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Property Rights in Blockchain Assets: Emerging Issues from a U.S. Perspective

*Douglas J. Pepe, Marvin J. Lowenthal & Randall W. Bryer**

Abstract

Blockchain has the power to revolutionize the way we transact in and track ownership of assets, including by helping reduce counterparty risk, expediting transaction settlement, and improving asset provenance and recordkeeping. As technological innovations make blockchain transactions faster, easier, and more user-friendly, and as blockchain continues gaining widespread acceptance, individuals and businesses will seek to use blockchains to transact in a wider range of assets. Ownership interests in virtually any type of asset can be reposited on a blockchain, including real or personal property and digital assets, as can the right to temporarily use property owned by someone else. There are, however, numerous unsettled issues under U.S. law that could inject uncertainty into transactions in blockchain assets. This article examines some of the key issues that must be resolved if blockchain is going to be more widely utilized and how certain courts and legislatures have weighed in on these issues to date.

Keywords: blockchain, NFT, tokenization, token, tokenize.

Blockchain has the power to revolutionize the way we transact in and track ownership of assets. At its most basic level, a blockchain is a ledger that facilitates the peer-to-peer transaction of information between two parties without a trusted intermediary. That information can comprise a digital representation of value, as in the case of Bitcoin, but the application of blockchain technology has a far broader reach. Ownership interests in virtually any type of asset can be reposited on a blockchain. This can yield significant benefits, including eliminating counterparty settlement risk, expediting settlement and clearance times, reducing the need for transaction intermediaries and associated costs, and facilitating a verifiable ledger of asset ownership information.

As blockchain continues to gain acceptance and technological innovations continue to make blockchain transactions faster, easier, and more user-friendly, individuals and businesses will look to utilize blockchains to transact in a wider range of assets.

Given the importance of property rights in the blockchain space, it is somewhat surprising that relatively little scholarship exists on the subject. This article

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examines some of the key unsettled issues under U.S. law surrounding ownership interests in blockchain assets involving incorporeal and corporeal property.

A Incorporeal Assets

Incorporeal assets are generally defined as '[a]ny intangible thing without physical substance that can be owned and be the subject of rights (*e.g.*, intellectual property)'.[1]

Blockchains are uniquely suited for transactions in incorporeal assets. In fact, the first and most prominent application of blockchain technology, Bitcoin, facilitates the transfer of incorporeal value in the form of a chain of cryptographic signatures transferring digital 'coins' from one Bitcoin address to another. Those coins have no physical existence, but users imbue them with exchange value because of the unique properties of the Bitcoin blockchain ledger. While Bitcoin was the first cryptocurrency, many others have followed – either on networks developed as hard forks or code forks of Bitcoin, or as blockchains with entirely different structures and codebases like Ethereum. Other incorporeal assets – including 'Non-Fungible Tokens' or 'NFTs' and other kinds of property interests (like stocks and bonds) – can similarly be transacted on a blockchain. Significant legal issues implicated by these kinds of incorporeal blockchain assets are discussed later.

I Cryptocurrencies

Cryptocurrencies have been described generally as 'any form of currency that exists digitally or virtually and uses cryptography to secure transactions'.[2] Cryptocurrencies are typically held in addresses, representing the hash of a public key that is cryptographically related to a private key. As a technical matter, possession of the private key allows the user to transfer the cryptocurrency to another user by digitally signing it over to another address. The transaction is then broadcast to computerized nodes in a network and incorporated into a 'block', ultimately forming part of the blockchain ledger.[3]

Under this system, the only recognition of a transferee's 'ownership' is a record entry on the blockchain noting the amount of cryptocurrency held in an address. Unlike with traditional currencies, a person who acquires cryptocurrency does not obtain rights to any corresponding tangible item (*e.g.*, a dollar bill). This gives cryptocurrency a wholly incorporeal existence; an entry is simply added to the blockchain detailing the transfer without referencing anything outside the blockchain itself. This raises significant and unsettled legal issues surrounding property rights that are unique to this novel form of incorporeal asset.

1 *See* Oxford Reference, *Overview 'incorporeal property'*, www.oxfordreference.com/display/10.1093/oi/authority.20110803100000579 (last accessed 11 January 2023).

2 Kaspersky, *What Is Cryptocurrency and How Does It Work?* www.kaspersky.com/resource-center/definitions/what-is-cryptocurrency (last accessed 11 January 2023).

3 Different blockchains can have different processes for the transfer and recording of transactions. For purposes of this general overview, Bitcoin's mechanism is described for simplicity.

