DIGITAL ASSETS AND THE PROPERTY QUESTION

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Abstract

Is crypto property? The proliferation of digital assets such as cryptocurrencies, stablecoins, memecoins, and NFTs has confronted legal systems worldwide with three interdependent challenges: determining whether they are property, identifying their appropriate classification within property taxonomies, and establishing rules for their circulation in commerce. Our Article addresses this tripartite question—the *Property Question*—within American law.

The stakes here are significant. Billions of dollars in digital assets are traded daily, used as collateral, and held by custodial platforms. Yet all these transactions rest on an unresolved premise: that digital assets can be owned and are governed by established property rules. This fundamental uncertainty affects everything, spanning the recovery of stolen cryptocurrencies, customers' rights in crypto platform bankruptcies, good faith purchaser protections, and even tax and accounting.

This Article makes two primary contributions. First, we provide a comprehensive analysis of digital assets as property under American law, examining both the historical development and the current framework under the new Article 12 of the Uniform Commercial Code. Second, through this investigation, we illuminate a broader pattern in the evolution of American property law: formalistic reasoning and traditional categories, such as *choses* in action and *choses* in possession, have given way to a more functional approach that prioritizes alignment with market practices and societal expectations.

Answering the *Property Question* yields significant normative insights. We clarify uncertainties that presently beset property rights in digital asset markets, thereby establishing solid foundations for regulatory interventions in this space. Furthermore, our analysis sheds light on how American law understands and governs personal property, revealing a distinct approach that favors pragmatism

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over doctrinal purity. Together, these insights not only help us navigate the rapid evolution of digital assets but also offer a blueprint for incorporating future forms of intangible property into our legal system.

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INTRODUCTION

The story of crypto presents a striking paradox. From Main Street to Wall Street and, most recently, the White House—what began in 2009 as an idealistic experiment in digital cash has exploded into a complex multi-trillion ecosystem that increasingly intertwines with traditional finance and global commerce.[1] Major institutions like BlackRock and Fidelity now offer cryptocurrency services, payment giants facilitate digital asset transactions for hundreds of millions of users, and even traditionally skeptical governments are embracing these novel assets.[2] Yet beneath this remarkable growth lies a fundamental uncertainty: **what exactly are digital assets?** More specifically, from a private law perspective, how should the law treat these intangible, code-controlled assets that exist purely as entries on distributed ledgers? Are they property? If so, how do they fit within existing property taxonomies? And what rules should govern their circulation in commerce?

This tripartite inquiry (which we moniker, the *Property Question*) is far from academic. Every day, market participants execute millions of transactions worth billions of dollars, relying on an uncertain patchwork of traditional legal frameworks awkwardly adapted to this new technology.[3] The practical implications are both immediate and far-reaching. When digital assets are stolen through hacks or fraud, courts must grapple with whether they constitute "property" that can be recovered through traditional remedies like conversion

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[1] Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG https://bitcoin.org/bitcoin.pdf. [https://perma.cc/MN3P-KSPJ]; Bernard Marr, *Bitcoin's Trillion-Dollar Comeback: The Market Shift You Can't Ignore*, FORBES (Dec. 9, 2024), https://www.forbes.com/sites/bernardmarr/2024/12/09/bitcoins-trillion-dollar-comeback-the-market-shift-you-cant-ignore/ (last visited Feb. 16, 2025); James Royal, *Bitcoin Price History: From Its 2009 Launch to its 2025 Heights*, BANKRATE, https://www.bankrate.com/investing/bitcoin-price-history/ (last visited Feb. 16, 2025); Exec. Order No. 14067, 90 Fed. Reg. 8647 (Jan. 23, 2025), https://www.whitehouse.gov/presidential-actions/2025/01/strengthening-american-leadership-in-digital-financial-technology/.

