring the relevant terms to the insured's attention prior to the insured's decision to insert coins into the vending machine.

For example, in *Roberts v. Fidelity and Casualty Company of New York*,[87] the Ninth Circuit affirmed a judgment in favor of the insurer in light of (1) the availability, outside the vending machine, of a specimen policy that included a bold notice of the relevant limitation of coverage and, (2) a prominent display on the front of the vending machine which said "COVERS FIRST ONE-WAY OR ROUND TRIP FLIGHT (IF COMPLETELY TICKETED PRIOR TO ORIGINAL DEPARTURE) WITHIN 12 MONTHS ON ANY SCHEDULED AIR CARRIER TO ANY PART OF THE WORLD."[88] The insured purchased the policy before traveling from Portland to Los Angeles. After arriving in Los Angeles, the insured purchased a round-trip helicopter trip from Los Angeles to Disneyland. The insured person was killed when the helicopter crashed. Given the prominent display that explained the scope of coverage and the bolded notice of the exclusion in the specimen policy, the court upheld the insurer's denial of coverage.[89] Similarly, when the vending machine included a notice on its exterior advising purchasers of a $25,000 aggregate limit and instructing them not to purchase insurance above that amount, an insured who purchased more than $25,000 could not enforce the policies in excess of that amount.[90] The insurer, of course, returned the $0.75 premium that the insureds inserted into the machine to purchase the excessive, void coverage.[91]

In *Lachs v. Fidelity & Casualty Co. of New York*,[92] the New York Court of Appeals refused to enforce a provision limiting coverage to injuries sustained in connection with tickets purchased from "a Scheduled Airline."[93] The vending machine advertised itself as offering "Airline Trip Insurance" and included information relating to the premiums for coverage, aggregate limits, and basic scope of coverage.[94] The machine was positioned directly next to the counter at which all passengers flying on Non-Scheduled Airline Carriers (*i.e.*, those to which the coverage limitation would apply) received their tickets.[95] Under these facts, the court of appeals held that a reasonable jury could find that the actual agreement was for "Airline Trip Insurance" that was not limited to particular classes or categories of airlines.[96] In a case also involving a scheduled airline limitation, the California Supreme Court similarly refused to apply the provision.[97] There, the non-scheduled flight was arranged by the ticketing airline

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[87] Roberts v. Fid. & Cas. Co., 452 F.2d 981, 985 (9th Cir. 1971).

[88] *Id.* at 985.

[89] *Id.*

[90] *Slater*, 98 N.Y.S.2d at 30.

[91] *Id.* at 30..

[92] Lachs v. Fidelity & Cas. Co., 118 N.E.2d 555, 557 (N.Y. 1954).

[93] *Id.*

[94] *Id.*

[95] *Id.* at 558.

[96] *Id.*

[97] Steven v. Fid. & Cas. Co., 377 P.2d 284, 286 (Cal. 1962).

to accommodate the decedent/insured's need to make a connection after a leg of his original flight was canceled, and "the facts of the case foreclose[d] any contention of the company that it afforded Mr. Steven plain warning of non-coverage of the . . . flight."[98]

In both of these cases, common law judges grappled with the automation of the formation process and the effect it should have on their approach to the disputes in front of them. Writing for the California Supreme Court, Justice Tobriner explains:

> We must view the instant claim in the composite of its special and unique circumstances. To equate the bargaining table, where each clause is the subject of debate, to an automatic vending machine, which issues a policy before it can even be read, is to ignore basic distinctions. The proposition that the precedents must be viewed in the light of the imperatives of the age of the machine has become almost axiomatic. Here the age of the machine is no mere abstraction; it presents itself in the shape of an instrument for the mass distribution of standard contracts.[99]

Notable in this passage is the reference to precedent—Justice Tobriner is not calling for new rules or principles. Instead, he is calling for a careful application of existing precedents to new circumstances.