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Blockchains are not legal constructs. Consequently, they cannot, on their own, establish legal 'ownership'. While the person who possesses the private key associated with an address has the technical ability to transfer a cryptocurrency to another address, that is not conclusive evidence of ownership under the law. Take, for example, a situation where two users generate the same private key. While a properly derived private key should theoretically be distinct from any other, private key collisions can occur where, for example, keys are derived with insufficient entropy (*e.g.*, two users deriving a private key from the words 'private key'). Collisions are theoretically possible even in the case of securely derived keys (albeit improbable). If the private key possessed by two different users can unlock an amount of cryptocurrency in a single address, who owns that cryptocurrency? In this context, the mantra 'code is law'[4] provides an insufficient answer. The code would allow both users to spend the cryptocurrency forward. Reference must be made to some external information – some right existing outside the blockchain code itself – and traditional legal constructs supply the mechanism to mediate user disputes.

The same holds true in situations involving theft of a private key. Even the most extreme adherents to the 'code is law' formulation would not argue that a stolen private key provides legal ownership over a cryptocurrency to the thief. Courts would be called upon to address that issue, along with related issues such as whether the thief can transfer good title to innocent third parties.[5]

Similarly, consider an individual buying cryptocurrency through a custodial service – *i.e.*, an entity that holds the private keys for all cryptocurrency purchased through it, tracking user balances with the entity's own internal database. Who owns those assets? One U.S. court recently touched on these issues. In *In re Celsius Network LLC*, the Bankruptcy Court for the Southern District of New York answered this question by reference to principles of contract law.[6] The court held that the specific terms of use in place between account holders to the company in that case formed an enforceable contract that transferred title from the account holders to the company.[7] Interestingly, earlier versions of the terms of service 'did not contain any clauses regarding Celsius taking rights to ownership', but the *Celsius* court did not address the implications of those terms in light of testimony that 99% of assets had assented to the more recent terms.[8] Determining ownership interests in the absence of contractual language addressing it will have to await resolution in another case.

4 The phrase was apparently coined by Lawrence Lessig in his book *Code and Other Laws of Cyberspace*, Basic Books 1999. *See also* Lawrence Lessig, *Code Is Law – On Liberty in Cyberspace*, Harvard Magazine (2000), www.harvardmagazine.com/2000/01/code-is-law-html.

5 Restatement (Third) of Restitution and Unjust Enrichment § 13(d) (2011) (October 2022 Update) (distinguishing *void* and *voidable* transfers).

6 *In re Celsius Network LLC*, No. 22-10964-mg (S.D.N.Y 4 January 2023) (ECF No. 1822).

7 *Id.*, at 31-43.

8 *Id.*, at 38-39.

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As the discussion above demonstrates, while crypto adherents often repeat that 'code is law' and cryptocurrencies are often described as digital 'bearer assets',[9] that paints an oversimplified picture. Law is law. Even in the case of incorporeal assets like cryptocurrencies, courts will have little difficulty piercing through *possession* of a private key to determine *ownership* by reference to traditional legal constructs. Issues surrounding ownership and property interests in cryptocurrencies can and will be resolved by the legal system, as was the case in *Celsius*.

II Other Incorporeal Blockchain Assets

Following the release of Bitcoin, blockchain technology has more recently become home to other forms of incorporeal assets beyond the representation of value. Various kinds of purely digital items – including digital artwork, photographs, videos, songs, and virtual collectibles – have been increasingly bought, sold, and tracked on blockchains. These items are often 'minted' on a blockchain by association with NFTs, which are blockchain assets that typically contain a reference to external information or media in the form of a cryptographic hash.[10]

Blockchain technology is particularly useful for incorporeal digital assets like these because it is almost purpose-built to establish provenance: proving the authenticity of an asset by tracking on the blockchain the ownership of a digital asset. For example, if the Astros sold digital pictures commemorating the 2022 World Series, those assets would have little value if anyone could make an indistinguishable copy with the click of a mouse. Connecting the collectible or picture to NFTs allows easy separation of authentic, original collectibles from otherwise identical copies, establishing provenance of the genuine item on the blockchain.

Blockchain technology could also be used to track newly created property rights by establishing an easily accessible and tamper-proof blockchain ledger upon which to record patents and copyrights, bypassing some of the inefficiency inherent in patent and regulatory bodies.[11] Creating a centralized, blockchain-based way to register intellectual property would also make it easier to determine creatorship and proof of ownership, and to distribute royalties upon use of another person's creation.[12]

With the proliferation of NFTs specifically, it is important to consider and understand what rights are conferred by them. NFTs often purport to represent ownership interests not only in the blockchain asset itself, but its associated media referenced within the NFT as well. This raises several basic but interesting legal issues beyond those implicated by cryptocurrencies.

9 *See, e.g.*, Fidelity Investments, *Bitcoin and Digital Assets: Understanding the Digital Ecosystem*, Fidelity Institutional Insights (2022), https://institutional.fidelity.com/app/proxy/content?literatureURL=/9903921.PDF.