[2] *Bitcoin Investing*, BLACKROCK, https://www.blackrock.com/us/financial-professionals/investments/products/bitcoin-investing (last visited Feb. 16, 2025); *Crypto Trading*, FIDELITY, https://www.fidelity.com/crypto/trading (last visited Feb. 16, 2025); Jay Peters, *PayPal and Visa Embrace Blockchain Stablecoins*, THE VERGE (Oct. 3, 2024), https://www.theverge.com/2024/10/3/24261453/paypal-visa-blockchain-stablecoins (last visited Feb. 16, 2025); Emma Pecenicic: "El Bitcoin es un Buen Diversificador. Tiene sentido asignar un porcentaje de la cartera a este active," CINCO DÍAS (Nov. 25, 2024), https://cincodias.elpais.com/criptoactivos/2024-11-25/emma-pecenicic-fidelity-el-bitcoin-es-un-buen-diversificador-tiene-sentido-asignar-un-porcentaje-de-la-cartera-a-este-activo.html (last visited Feb. 16, 2025).

[3] *Trading Volume*, COINCODEX, https://coincodex.com/trading-volume/ (last visited Feb. 14, 2025).

and replevin.[4] When these assets are pledged as collateral in lending arrangements—a market that reached $130 billion in 2024—lenders need clarity on how to perfect and enforce their security interests against both the borrower and third parties.[5] When major crypto platforms like FTX, Celsius, and Genesis become insolvent, bankruptcy courts must navigate complex questions about whether customers' digital asset deposits belong to the debtor's estate or else constitute separately owned property that should be returned to account holders.[6] Even routine business matters, from recording digital assets on balance sheets to determining their tax treatment, hinge on their fundamental legal characterization.[7] And the stakes of these questions have only grown as institutional investors, banks, and payment processors have entered the digital asset ecosystem, bringing with them the need for clear legal frameworks that can support sophisticated commercial arrangements.[8]

The legal systems of major jurisdictions across the globe have responded to the challenges of the Property Question in dramatically different ways. Common law jurisdictions outside the United States have recognized digital assets as property, yet have remained entangled in a theoretical debate about their classification.[9] This formalistic preoccupation has impeded the development of rules governing their use in market transactions, resulting in a problematic legal *lacuna*.[10] In the United States, by contrast, these taxonomy questions have largely been ignored.[11] Instead, American courts have pragmatically accepted digital assets as property and focused primarily on trying

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[4] *See, e.g.*, Ox Labs, Inc. v. BitPay, Inc., No. CV 18-5934 (KSX), 2020 WL 1039012 (C.D. Cal. Jan. 24, 2020); Temurian v. Piccolo, No. 18-cv-62737, 2019 WL 1763022 (S.D. Fla. Apr. 22, 2019) (discussing conversion claims for misappropriated digital assets).

[5] *See Lending Protocols*, DEFI LLAMA, https://defillama.com/protocols/lending (last visited Feb. 14, 2025).

[6] *See* In re Celsius Network LLC, 644 B.R. 276, 280 (Bankr. S.D.N.Y. 2022); In re FTX Trading Ltd., No. 22-11068, 2024 WL 4562675 (Bankr. D. Del. Oct. 23, 2024); In re Genesis Glob. Holdco, LLC, 652 B.R. 618, 623 (Bankr. S.D.N.Y. 2023). *See also* Kara Bruce et al., *Bankrupt Crypto Organizations*, N.C. L. REV. (forthcoming 2025) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5115277.

[7] *See* Fin. Acct. Standards Bd., *Accounting for and Disclosure of Crypto Assets, Accounting Standards Update 2023-08*, FASB (Dec. 2023), https://www.fasb.org/page/PageContent?pageId=/projects/recentlycompleted/accounting-for-and-disclosure-of-crypto-assets.html; *See also* I.R.S. Notice 2014-21, 2014-16 I.R.B. 938 (providing guidance on taxation of virtual currencies).

[8] U.S. DEP'T OF THE TREASURY, FIN. STABILITY OVERSIGHT COUNCIL, *Report on Digital Asset Financial Stability Risks and Regulation* (2023), https://home.treasury.gov/system/files/261/FSOC2023AnnualReport.pdf (emphasizing increased institutional participation in digital asset markets).