Echoing Lord Denning, Judge Conway of the New York Court of Appeals approached the issue, in part, through a foundational principle of traditional contract doctrine, the "meeting of the minds."[100] Like Lord Denning, Judge Conway is concerned with the effect that the substitution of an automated contracting process has on assent and the content of the parties' agreement:

> No doubt it is advisable, if not indeed necessary, as a matter of business competition to sell insurance policies from automatic vending machines. . . . However, there must be a meeting of the minds achieved between the applicant and the company through an application and signs and lettering, for while the applicant has a mind the machine has none and cannot answer questions. If the defendant had paid for a living salesman, the decedent would not have purchased the insurance if it did not cover her trip or she might have purchased it and changed her plane.[101]

Notice just how closely Judge Conway tracks Lord Denning. Contracts require mutual assent or a "meeting of the minds" even when formed through an automated process like a vending machine. Aspects of that formation process which prevent the policyholder from having an opportunity to understand what they are agreeing to can prevent a contract from forming.

Obviously, the smart contracts today and tomorrow are, and will be, more complicated and complex than the "humble vending machine," thereby presenting a myriad of issues. Nevertheless, the parallels are surprising. Immutability, practical barriers to comprehension of terms and this body of vending machine cases shows that traditional contract law doctrine does offer some tools for dealing with the general

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[98] *Id.* at 294.

[99] *Id.* at 298.

[100] *Lachs*, 118 N.E.2d at 559.

[101] *Id.*

issues raised by the use of smart contracts and automation in the context of legal contracting.

IV. SMART CONTRACT AS LEGAL CONTRACT

To further consider the application of traditional contract law to smart contracts, consider as an example, issues related to intent and assent that are created by attempting to express a contract in code. If contracting parties cannot "read" code, how do we know what they are assenting to? To be sure, the introduction of code and blockchain introduces factual complications. But, whether it is because the terms of a contract are expressed in code, or because they are concealed in a vending machine and can be fully accessed only after the customer has taken the irreversible step of inserting payment, the fundamental issue is, and will be, the same—whether terms that a contracting party claims not to have agreed to are part of the "deal," or stated differently, whether the memorialization of the contract represents the terms that a contracting party agreed to.

When parties use smart contract code to automate only part of a larger contractual arrangement, divergences between their natural language conception of contractual obligations, and the way those obligations are coded, should be relatively easy to address, provided, of course, that there is something establishing that the parties' agreement exists outside the code and that the parties actually agreed to something other than what was coded.[102] Here, the code is likely to be viewed as a component of performance that one party will attempt to prove is nonconforming. Of course, it may be impossible to "undo" a smart contract in a literal sense, but a court called upon to adjudicate a dispute over smart contract code that has executed could order other remedial measures.

When, however, the code purports to be the parties' entire agreement, traditional contract law offers a variety of ways to look at the situation. Depending on the facts in any particular case, legal decision makers will have options. Courts *could* focus on objective assent to the code through the action that triggers the smart contract (*e.g.*, sending digital currency to a particular address), in effect treating the smart contract code as a natural language contract whose terms are binding upon a party who has objectively indicated assent to them whether they understand or have even read them. Courts applying this line of reasoning hold that individuals who sign contracts in languages that they do not read, write, or understand are still bound to the terms in the contract.[103]

Or, given the likelihood, or perhaps certainty, that some representations were made about the effects of the code (at least in situations where the decision to enter into a contractual relationship that is embodied in code is made by a human and not an algorithm), courts could focus on any divergences between those representations and the actual code. Recall Lord Denning's approach in *Shoe Lane Parking*. The garage claimed that the terms included the conditions that were located in areas that were not easily accessible prior to the point of ticketing, but Lord Denning would hold that the terms only included those advertised on the notice *outside* the garage, that individuals

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[102]   *Whitepaper: Smart Contracts and Distributed Ledger – A Legal Perspective*, *supra* note 21, at 10–11.

[103]   *See, e.g.*, Morales v. Sun Construction, Inc., 541 F.3d 218, 222 (3d Cir. 2008).

wishing to park their car could see prior to making the decision to take a ticket.[104] This is functionally the same approach as those taken by courts that refused to enforce "surprise" terms in the flight insurance policies sold through vending machines.[105] Other common law doctrines could play a role in resolving these issues in particular disputes. It is not hard to imagine situations in which fraudulent misrepresentations as to the content of the code were made, giving the aggrieved party a basis to terminate the contract. Unconscionability could very well provide another avenue under the right facts.