10 *See, e.g.*, Marvin Lowenthal, *MLB-Sorare Deal Suggests Bright Future for NFT-Based Fantasy Sports Games*, Blockchain Law Alliance (13 May 2022), https://roundtable.io/blockchain-law-alliance/breaking-news/mlb-sorare-deal-suggests-bright-future-for-nft-based-fantasy-sports-games.

11 Miriam Stankovich, *Is Intellectual Property Ready for Blockchain?* Digital @ Dai (2 September 2021), https://dai-global-digital.com/is-intellectual-property-ready-for-blockchain.html.

12 *Id*.

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First, is the question: who owns the rights to the NFT media? Broadly speaking, intellectual property law gives creators certain, often exclusive, rights to use their creations.[13] As explained above, NFTs often contain a reference to off-blockchain property, but do not actually contain the picture, artwork, video, or song. This raises a series of interrelated issues. Namely, whether the bundle of rights the NFT purchaser has acquired includes only the blockchain asset with reference to the media, or it also includes the right to display, transfer, sell, or otherwise use the underlying media itself.

Although the answer to these questions has not been definitely resolved in the NFT context, traditional intellectual property law will certainly be called upon to address them. Ordinarily, when an artist creates a painting, the artist gains a copyright over that work that is distinct from the painting itself.[14] A purchaser may use it but may not copy it without the copyright holder's permission.[15] Where the artist connects an NFT to a unique, potentially copyrightable asset like an image, does copyright law confer the same rights to the NFT purchaser? The answer may not be so clear-cut. Remember, an off-chain asset like an NFT consists of various components – the on-chain cryptographic hash and the off-chain image that is referenced by the hash. It is unclear whether courts would determine that the purchaser's rights are limited to the ability to transact in the hash or whether, in the absence of terms between the purchaser and seller, a right to display and transact in the underlying image referenced by the hash will be implied. Notably, some commentators believe that many existing NFT projects have not taken all of the necessary steps needed to make NFTs confer the rights that transacting parties expect.[16]

Recent efforts have been undertaken to rationalize and demystify intellectual property in the blockchain NFT context. One such effort is through the development and publication of NFT-specific public licences, called the 'Can't Be Evil' Licences,[17] which are freely available for use in a public, open-source repository.[18] These licences contain built-in mechanisms specifying the rights that attach to an NFT, allowing the creator, seller, and purchaser of an NFT to better understand the specific rights associated with NFT ownership.[19]

Even where existing legal constructs apply, however, unique applications arise in the context of new technology. NFTs are no different. One interesting case involved the question whether minting an NFT of another person's copyrighted

13 *See, e.g.*, *What Are Intellectual Property Rights?* World Trade Organization, www.wto.org/english/tratop_e/trips_e/intel1_e.htm ('Intellectual property rights are the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time'.); Copyright Act of 1976, 17 U.S.C. § 106.

14 *See* Copyright Act of 1976, 17 U.S.C. § 102(a) (1976).

15 Moish E. Peltz, *IP and Non-Fungibility: The Intersection of Intellectual Property and NFTs*, Falcon Rappaport & Berkman LLP (15 March 2021), https://frblaw.com/intellectual-property-and-nfts/.

16 James Grimmelmann, Yan Ji, and Tyler Kell, *The Tangled Truth about NFTs and Copyright*, The Verge (8 June 2022), www.theverge.com/23139793/nft-crypto-copyright-ownership-primer-cornell-ic3.

17 Miles Jennings and Chris Dixon, *The Can't Be Evil NFT Licenses*, a16zcrypto (31 August 2022), https://a16zcrypto.com/introducing-nft-licenses/.

18 *See* https://github.com/a16z/a16z-contracts.

19 *See* Jennings and Dixon, *supra* note 18.

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work is transformative enough to obtain a new copyright and avoid an infringement claim. In April 2022, a person attempted to sell an NFT of a digital image of a Basquiat painting that was protected by the artist's copyright.[20] The case was resolved without adjudicating that legal issue, so it remains unclear whether digitizing a copyrighted painting and tying it to an NFT is sufficiently transformative to avoid a copyright infringement claim,[21] but the courts will need to answer that question.[22]

Similarly, interesting issues arise when intellectual property rights are tied solely to the ownership of an NFT that is stolen. In May 2021, for example, a valuable Bored Ape Yacht Club NFT was stolen from the purchaser's blockchain wallet.[23] The terms of service applicable to the NFT stated: 'When you purchase an NFT, you own the underlying Bored Ape, the Art, completely. Ownership of the NFT is mediated entirely by the Smart Contract and the Ethereum Network'.[24] Because ownership of the underlying intellectual property belonged to whoever owned the NFT, it was unclear whether the dispossessed purchaser could proceed with a television show he had been planning that used the character pictured in his NFT.[25] Ultimately, the purchaser appears to have bought back the stolen NFT for nearly $300,000.[26] This would have raised interesting issues, however, if the purchaser had sued rather than resorting to self-help, since the owner's right to the intellectual property derived from a contractual arrangement explicitly requiring ownership to be 'mediated entirely by the Smart Contract and the Ethereum Network'. Putting aside the thorny question whether such an agreement would be binding and enforceable to specify a dispute resolution forum (courts vs. the 'Smart Contract and the Ethereum Network'), it is conceivable that a court would analyze the intellectual property rights in tandem with the terms limiting ownership of those rights to the holder of the key for the address holding the NFT. How courts will address these kinds of issues remains completely unsettled.