[9] *See infra* Parts II.B and III.B.

[10] *See infra* Parts II.B and III.B.

[11] *See infra* Parts II.B and III.B.

to overcome the challenges and legal uncertainties affecting their commercial circulation.[12]

This Article makes two primary contributions. First, we provide the first systematic treatment of how American law addresses the foundational property law issues raised by digital assets. Through a comparative and historical lens, we examine how U.S. courts and legislators have determined whether digital assets constitute property and where they fit within the existing personal property framework.[13] We then trace how American law initially struggled to accommodate these novel assets, leading to uncertainty and inefficiencies in ownership transfers, collateralization, and tokenizations.[14] Our analysis culminates in explaining how these challenges have been tackled through a distinctly American solution: the 2022 Amendments to the Uniform Commercial Code (UCC). Unlike other common law jurisdictions, the United States has created an entirely new statutory instrument in UCC Article 12. This law introduces "controllable electronic records" as a novel category of personal property, together with a regime deliberately crafted to align with parties' expectations and market practices.[15]

Second, our examination of digital assets leads us to advance a novel thesis about the evolution and current state of American personal property law that explains its divergence from other common law systems. We argue that, over the course of the 20th century, the United States has progressively abandoned traditional classifications—particularly the division between *choses* in possession and *choses* in action—in favor of a more functional and pragmatic architecture.[16] This distinctive approach, we contend, emerged and solidified while leading property scholarship—from Calabresi and Melamed's seminal work on property rules to the more recent progressive property and exclusionary/information-cost literature by scholars such as Singer, Alexander, Merrill, and Smith—remained focused primarily on land as its analytical lens, leaving personal property theoretically understudied.[17] We identify the Uniform Commercial Code as the primary engine of this transformation, showing how it progressively displaced classical personal property categories with an entirely new taxonomy organized around commercial functions, prioritizing practical utility over doctrinal purity.[18]

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[12] *See infra* Parts II.B and III.B.
[13] *See infra* Parts II.B and III.B.
[14] *See infra* Parts IV.A
[15] *See infra* Parts IV.B
[16] *See infra* Parts II.B and III.B.
[17] *See infra* Part III.B.
[18] *See infra* Part III.B.

Our resolution of the *Property Question* bears significant theoretical and normative payoffs. For digital assets, this work elucidates their status as property by tracing their recognition across judicial and statutory contexts. It highlights how UCC Article 12, through the innovative "controllable electronic records" category provides a functional taxonomy that largely dispels persistent legal uncertainties and sidesteps intractable classification dilemmas. This clarity not only empowers market participants to transact confidently in digital assets, but also establishes the essential foundation upon which effective regulatory frameworks can be constructed—a critical need as policymakers struggle to govern digital asset markets without a clear understanding of the underlying private law relationships they seek to regulate.

For American personal property law, our findings offer a blueprint for the continued integration of digital assets and related technologies into the property framework, as well as lay the groundwork for the integration of future forms of intangible property. Just as Article 12 accommodates digital assets by focusing on their functional attributes, this approach can be extended to emerging asset classes—such as carbon credits—that may appear distinct but actually pose analogous legal challenges. By recognizing and prioritizing market-driven proprietary structures, American law can continue evolving in ways that facilitate innovation while maintaining legal stability.

This Article proceeds in four parts. Part I surveys the evolution of digital asset markets from their origins as a niche technological experiment to their current status as a multi-trillion-dollar ecosystem, while also introducing the Property Question. Part II then examines how different jurisdictions have approached the threshold question of whether digital assets constitute property. Here, we contrast the methodical, doctrinal analysis employed by courts outside the United States with the more pragmatic approach taken by American courts. In turn, Part III delves into the divergent frameworks that jurisdictions have developed to classify digital assets within existing property law categories. We give particular attention to the traditional distinction between *choses* in possession and *choses* in action—both serving as the mainstay, historical way of classifying intangible personalty in the common law—and its diminishing relevance in U.S. law. We explain how this has resulted in no small part from the sustained focus among leading American property scholars on issues related to real property. Finally, Part IV explores how American commercial law has developed distinctive solutions to facilitate the circulation of digital assets. This final discussion offers a detailed analysis of the 2022 Amendments to the UCC, which constitute the most significant legislative intervention to date in establishing a comprehensive legal framework for digital assets.