Digital token sales offer a helpful example for thinking through these issues in a more concrete way and demonstrate that traditional contract law does provide a robust set of tools for resolving the issues that smart contracts implicate. Since 2016, tech entrepreneurs have increasingly looked to the sale of blockchain-based tokens to finance the development of new platforms, networks, and online services.[106] In many instances, these entrepreneurs forego traditional business entities, instead forming loose associations with one another.[107] The tokens that are sold to members of the public are hosted on public blockchains, usually the Ethereum blockchain, and are paired with smart contracts to confer a variety of rights on the owner of the token.[108] These rights can include economic rights (*i.e.*, entitlement to a percentage of revenue or profit generated by the enterprise), utility rights (*i.e.*, entitlement to use the software, platform, or service when and if it is operational), and even governance/participation rights (*i.e.*, entitlement to vote on certain decisions). Currently, the most pressing legal issues related to these sales are related to categorization for regulatory purposes—are they securities? Commodities? Digital goods? Regardless of the status for regulatory purposes, they appear to be contractual in the legal sense. Sellers of tokens offer to the public a bundle of rights that has been digitized. Purchasers accept and transfer value—usually virtual currency—in exchange for the token.[109] Of course, to sell tokens, sellers have to give prospective purchasers more information about the project being funded by the proceeds of a token sale, as well as the bundle of rights associated with a token.[110] It has become standard for development teams to release white papers that include this information and also to post a variety of other materials, such as explanatory videos, online.[111]

As one of the most famous token-funded enterprises makes clear, token sellers are aware of the potential legal issues that could arise if there are divergences between the

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[104]   Thornton v. Shoe Lane Parking, Ltd. [1971] 2 QB 163 at 168.

[105]   *See, e.g.*, Roberts v. Fidelity & Cas. Co., 452 F.2d 981, 983 (9th Cir. 1971); Steven v. Fidelity & Cas. Co., 377 P.2d 284, 286 (Cal. 1962); *Lachs*, 118 N.E.2d at 557; Slater v. Fidelity & Cas. Co., 98 N.Y.S.2d 28, 29 (N.Y. App. Div. 1950).

[106]   Jonathan Rohr & Aaron Wright, *Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets*, Cardozo Legal Stud. Res. Paper No. 527, Univ. of Tenn. Legal Stud. Res. Paper No. 338 (Oct. 4, 2017), https://ssrn.com/abstract=3048104.

[107]   *Id.* at 30.

[108]   *Id.* at 31.

[109]   *Id.* at 19.

[110]   *Id.* at 112.

[111]   *Id.* at 113.

code and representations made about the tokens being sold. The DAO, one of the first decentralized autonomous organizations, was an investor directed venture capital fund that was funded through the sale of DAO Tokens.[112] For a period of time in 2016, it was possible to purchase a DAO Token by sending digital currency to a specified account on the Ethereum blockchain and receive, in return, DAO Tokens which could be subsequently transferred to other accounts.[113] Holders of DAO Tokens were entitled both to vote on The DAO's investment decisions, and to receive a portion of the proceeds generated by successful investments, hence its characterization as an "investor focused venture capital fund."[114] The DAO was organized by Slock.it (a technology company) and a group of high-level Slock.it employees, including its Chief Technology Officer Christoph Jentzsch.[115] Only a few months after The DAO's successful fundraising round in which over $150 million was raised, someone exploited a "recursive call bug" in The DAO's code and was able to divert around $50 million worth of ether from The DAO's address.[116]

Soon after the diversion of funds became public knowledge, it became common to refer to the incident as a "hack" of The DAO.[117] But, an open letter that was ostensibly from the culprit took issue with this characterization. Instead, the Attacker (as the letter was signed) argued that because the code allowed this action, it was a perfectly legitimate and legal course of action.[118] In support of this claim, the Attacker cited a provision in The DAO's Terms of Use which purported to limit the terms governing The DAO to only terms that were included in the code:

> The terms of The DAO Creation are set forth in the smart contract code existing on the Ethereum blockchain at [string of characters denoting digital address]. Nothing in this explanation of terms or in any other document or communication may modify or add any additional obligations or guarantees beyond those set forth in The DAO's code. Any and all explanatory terms or descriptions are merely offered for educational purposes and do not supercede or modify the express terms of The DAO's code set forth on the blockchain; to the extent you believe there to be any conflict or discrepancy between the descriptions offered here and the functionality of The DAO's code at [string of characters denoting digital

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[112] A variety of sources provide an overview of the DAO and its demise. *See, e.g.*, DE FILIPPI & WRIGHT, *supra* note 6; Carla L. Reyes, Nizan Geslevich Packin, & Benjamin P. Edwards, *Distributed Governance*, 59 WM. & MARY L. REV. ONLINE 1 (Sept. 22, 2017), https://wmlawreview.org/distributed-governance; Usha Rodrigues, *Law and the Blockchain*, 104 IOWA L. REV. (forthcoming 2018), https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3127782.