Another interesting situation that arises in the NFT context involves the scenario where the NFT references media that is no longer hosted anywhere and therefore can no longer be retrieved. This can happen, for example, when the issuer of an NFT originally hosts the file referenced by, it but goes out of business or stops hosting the file for some other reason. If the purchaser does not maintain and host a copy of the file, it can be lost. Parties can address issues surrounding storage and maintenance of the NFT file in terms of service. Many do not. In the absence of an

20 Nicholas O'Donnell, *No, You Probably Can't Sell Your Basquiat as an NFT*, Apollo: The International Art Magazine (12 May 2021), apollo-magazine.com/basquiat-nft-intellectual-property-copyright/#:~:text=No%2C%20you%20probably%20can't%20sell%20your%20Basquiat%20as%20an%20NFT.

21 *See id*.

22 *See* Peltz, *supra* note 16.

23 Sarah Emerson, *Someone Stole Seth Green's Bored Ape, Which was Supposed to Star in His New Show*, BuzzFeedNews (24 May 2022), www.buzzfeednews.com/article/sarahemerson/seth-green-bored-ape-stolen-tv-show.

24 Terms of Service, https://boredapeyachtclub.com/#/terms.

25 *See* Emerson, *supra* note 24.

26 Sarah Emerson, *Seth Green's Stolen Bored Ape is Back Home*, BuzzFeedNews (9 June 2022), www.buzzfeednews.com/article/sarahemerson/seth-green-bored-ape-nft-returned.

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agreement, it is not clear what legal doctrines could apply in a suit between the purchaser and issuer. Several tort principles could conceivably apply, but a body of law has not fully developed to address these kinds of questions. Moreover, given the transnational nature of blockchain networks, outcomes are bound to vary by jurisdiction.

Courts, legislatures, and/or the industry itself have barely begun to scratch the surface in planning for and resolving these and similar issues. It is incumbent upon NFT creators (and those advising them) to think about these and myriad other potential issues when creating and purchasing NFTs and getting involved in blockchain technology.

III Non-possessory Property Rights

Non-possessory property interests (NPIs) can be transferred and tracked on the blockchain as well. These often take the form of rights transferred by agreements, such as royalties, financial instruments, including stocks and bonds, or contractual rights and obligations.

Blockchains can have many advantages over traditional systems in maintaining ownership ledgers for NPIs. Consider, for instance, the ownership and transfer of stocks. Stock transactions once historically cleared through the exchange of physical certificates. As the volume of transactions grew, this created massive inefficiencies culminating in what is often referred to as the Wall Street paperwork crisis of the late 1960s and early 1970s.[27] Clearing corporations like the Depository Trust Company and National Securities Clearing Corporation arose to 'immobilize securities and clear and settle trades' for exchanges.[28] Those organizations ultimately consolidated under the Depository Trust & Clearing Corporation (DTCC), which now serves as a centralized infrastructure that settles and clears 'nearly all US market trades in equities' and other securities and derivatives.[29]

Clearing of stock trades through DTCC's central system takes substantial time (with associated settlement risks) and has been known to give rise to uncertainties in the record ledger of securities ownership. Regarding time, settlement times have been reduced from historical five- and three-day (T+5 and T+3) settlement systems to a two-day (T+2) settlement system in 2017, with a push to move to a one-day

27 Virginia B. Morris, *Guide to Clearance & Settlement: An Introduction to DTCC*, Lightbulb Press, at 7, www.dtcc.com/-/media/Files/Downloads/DTCC-Connection/DTCC-Interactive-Guide-to-Clearance-and-Settlement-2022.pdf. 'DTC, the central securities depository subsidiary of DTCC, provides settlement services for virtually all broker-to-broker equity and listed corporate and municipal debt securities transactions in the U.S…'. DTCC, *Settlement and Asset Services*, www.dtcc.com/settlement-and-asset-services#:~:text=The%20Depository%20Trust%20Company%20(DTC,settled%20at%20DTCC%20in%20an (last accessed 11 January 2023).