I. DIGITAL ASSET MARKETS AND THE PROPERTY QUESTION

We begin our examination by surveying the remarkable evolution of digital assets markets. Understanding this trajectory provides essential context for analyzing the questions surrounding their legal nature and commercial circulation. It is a short but intense history, spanning fifteen years, marked by exponential growth in value, volumes, and complexity. What began in 2009 as a cypherpunk experiment in digital cash has since blossomed into a complex ecosystem worth almost $4 trillion as of December 2024.[19]

Cryptocurrencies have led the charge in this remarkable growth story. Bitcoin, which first traded for mere pennies, has seen its market capitalization climb to nearly $2 trillion in 2025, commanding the lion's share of the crypto market.[20] Stablecoins—digital assets designed to maintain "a stable price relative to a specified asset"[21]—have experienced their own dramatic ascent, expanding from a modest $5 billion in early 2020 to over $200 billion in circulation today.[22] The market for non-fungible tokens (NFTs) has traced an equally dramatic, if more volatile, trajectory. NFT valuations surged from $82 million in 2020 to an astounding $17.6 billion in 2021, though this meteoric rise was followed by a significant contraction in subsequent years.[23]

Within this bustling ecosystem, a fundamental distinction has emerged between two categories of digital assets. The first comprises assets like Bitcoin, Ethereum, and Solana that market participants trade for their intrinsic value and technological utility.[24] The second encompasses digital assets that derive their

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[19] *Total Cryptocurrency Market Capitalization*, COINGECKO, https://www.coingecko.com/en/global-charts (last visited Dec. 6, 2024).

[20] Here we use the term market capitalization to indicate current price times circulating supply.

[21] See Kara J Bruce, Christopher K. Odinet, & Andrea Tosato, *The Private Law of Stablecoins*, 54 ARIZ. ST. L. J. 1073 (2022).

[22] *Total Stablecoin Market Capitalization*, THE BLOCK https://www.theblock.co/data/stablecoins/market-cap (last visited Dec. 6, 2024).

[23] Ryan Browne, *Trading in NFTs spiked 21,000% to more than $17 billion in 2021, report says*, CNBC (Mar. 10, 2022, 1:00 AM), https://www.cnbc.com/2022/03/10/trading-in-nfts-spiked-21000percent-to-top-17-billion-in-2021-report.html; Pymnts, *NFTs Hit $17B in Trading in 2021, Up 21,000%*, PYMTNS (Mar. 10, 2022), https://www.pymnts.com/nfts/2022/nfts-hit-17b-in-trading-in-2021-up-21000/.

[24] *See* Jocelyn Blake, *Bitcoin's Intrinsic Value*, BITGET, https://www.bitget.com/news/detail/12560604426149 (last visited Feb. 16, 2025); Emi Lacapra, *Why Does Ethereum Have an Intrinsic Value?*, COINTELEGRAPH, https://cointelegraph.com/explained/why-does-ethereum-have-an-intrinsic-value (last visited Feb. 16, 2025); *Bitcoin vs Ethereum vs Solana vs Polygon: Which Is Best*, TASTY LIVE, https://www.tastylive.com/concepts-strategies/btc-vs-eth-vs-sol-vs-matic (last visited Feb. 16, 2025).

value from purportedly representing rights in other assets or claims against third parties—a concept known as *tokenization*.[25] Proponents of tokenization suggest that this technology could revolutionize how assets are owned and traded (including through fractionalized ownership), create markets for historically illiquid assets, and, even usher in a socio-economic reorganization based on continuous auctions of all assets to achieve a more efficient allocation of resources.[26]