[113] SEC, REPORT OF INVESTIGATION PURSUANT TO §21(A) OF THE SECURITIES EXCHANGE ACT OF 1934: THE DAO, NO. 81207 (July 25, 2017).

[114] Usha Rodrigues, *supra* note 114.

[115] *Id.*

[116] *Id.*

[117] *Id.*

[118] *An Open Letter to the DAO and the Ethereum Community*, STEEMIT, https://steemit.com/ethereum/@chris4210/an-open-letter-to-the-dao-and-the-ethereum-community (last visited Oct. 3, 2018).

address], The DAO's code controls and sets forth all terms of The DAO Creation.[119]

Notably, the Attacker threatened legal action against anyone who would attempt to undo the diversion of funds in reliance on this provision, apparently under the assumption that a court would enforce this provision in a way that would "bless" the diversion of funds—after all, everyone "agreed" to the code that allowed this to happen.[120] As an analysis of The DAO's terms that appeared in *Bitcoin Magazine* almost immediately after the incident demonstrates, there are a number of other provisions that would be relevant to any attempt to address the losses suffered by owners of DAO Tokens under traditional contract law.[121] The provision referenced above (let's call it the "Code Controls" provision) appeared in the Terms of Use that were on Daohub.org, which included, among other things, a limitation of liability provision in which token holders agree not to hold "third parties or individuals associated with The DAO Creation liable for any and all damages or injury whatsoever caused by or related to use of, or inability to use, DAO Tokens . . . "[122] Other potential reasons appear in the readme.md file at the Slock.it Github, which provides The Decentralized Autonomous Organization DAO Framework.[123] The Framework addresses a variety of legal issues, including the possibility that DAO Tokens were securities, and includes a provision purporting to opt-out of contract law altogether:

> Your use of the Software does not, in and of itself, create a legally binding contract in any jurisdiction and does not establish a lawyer-client relationship. Your communication with a non-lawyer will not be subject to the attorney-client privilege and (depending on your jurisdiction) may not be entitled to protection as confidential communication.[124]

Suppose "The Attacker" had, in fact, attempted to enforce the Code Controls provision against holders of DAO Tokens and individuals associated with Slock.it who pushed for the hard fork that allowed the diversion to be unwound. Or, suppose DAO Token holders brought breach of contract actions against the organizers of Slock.it for delivering tokens (or, more precisely, causing The DAO address to issue tokens) that deviated from the specifications included in the various materials describing the tokens and their functionality (presumably, none of these materials mentioned the bug that would allow a single Ethereum address to siphon $50 million worth of assets from The DAO). Or, suppose an enterprising and aggrieved holder of DAO Tokens discovered The Attacker's real-world identity and brought a breach of contract action alleging that, notwithstanding the fact that the code allowed the diversion to occur, The Attacker's exploitation of this mistake violated the terms that

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[119]   *See* Drew Hinkes, *A Legal Analysis of the DAO Exploit and Possible Investor Rights*, Bitcoin Mag. (June 21, 2016), https://bitcoinmagazine.com/articles/a-legal-analysis-of-the-dao-exploit-and-possible-investor-rights-1466524659/.

[120]   *An Open Letter to the DAO and the Ethereum* Community, *supra* note 120.

[121]   Hinkes, *supra* note 121, at 3.

[122]   *Id.*

[123]   *Decentralized   Autonomous   Organization   (DAO)   Framework*,   GitHub, https://github.com/slockit/DAO (last visited Oct. 12, 2018).

[124]   *Id.*

everyone (including The Attacker) *actually* agreed to when they purchased DAO Tokens.