28 *See, e.g.*, The Depository Trust & Clearing Corporation, *An Introduction to DTCC Services and Capabilities*, at 1, www.sechistorical.org/collection/papers/2010/2010_0701_DTCCServices.pdf.

29 *See id*.; *see also* Morris, *supra* note 28, at 7 ('DTC, as a central securities depository, holds custody of 85% to 90% of all securities in the United States and services those assets for financial firms on behalf of investors.').

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(T+1) settlement system by 2024.[30] While industry participants continue to study mechanisms to reduce transfer and settlement times in the securities context, blockchain provides a mechanism for real-time settlement of transactions.[31] Transactions on the Ethereum blockchain, for example, typically take between 15 seconds and 5 minutes.[32] The Ravencoin blockchain, which was designed for the transaction of blockchain assets, including securities, settles transactions in approximately 1 minute.[33] Real-time (T+0) trades have the potential to eliminate counterparty risk in securities transactions, and to reduce the inefficiencies that exist in the current centralized system that arose to address an outdated problem.

Regarding uncertainty in the transaction record, the bulk of securities under the current system are held in 'street name' through DTCC's nominee, Cede & Co. Problems with this system are not unknown. For example, in 2013, Dole Food Company (Dole) was sued for allegedly paying shareholders inadequate consideration in a going-private transaction. When shareholders submitted claims to receive payments from the settlement, claimants submitted facially eligible claims for approximately 33% more shares of Dole stock than actually existed.[34] When the settlement administrator contacted DTCC for help, the DTCC representative explained that DTCC's ledger did not reflect all the trades in Dole's stock from the day of the merger or two days before it, so DTCC could not easily resolve the confusion over share ownership.[35] The secure, real-time blockchain ledger has the potential to eliminate uncertainties in record ownership like those at issue in the *Dole Food Co*. case, and the unforgeable nature of blockchain records eliminates the prospect of claims of share ownership exceeding the number of shares that actually exist.

While blockchains have significant potential benefits, there are multiple legal hurdles to transacting in securities and other kinds of NPIs on the blockchain. First, there is the basic question whether these interests can be reposited on the blockchain at all. Only a few states have amended their laws to expressly permit recording ownership of stocks, for example, on a blockchain. Delaware amended the Delaware's General Corporation Law in 2017 to permit companies to use blockchain to issue and track stocks.[36] Wyoming followed suit in 2019, passing a law allowing corporations to issue a portion of their shares as certificate tokens on

30 Securities and Exchange Commission Release Nos. 34-94196, 1A-5957, *Shortening the Securities Transaction Settlement Cycle*, File No. S7-05-22 (9 February 2022); *see also SEC Issues Proposal to Reduce Risks in Clearance and Settlement* (9 February 2022), www.sec.gov/news/press-release/2022-21.

31 Marco Iansiti and Karim R. Lakhani, *The Truth About Blockchain*, Harvard Business Review (January-February 2017), https://hbr.org/2017/01/the-truth-about-blockchain.

32 Andrey Sergeenkov, *How to Check Your Ethereum Transaction*, CoinDesk (19 August 2022), www.coindesk.com/learn/how-to-check-your-ethereum-transaction/.

33 Bruce Fenton and Tron Black, *Ravencoin: A Peer to Peer Electronic System for the Creation and Transfer of Assets* (3 April 2018), https://ravencoin.org/assets/documents/Ravencoin.pdf.

34 *See In re Dole Food Co., Inc*., No. CV 8703-VCL, 2017 WL 624843, at *2 (Del. Ch. 15 February 2017).

35 *Id*. at *3.

36 *See, e.g*., DGCL §219 (defining 'stock ledger' as 'records administered by or on behalf of the corporation'); *id*. §224 (permitted records 'administered by or on behalf of the corporation' to be kept as '1 or more electronic networks or databases (including 1 or more distributed electronic networks or databases)').

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a blockchain.[37] Recording ownership of and transactions in stocks may not be permissible, however, in certain other states in the absence of similar enabling legislation.

Second, federal law regulates the creation and transfer of certain NPIs. The classic example is publicly issued securities, which are subject to registration requirements and an extensive body of regulation governing exchanges, broker-dealers, and transfer agents. While a few intrepid startup companies have waded into the thicket of these regulations, they have not been substantially recalibrated to account for the use of blockchain to transact in securities.[38]

Third, federal law has an extensive and overlapping set of rules applicable to financial institutions and financial service companies, including broker-dealers and others in the securities industry, mandating compliance with know your customer (KYC) and anti-money laundering (AML) requirements designed to prevent identity theft, money laundering, and fraud.[39] Application of these rules to the unique context of blockchain-traded securities has little guidance or judicial precedent.

B Corporeal Assets

A corporeal asset is defined as '[a]ny tangible thing, including land, which has physical substance and can be owned'.[40] Blockchains have been used for recording and transactions in real and personal property, raising interesting issues of property law in these contexts.