The velocity and complexity of digital asset circulation have evolved in lockstep with their increasing value. Early Bitcoin transactions in 2009-2010 were peer-to-peer and sporadic, taking minutes or hours to settle.[27] Over time, centralized exchanges have emerged as crucial trading venues, processing and finalizing millions of transactions worth trillions daily.[28] Most recently, decentralized exchanges have come to the fore enabling highly complex, automated and fully disintermediated transactions for a variety of digital assets, with daily trading volumes regularly exceeding $30 billion.[29]

The demographics of digital asset market participants have also evolved dramatically. Originally a niche movement comprising technologists, cryptographers, and crypto-anarchists,[30] this cohort has expanded to encompass institutional investors, traditional financial institutions, and retail traders.[31] At present, major financial institutions including BlackRock, Fidelity, and Franklin Templeton offer digital asset services, while payment giants like PayPal, Stripe and Visa facilitate cryptocurrency transactions for hundreds of millions of users.[32]

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[25] Steven L. Schwarcz, *Next-Generation Securitization: NFTS, Tokenization, and the Monetization of "Things"*, 103 B.U. L. REV. 967 (2023); Juliet M. Moringiello & Christopher K. Odinet, *The Property Law of Tokens*, 74 FLA. L. REV. 607 (2022); Christopher K. Odinet & Andrea Tosato, *The Intersection of NFTs and Structured Finance*, 103 BU L Rev 1525, 1540-1545 (2023); R. Wilson Freyermuth et al., *Crypto in Real Estate Finance,* 75 ALA. L. REV. (2023).

[26] Schwarcz, *supra* note 25; Moringiello & Odinet, *supra* note 25; Odinet & Tosato, *supra* note 25 at 1540-1545; Freyermuth et al., *supra* note 25.

[27] ARVIND NARAYANAN ET AL., BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES: A COMPREHENSIVE INTRODUCTION 23-25 (Princeton Univ. Press 2016)

[28] *See* Adam J. Levitin, *Not Your Keys, Not Your Coins: Unpriced Credit Risk in Cryptocurrency*, 101 TEX. L. REV. 877, 889 (2023).

[29] *Top Decentralized Exchanges Ranked by 24H Trading Volume*, COINGECKO, https://www.coingecko.com/en/exchanges/decentralized (last visited Dec. 6, 2024).

[30] Craig Jarvis, *Cypherpunk Ideology: Objectives, Profiles, and Influences (1992-1998*), 6(3) INTERNET HISTORIES, 315 (2022).

[31] *See* Kara Bruce, et al., *DAOs in Financial Distress*, *in* FOUNDATIONS OF DECENTRALIZED ORGANIZATIONS: BLOCKCHAIN AND THE FUTURE OF CORPORATE LAW (Kevin Werbach et al, eds., Oxford Univ. Press) (forthcoming 2025) (on file with authors).

[32] *Report on Digital Asset Financial Stability Risks and Regulation*, *supra* note 8.

Sovereign approaches to digital assets have traced an arc from prohibition to selective embrace. China's 2017 ban on cryptocurrency trading and initial coin offerings marked an early restrictive stance, followed by similar measures in Russia and India.[33] However, this trajectory has shifted significantly. El Salvador and the Central African Republic both adopted Bitcoin as legal tender in 2021 and 2022 respectively.[34] Argentina now accepts Bitcoin for tax payments.[35] In the United States, political discourse has increasingly centered on digital assets' potential role in monetary policy, with recent proposals even suggesting the establishment of sovereign Bitcoin reserves.[36] In turn, even countries that initially opposed cryptocurrencies have moderated their stance, with Russia and China markedly softening their positions.[37]

These empirical data might lead to the seemingly compelling yet ultimately incomplete conclusion that digital assets must be capable of being legally owned. Indeed, the growing market capitalization, increasing trading volumes, and expanding institutional adoption could be interpreted as dispositive, if not conclusive, evidence that digital assets are eligible subject matter for property. After all, why would countless individuals, corporations, and governments commit substantial resources toward assets that exist beyond the realm of legal property?