These hypothetical claims raise a variety of legal issues that are not strictly contractual. Agency law (*i.e.*, whether the account that issued DAO Tokens will be treated as an agent of Slock.it or individuals associated with its creation),[125] and standing and partnership law, which will both impact whether individual DAO Token Holders can sue in their own capacity, are perhaps the most obvious. They also raise practical issues, such as the claims against The Attacker and the need to determine her, his, or their real world identity. Putting these aside for the time being, consider the issues that would arise under traditional contract law and whether that body of law offers principles and rules that are capable of handling the issues in a sensible way.

For example, would a court enforce the Code Controls provision? In other words, would a judge hold that this provision in the Terms of Use precludes the DAO Token Holders' argument that the diversion of funds was improper from a contractual perspective because they allowed it? Said another way, would a court adopt the position advanced in "The Attacker's" open letter, which relies upon the Code Controls provision? Ultimately, the question is a familiar one—what terms are part of the parties' agreement? On one hand, notions of objective assent could lead a legal decision-maker to determine that, when individuals sent ether to the DAO address in exchange for tokens, they were manifesting assent to the terms as embodied in the code and only the terms embodied in the code, whether they understood the terms or not. However, as the vending machine and other cases show, other concepts related to assent and meeting of the minds would give legal decision-makers a path to holding that the agreement includes only those terms that were reasonably available to DAO Token holders prior to purchase. This position would be bolstered by the fact that the Code Controls provision itself exists outside of the code; reliance on the Code Controls provision in a sense concedes the need to look outside the code aspects of the relevant agreement. The parallel to the vending machine cases is obvious; once a purchaser sent ether to the DAO account during the funding window, it cannot be undone. This is the nature of the blockchain. Lord Denning's observation about the irrevocability of vending machine contracts are oddly resonant here:

> He [the customer] cannot get his money back. He may protest to the machine, even swear at it. But it will remain unmoved. He is committed well beyond recall. He was committed at the very moment when he put his money into the machine. The contract was concluded at that time.[126]

Determining which terms are part of the contract would, no doubt, present complicated factual issues, some of which result from the innovative technology. Nevertheless, at its core, the question of which terms are part of the contract when there are multiple potential sources of those terms is an issue that has arisen before in other contexts. The principles that have applied in the context of vending machines, shrinkwrap, and Internet contracting are sufficiently general to be applicable here and will provide judges with considerable flexibility in the way that they apply those principles to particular disputes.

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[125] *See, e.g.*, Samir Chopra & Laurence White, *Artificial Agents and the Contracting Problem*, U. ILL. J.L. TECH. & POL'Y 363, 402 (2009).

[126] Thornton v. Shoe Lane Parking, Ltd. [1971] 2 QB 163 at 169.

What about the provision in The DAO Framework which purports to prevent the creation of a contract in the first instance? Again, the need to look outside the code for this term undercuts the Code Controls provision, but the issue presented by the "No Contract Provision" is not a new one. Instead, there is an entire doctrine which deals with the relevance of parties' intent (or lack of intent) to imbue an agreement or obligation with legally binding status.[127] The doctrine even has its own section in the Restatement (Second) of Contracts.[128] Under the American rule, intent to form a legally binding contract is not required to form a contract (*i.e.*, it is possible to form a legally binding contract without even knowing that such a thing exists), but "a manifestation of intention that a promise shall not affect legal relations *may* prevent the formation of a contract."[129] As the case law demonstrates, statements disclaiming contractual liability will be enforced in many instances,[130] but notions of fairness play a considerable role, especially when one side has performed or relinquished something of value.[131] Again, the relevant facts may be complicated and require an understanding of new technology, but the fundamental questions relating to the availability/accessibility of the disclaimer, fairness concerns over its potential enforcement, and its consistency with other terms, including potentially the Code Controls provision, are familiar.

A final observation with regard to the applicability of traditional contract law to the DAO incident. Were it possible for DAO Token holders or organizers of The DAO to discover the real-world identity of The Attacker and institute a breach of contract suit under American law, contract law may very well provide the answer to The Attacker's reliance on the Code Controls provision. Even if a court were inclined to enforce it, there is a mandatory duty of good faith and fair dealing that is implied in every contract.[132] While it is typically conceived of as a narrow duty, the actions of The Attacker seem to fall squarely within the type of opportunistic behavior that the implied duty is intended to circumscribe. As traditionally formulated, the implied duty prohibits conduct which violates the "spirit"[133] of the bargain, or which prevents counterparties from enjoying the "benefits of the agreement."[134] There can be no question that neither the organizers of The DAO, nor the non-Attacker token holders, intended for participants to be able to siphon off funds in the way that The Attacker did. In our hypothetical breach of contract litigation over The Attacker's conduct, a court inclined to take a strict reading of the Code Controls provision could find that the implied duty applies in the same way that it applies to written, natural language contracts that include merger and integration clauses intended to limit contractual terms to only those in the writing.