I Real Property

Although the practice is not yet widespread, there is a growing trend towards recording ownership interests in real property on the blockchain.[41] Ordinarily, in the United States, ownership of real property is transferred by a deed and recorded on a physical ledger with a local or county clerk's office. Certain jurisdictions are

37 WY Stat. §17-16-625 ('The articles of incorporation or bylaws of a corporation may specify that all or a portion of the shares of the corporation may be represented by share certificates in the form of certificate tokens.').

38 *See* Securities Act of 1933, 15 U.S.C. §77a; Securities Exchange Act of 1934, 15 U.S.C. §78a; Coindesk, *SEC Approves Blockchain Tech Startup Securitize to Record Stock Transfers* (21 August 2019), www.coindesk.com/markets/2019/08/21/sec-approves-blockchain-tech-startup-securitize-to-record-stock-transfers/; Reuters, *U.S. SEC Approves New U.S. Exchange with Blockchain Feed, Faster Settlement* (28 January 2022), www.reuters.com/business/us-sec-approves-new-us-exchange-with-blockchain-feed-faster-settlement-2022-01-28/. See generally www.sec.gov/news/public-statement/enforcement-tm-statement-potentially-unlawful-online-platforms-trading.

39 *See, e.g.*, Bank Secrecy Act, 31 U.S.C. §§ 5311, *et seq*.; Exchange Act Rule 17a-8, 17 C.F.R. § 240.17a-8; USA Patriot Act, Pub. L. No. 107-56, 115 Stat. 296 (2001). See generally SEC, *Anti-Money Laundering (AML) Source Tool for Broker-Dealers* (16 May 2022), www.sec.gov/about/offices/ocie/amlsourcetool. And see the article by Frank Emmert in this issue.

40 *See* Oxford Reference, *supra* note 2, www.oxfordreference.com/display/10.1093/oi/authority.20110803095640379;jsessionid=B378C6D8FD6EEFE443BAEDB8E21F1A45.

41 *Medici Land in Blockchain Deal with Another Wyoming County*, Ledger Insights (14 April 2020), www.ledgerinsights.com/medici-land-record-blockchain-wyoming/.

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beginning to experiment with blockchains to record deeds in lieu of a physical ledger, for example, in parts of Wyoming[42] and Vermont.[43] The appeal of the blockchain to record land deeds is apparent: it makes real-time settlement and recording of real estate title possible, keeps such records in a digitized and more easily accessible manner, and simplifies title searching, potentially reducing insurance and other transaction costs.

The blockchain can also be used to facilitate and simplify various facets of real property administration including mortgage securitization, property management, accounting, and property development projects.[44]

Although the existing body of property law should be able to accommodate blockchain technology, it is not perfectly equipped for all the unique aspects of blockchain. As an initial matter, while a few states currently permit the recording of blockchain deeds, blockchain land titles are not recognized as valid in most states. Moreover, to combat fraud and protect the interests of owners and good faith purchasers, many states and municipalities designate a physical location where a transfer of property must be recorded and require certain authentication protocols. The desire for a centralized recording repository, with its formalities, is at odds with blockchain technology.[45]

A related question concerns whether transfer of a deed over the blockchain, such as by transferring the property's tokenized blockchain asset, is an effective transfer at all under the current legal framework.[46] For example, it is far from clear in jurisdictions that do not explicitly recognize blockchain titles that the minting of an ownership interest in real property is legally permissible. With respect to the transfer of title, use of the blockchain to record or transfer deeds could potentially run afoul of the statute of frauds, which requires certain contracts – including agreements for the transfer of an interest in land – to be in writing and signed by the parties. It is unclear whether courts will recognize the computer code used to program a smart contract,[47] or to execute a transaction on the blockchain through a cryptographic signature, as satisfying the statute of frauds.[48] One commentator has argued that over 100 years of precedent support a broad interpretation of what

42 *See, e.g.*, Anna Baydakova, *Wyoming County Moves to Put Land Records on Blockchain*, CoinDesk (13 September 2021), www.coindesk.com/markets/2018/12/21/wyoming-county-moves-to-put-land-records-on-blockchain/; Edward Ongweso Jr., *Crypto Investors Buy 40 Acres of Land in Wyoming to Build Blockchain City*, Vice (3 November 2021), www.vice.com/en/article/93b5ve/crypto-investors-buy-40-acres-of-land-in-wyoming-to-build-blockchain-city.

43 *See* Ben Miller, *Here's What a Blockchain Property Deed Looks Like*, Government Technology (7 April 2022), www.govtech.com/biz/heres-what-a-blockchain-property-deed-looks-like.html.

44 *See What Are the Benefits of Blockchain in Real Estate*, Consensys, https://consensys.net/blockchain-use-cases/real-estate/.