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[33] *Regulation of Cryptocurrency Around the World*, LAW LIBRARY OF CONGRESS, GLOBAL LEGAL RESEARCH DIRECTORATE, https://www.loc.gov/item/2021687419/ (last visited Feb. 22, 2021).

[34] Laura Alfaro et al., *El Salvador: Launching Bitcoin as Legal Tender*, Harv. Bus. Sch. 322-055 (2022) (revised Feb. 2024), https://www.hbs.edu/faculty/Pages/item.aspx?num=62068; *Central African Republic adopts bitcoin as an official currency*, REUTERS (Apr. 28, 2022), https://www.reuters.com/world/africa/central-african-republic-adopts-bitcoin-an-official-currency-2022-04-27. Although, in early 2025, El Salvador revised its stance, see Alexey Borovets, *El Salvador Ends Bitcoin Legal Tender Experiment—What Went Wrong?* (Feb. 6, 2025), https://crypto.news/el-salvador-bitcoin-legal-tender-experiment-failure/.

[35] Andrés Engler, *Argentina's Mendoza Province Now Accepts Cryptocurrencies for Tax Payments*, COINDESK (Aug. 29, 2022), https://www.coindesk.com/policy/2022/08/29/argentinas-mendoza-province-now-accepts-cryptocurrencies-for-tax-payments.

[36] CRS Report R46208, *Digital Assets and SEC Regulation*, CONGRESSIONAL RESEARCH SERVICE (June 23, 2021), https://crsreports.congress.gov/product/pdf/R/R46208/5; Feliba, David. *US States Lead in Strategic Bitcoin Reserve Creation — Will Trump Deliver on His BTC Promise?*, COINTELEGRAPH (Feb. 12, 2025), https://cointelegraph.com/news/us-states-lead-strategic-bitcoin-reserve-creation-will-trump-deliver-his-btc-promise.

[37] *See* Lockridge Okoth, *China softens stance as court declares crypto cannot be "seized", is legal-and-civil property*, FX STREET (Sept. 1, 2023), https://www.fxstreet.com/cryptocurrencies/news/china-softens-stance-as-court-declares-crypto-cannot-be-seized-is-legal-and-civil-property-202309011844; Camomile Shumba & Amitoj Singh, *Russia Is About to Try Using Crypto to Get Around Sanctions*, YAHOO FINANCE (Aug. 30, 2024), https://finance.yahoo.com/news/russia-try-using-crypto-around-072050659.html?guccounter=1.

This pragmatic reasoning has a certain allure.[38] However, as the 19th century British philosopher and jurist Jeremy Bentham lucidly explained, property is a right distinct from the physical object to which it relates, and this right "is entirely the creature of law."[39] Property exists through the recognition and protection afforded by legal systems, and its nature is determined by the framework governing it.[40] While the pervasive trading of digital assets indicates a societal expectation that they are capable of being owned—a consideration particularly relevant in common law jurisdictions where custom and practice have historically shaped property rights[41]—such behavior alone cannot determine their legal classification as objects of property.

Thus, to answer our Property Question, it is necessary to investigate the relevant property law framework and analyze it according to its fundamental principles and rules. While the central focus of this inquiry is on United States law, we conduct a comparative analysis with other common law jurisdictions. This approach has a twofold purpose. Because digital assets operate on borderless distributed networks and are traded in global markets, examining how different legal systems adapt their property frameworks illuminates the range of possible doctrinal solutions. More broadly, this comparative exercise reveals how American personal property law has charted its own distinctive course within the common law tradition.[42]

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[38] *See* Royston Goode, *What is Property?*, L.Q.R. 2023, 139, 4, https://uk.westlaw.com/Document/I20BE002071DC11EDBD3A8510F3309710/View/FullText.html?transitionType=Default&contextData=(sc.Default)&firstPage=true (who offers a provocative approach to simplify the conceptualization of property under English Law, by suggesting that "Subject to statute, property is anything of realisable commercial value.").