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[127] *See, e.g.*, Gregory Klass, *Intent to Contract*, 95 VA. L. REV. 1437, 1442–43 (2009).

[128] RESTATEMENT (SECOND) OF CONTRACTS § 21 (AM. L. INST. 1981).

[129] *Id.*

[130] *See, e.g.*, Lebrecht v. Deep Blue Pools & Spas, 374 P.3d 1064, 1066–67 (Utah Ct. App. 2016).

[131] RESTATEMENT (SECOND) OF CONTRACTS § 21 cmt. b (AM. LAW INST. 1981).

[132] *Id.* § 205.

[133] *Id.* § 205, cmt. d.

[134] 23 Williston on Contracts § 63:22 (4th ed. 1993).

Certainly, there are other contract doctrines, such as the doctrine of mistake, that could potentially have application here. But, thinking about the applicability of the implied duty of good faith in this context reveals something more about traditional contract law's application here than the relatively straightforward observation that it is sufficiently flexible to be applied in principled ways in this new technological context. As The DAO demonstrates, the humans responsible for converting agreements into code are, themselves, fallible both on account of the likelihood that they will make mistakes from time to time, and on account of the fact that the ability to convert agreements into code does nothing to solve the bounded rationality of those who are responsible for devising the terms of these agreements in the first place. Traditional contract law, as well as doctrinal areas that are, at their core, specific applications of contractual principles to particular types of relationships (*e.g.*, partnership law) deal with these issues, in part, with gap filling terms like the implied duty of good faith and fair dealing.[135] There is some irony here—the consequences of the DAO organizers' attempt to opt-in to an extra-legal framework for the relationship between and among holders of DAO tokens and other participants in the enterprise are arguably best addressed by the legal framework that they attempted to disclaim.

At the beginning of this discussion, I noted that there are a variety of issues that would confront litigants actually attempting to bring a claim related to The DAO meltdown. Jurisdictional questions, standing, and the need to correlate real-world identities are all potential roadblocks when it comes to enforcing smart contracts as legal contracts.[136] Blockchain and smart contracts do threaten to eliminate "legal intervention points,"[137] and it may very well be that the emergence of both practical roadblocks to actually filing litigation, and the availability of non-legal substitutes for legal intervention points, prevent contract law from providing the primary framework under which disputes over smart contracts are decided. Nevertheless, as long as there are identifiable individuals or entities involved, the possibility of legal intervention remains,[138] and the need to understand the application of traditional legal doctrines to smart contracts and blockchain more generally will grow. As I hope this Essay has shown, the traditional law of contracts has already confronted many of the underlying issues that smart contracting presents and will provide legal decision-makers tasked with applying that body of law with a robust and flexible set of tools with which it will be possible to reach a variety of results.

V. CONCLUSION

In conclusion, I would like to offer a suggestion about the nature of the challenges that will be involved in the effort to incorporate smart contracts into the law. No doubt, large regulatory questions will require well-reasoned and nuanced responses. Some of these may require making largescale changes to existing legal regimes or, potentially, creating completely new legal doctrines. When it comes to the law of contracts, however, it seems like the nature of the challenge will be different. In the hands of judges, traditional contract law has been sufficiently flexible to handle a variety of technological innovations up to this point. Shrinkwrap contracts, Internet contracting,

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[135]   *Id.*

[136]   Rodrigues, *supra* note 116, at 45.

[137]   *Id.* at 9.

[138]   *Id.* at 54.

and the rise of email and other methods of electronic communications as a way of conducting bilateral negotiations all come to mind. As legal decision-makers are tasked with deciding the disputes that will be responsible for incorporating smart contracts into the law of contracts, it may be that the main challenges will be ensuring that they are sufficiently equipped with the knowledge they need about the technology and the way it functions—both more generally and in an application specific way—to apply these doctrines in sensible ways to result in a coherent body of law that provides the certainty and predictive ability that commercial actors require.