45 *See* Mercedes Tunstall, et al., *Real Property Transfers Ripe for Blockchain Dispute*, 31 International Law Practicum No. 1, at 3 (2018).

46 *Id*.

47 Smart contracts are 'programs stored on the blockchain that run when predetermined conditions are met'. IBM, *Smart Contracts Defined*, www.ibm.com/topics/smart-contracts.

48 The same question arises in transactions in personal property when the statute of frauds applies to such transactions.

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satisfies the signature requirement,[49] such that courts should view the parties' private keys as sufficient.[50] But such a result is not certain until courts have been confronted with and ruled upon this specific issue.

II Personal Property

Blockchain could be used to track ownership of personal property in a similar manner to real property. In some cases, it may be hard to identify the specific piece of personal property that corresponds to the blockchain entry, but it would work for any personal property with a serial number or other unique means of identification. For example, one company, Everledger, stores serial numbers and descriptions of diamonds on the blockchain along with the current owner.[51] Not only would tracking personal property help prove ownership of lost or stolen items, but it could also help establish the authenticity of products, reducing the $500 billion cost to the global economy each year caused by counterfeit goods.[52]

Unfortunately, Article 2 of the UCC, which governs transactions in personal property,[53] does not fully account for all the possible complications caused by transacting on the blockchain. For example, Part 2 of Article 2 explains the requirements for forming a contract and how to address later modifications. But in smart contracts, the parties will often simultaneously agree on computer code that executes their agreement and a written language description of their agreement. There will inevitably be times when those agreements are not aligned.[54] The UCC provides no guidance for determining which of these two simultaneously executed agreements reflects the intent of the parties, and even proposed Article 12 of the UCC, which specifically discusses blockchain transactions, does not address this question.[55]

49 *See* Benjamin Van Adrichem, *Enforceability of Smart Contracts under the Statute of Frauds*, Columbia Science and Technology Law Review (excerpt) (31 January 2018), https://journals.library.columbia.edu/index.php/stlr/blog/view/162 (citing *Bibb v. Allen*, 149 U.S. 481 (1893) (holding that a contract in the Shepperson Cotton Code, a telegraphic cipher code, was binding), *and Lamle v. Mattel*, 394 F.3d 1355 (Fed. Cir. 2005) (holding that names at the end of telegrams are sufficient under the Statute of Frauds)).

50 *Id*.

51 RedChalk Group, *Using the Blockchain to Track Assets for Proof of Ownership*, www.redchalk.com/feature/using-the-blockchain-to-track-assets-for-proof-of-ownership-5/.

52 U.S. Chamber of Commerce, *Back-to-School: Business and Law Enforcement Team Up to Protect Students, Parents, and Teachers from Counterfeit Goods* (11 August 2022), www.uschamber.com/intellectual-property/back-to-school-business-and-law-enforcement-team-up-to-protect-students-parents-and-teachers-from-counterfeit-goods#:~:text=money%20over%20time%20Counterfeit%20products%20cost%20the%20global%20economy%20over%20%24500%20billion%20a,about%20the%20dangers%20of%20counterfeits.

53 *See* U.C.C. §2-102 ('[T]his Article applies to transactions in goods'); U.C.C. §2-105 (defining 'goods' as 'all things … which are movable at the time of identification to the contract for sale other than the money in which the price is to be paid…'.).

54 *See* Stuart D. Levi and Alex B. Lipton, *An Introduction to Smart Contracts and Their Potential and Inherent Limitations*, Harvard Law School Forum on Corporate Governance (26 May 2018), https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/.

55 *See* U.C.C. §12.

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Blockchain technology can also be used to establish the authenticity of personal property easily and efficiently. This can be critical for certain personal property, such as art, where authenticity and provenance are key bases of value.[56] Traditionally, establishing the authenticity of a piece of art is expensive and time consuming,[57] and even diligent buyers relying on trusted sellers may purchase forgeries, such as when a 'Chagall' purchased from Sotheby's was later declared inauthentic by French art experts.[58] Tracking title and authentication information on a public blockchain gives buyers more information about the artwork for sale and allows them to take title with more confidence. Several companies are already implementing such technologies. The Southwestern Association for Indian Arts partnered with a blockchain-based registry to create a global art registry on which artists can certify their works, allowing sellers to transfer a certificate of authenticity easily to the buyer.[59] Another company, Chronicled, developed a Cryptoseal that can be affixed to artwork, so that the physical item can be linked to a corresponding entry on the blockchain. That linkage prevents someone from buying an authentic painting and then selling a forgery of it along with the original's certificate of authenticity.[60] Whatever mechanism is used, using blockchain to publicly disseminate title and authentication information for art and other high-value personal property allows people to determine authenticity more quickly, limits how often buyers and sellers need to employ expensive authentication experts, and enables a broader base of people to confidently purchase high-value personal property like fine art.