[39] JEREMY BENTHAM, THEORY OF LEGISLATION, PRINCIPLES OF THE CIVIL CODE Pt. 1 Ch. 8 (Étienne Dumont ed., R. Hildreth. trans., 6th ed., Clarendon Press 1907) (Traités de Législation Civile et Pénale translated by R. Hildreth), https://www.laits.utexas.edu/poltheory/bentham/pcc/pcc.pa01.c08.html. This perspective finds echoes in David Hume's earlier writings, where he argued that property arises from societal conventions and mutual expectations, not from any intrinsic attribute of the object itself; DAVID HUME, A TREATISE OF HUMAN NATURE bk. III, pt. II, sec. II (Oxford Univ. Press 2007) (fist published 1739). Hume describes property as arising from social conventions, designed to maintain stability and mutual expectations in society.

[40] BENTHAM, *supra* note 39 ("The idea of property consists in an established expectation. — in the persuasion of power to derive certain advantages from the object, according to the nature of the case. But this expectation, this persuasion, can only be the work of the law.").

[41] *See* FREDERICK POLLOCK, THE GENIUS OF THE COMMON LAW (Kessinger Publ'g 2008) (providing a historical perspective on the relationship between market practice and legal recognition of property rights).

[42] Sjef van Erp, *Comparative Property Law*, *in* THE OXFORD HANDBOOK OF COMPARATIVE LAW 1031, 1034-36 (Mathias Reimann & Reinhard Zimmermann eds., Oxford Univ. Press 2019); COMPARATIVE PROPERTY LAW: GLOBAL PERSPECTIVES 12 (Michele Graziadei & Lionel Smith eds. Edward Elgar Publ'g 2017).

But, before we set off, we wish to make clear that what follows is not a vacuous scholastic exercise in legal theory; rather, this discussion has profound practical implications. As Henry Smith has observed, "property is a platform for the rest of private law"[43] and serves, to quote Joseph Singer, as "the infrastructure of a free and democratic society."[44] Property law provides stability.[45] Therefore, understanding how digital assets fit within the schema of property law provides essential insights for determining the legal regime governing their commercial circulation—which is to say, their voluntary transfer, use as collateral in secured transactions, holding in trust, devolution by will, and treatment in insolvency.[46]

II. DIGITAL ASSETS AS PROPERTY

Common law and civil law systems have developed distinct conceptions of personal property.[47] Even among jurisdictions that belong to the same "legal tradition,"[48] there can be meaningful variations despite shared foundations. These differences have resulted in substantively divergent frameworks for determining whether an asset can be owned, particularly in civil law systems, where more rigid, codified rules often apply.[49]

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[43] Henry E Smith, *Property as the Law of Things* 125 Harv. Law. Rev. 1691 (2012); *see also* Eric R. Claeys, *Exclusion and Private Law Theory: A Comment on Property As the Law of Things*, 125 Harv. L. Rev. 133, 134 (2012).

[44] Joseph William Singer, *Property As the Law of Democracy*, 63 DUKE L.J. 1287, 1303 (2014).

[45] Abraham Bell & Gideon Parchomovsky, *A Theory of Property*, 90 CORNELL L. REV. 531, 552 (2005); *see also* Eduardo Moisés Peñalver & Sonia K. Katyal, *Property Outlaws*, 155 U. PA. L. REV. 1095, 1098 (2007) (building on the idea of property as stability-producing to explore the idea of rule breakers in property law).

[46] *Cf.* Shawn Bayern, *Dynamic Common Law and Technological Change: The Classification of Bitcoin*, 71 WASH. & LEE L. REV. Online 22 (2014)

[47] *See generally* YAËLL EMERICH, CONCEPTUALISING PROPERTY LAW: INTEGRATING COMMON LAW AND CIVIL LAW TRADITIONS (Edward Elgar Publ'g 2018); Anna di Robilant, *Property: A Bundle of Sticks or a Tree?*, 66 VAND. L. REV. 869 (2013).