III Right to Use Property

In addition to managing ownership rights, blockchain can be used to manage and assign the right to access or use property. For example, blockchain could be used to record a simple signup list from which no one's name could be erased, or the assignment system could be more complex so that assigned usage times could be traded. Integrating these tracking mechanisms into a smart contract could even

56 Katie Dixon and Zachary Shufro, *Risky Business: Fraud, Authenticity, and Limited Legal Protections in the High Art Market*, 10 JIPEL No. 2 (29 May 2021), https://jipel.law.nyu.edu/risky-business-fraud-authenticity-and-limited-legal-protections-in-the-high-art-market/#II; Lisa A. Karczewski, *Long-Lost Painting Discovered in French Attic is Declared a Caravaggio Valued at $136M* (20 April 2016), www.mondaq.com/unitedstates/Media-Telecoms-IT-Entertainment/484772/LongLost-Painting-Discovered-In-French-Attic-Is-Declared-A-Caravaggio-Valued-At-136M?country_id=Guatemala (Caravaggio painting declared authentic by French art dealer after 2 years of research).

57 Jacqueline O'Neill, *Art Authentication Is Flawed. Here's How Blockchain Can Fill in the Gaps*, Blockchain Art Collective (30 April 2018), https://medium.com/blockchain-art-collective/art-authentication-is-flawed-heres-how-blockchain-can-fill-in-the-gaps-79cc1ec94a0f ('Authentication of art is prohibitively expensive for most people').

58 Liz Catalano, *A Fake Chagall Painting? Attribution and Authenticity in the Auction World*, AuctionDaily (15 July 2022), https://auctiondaily.com/news/a-fake-chagall-painting-attribution-and-authenticity-in-the-auction-world.

59 Chez Oxendine, *Southwestern Association for Indian Arts Partners with Native-Owned Blockchain Registry to Combat Fraud* (12 September 2022), https://tribalbusinessnews.com/sections/arts-and-culture/14021-southwestern-association-for-indian-arts-partners-with-native-owned-blockchain-registry-to-combat-fraud.

60 O'Neill, *supra* note 58.

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allow the owner of the property to be compensated for the use of its assets without a middleman.

Currently, society has countless systems that help owners rent otherwise idle assets to others. Through AirBNB, property owners can let others use their space for a fee. But instead of using AirBNB as the trusted intermediary between renter and owner, the parties could enter into a smart contract whereby the renter pays a fee and the smart contract emails him the passcode to the owner's front door. Eliminating intermediaries and distributing property use rights on the blockchain will make the process of renting out property more efficient. Some companies are already using blockchain to distribute such rights to use property. For example, Zennet uses the blockchain to allow people to sell their computers' idle processing power. Zennet will complete tasks that require a substantial amount of processing power by dividing the tasks among the numerous idle machines.[61]

Leases of personal property on blockchain, such as renting sports equipment, present the same legal challenges as sales of personal property on blockchain. Section 2A of the UCC governs leases of personal property[62] using very similar provisions to those in Section 2 of the UCC that govern sales of such property.

Leases of real property, on the other hand, will likely be governed by local laws and any agreement the owner made concerning use of the property. Landlord-tenant laws are local, and so are not consistent across different parts of the United States,[63] and those variations may create legal pitfalls for the unwary. For example, some landlord-tenant laws impose disclosure responsibilities on lessors whenever a new lease occurs.[64] Courts will need to determine whether transferring the right to lease someone's space through blockchain creates a new lease.

C Conclusion

Although many of the most common uses today for blockchain are adequately accounted for under existing law, there are other uses of blockchain today, and many more potential future uses, for which existing laws are inadequate. Given the benefits transacting on the blockchain could provide, modern society would benefit from the passage of new laws and regulations that allow this revolutionary technology to reach its full potential.

61 Danny Bradbury, *Zennet to Pay for Distributed Computing with Blockchain Tech*, CoinDesk (12 December 2022), www.coindesk.com/markets/2014/11/29/zennet-to-pay-for-distributed-computing-with-blockchain-tech/.

62 UCC §2A-102 (This article applies to any transaction, regardless of form, that creases a lease); *id*. § 2A-103(j) ("'Lease' means a transfer of the right to possession and use of goods for a term in return for consideration.....').

63 See generally Avail, *Landlord-Tenant Laws of the US*, www.avail.co/education/laws.

64 N.Y. Real Property Law § 231-A; *see* Caretaker, *Mandatory Landlord Disclosures in New York* (19 June 2020), https://caretaker.com/learn/lease-agreements/mandatory-landlord-disclosures-in-new-york ('Every residential lease shall provide conspicuous notice in bold face type as to the existence or non-existence of a maintained and operative sprinkler system in the leased premises.').

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