[48] In this Article, we adopt John Henry Merryman's concept of "legal tradition," defined as "a set of deeply rooted, historically conditioned attitudes about the nature of law, about the role of law in the society and the polity, about the proper organization and operation of a legal system, and about the way law is or should be made, applied, studied, perfected, and taught," which "relates the legal system to the culture of which it is a partial expression." John Henry Merryman, THE CIVIL LAW TRADITION: AN INTRODUCTION TO THE LEGAL SYSTEMS OF WESTERN EUROPE AND LATIN AMERICA 2 (2d ed. 1985). We recognize the ongoing scholarly debate surrounding the notion of legal tradition but do not engage with it here; instead, we employ the concept solely as a framework to focus our analysis on a specific group of jurisdictions.

[49] Regarding digital assets, *see* Kelvin F.K. Low & Megumi Hara, *Cryptoassets and Property*, *in* RESEARCH HANDBOOK ON EU PROPERTY LAW 146 (Sjef van Erp & Katja Zimmermann eds., Edward Elgar Publ'g 2024), https://ideas.repec.org/h/elg/eechap/19702_13.html. For

Historically, common law systems have developed a fluid rather than rigidly defined property law framework.[50] As Carol Rose aptly notes, "over time, the straightforward common law crystalline rules [of property law] have been muddied repeatedly by exceptions and equitable second-guessing."[51] Nestor Davidson observes, that property law "has always had its equitable adjustments to counterbalance the perceived benefits of formalism's purported certainty," reflecting an understanding that emphasizes contingency, pluralism, and property's social function."[52]

This flexibility has eased the challenge of accommodating novel types of assets, which advances in technology and the sciences have generated at an increasingly accelerated pace. Indeed, over the past 50-years, assets such as know-how, transferable state licenses,[53] emission allowances,[54] milk quotas,[55]

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example, Australia, Canada, England, New Zealand, Singapore, and the United States all have common law traditions under which their property law frameworks share a common lineage (yet present not-insubstantial differences). Even more starkly, among civilian systems, there are significant differences between the Germanic and Francophone systems. *See* George L. Gretton, *Ownership and its Objects*, 71 RABELSZ 802 (2007), https://doi.org/10.1628/003372507782419462.

Simon Douglas and Ben McFarlane, *Defining Property Rights*, *in* PHILOSOPHICAL FOUNDATIONS OF PROPERTY LAW 219 (James Penner and Henry Smith eds., Oxford Univ. Press 2014).

Kelvin F.K. Low, *Bitcoins as Property: Welcome Clarity?*, 136 L. Q. REV. 345 (2020);

J.E. Penner, *The Bundle of Rights Picture of Property*, 43 UCLA L. Rev. 711 (1996); J.E. PENNER, THE IDEA OF PROPERTY IN LAW, (Oxford Univ. Press 1997); Ben McFarlane and Simon Douglas, *Property, Analogy and Variety*, 42 OXFORD J. OF LEGAL STUD. 161 (2022); David Fox, *Cryptocurrencies in the Common Law of Property*, *in* CRYPTOCURRENCIES IN PUBLIC AND PRIVATE LAW 139 (David Fox and Sarah Green eds., Oxford Univ. Press 2019); Johan David Michels and Christopher Millard, *The New Things: Property Rights in Digital Files?*, 81 CAMBRIDGE L. J. 323 (2022), https://doi.org/10.1017/S0008197322000228.

[50] Tara K. Righetti & Joseph A. Schremmer, *Waste and the Governance of Private and Public Property*, 93 U. COLO. L. REV. 609 (2022) (discussing the ever-changing nature of servitude law).

[51] Rose, Carol M., *Crystals and Mud in Property Law*, 40 STAN. L. REV. 578 (1988).

[52] Nestor M. Davidson, *New Formalism in the Aftermath of the Housing Crisis*, 93 B.U. L. REV. 389, 395 (2013).

[53] *See* Saulnier v. Royal Bank of Canada, 2008 SCC 58, [2008] 3 S.C.R. 166. (Can.); Duggan, *In the wake of Bingo Queen: Are Licenses Property?*, 47 CANADIAN BUS. L. J. 225 (2009).

[54] Armstrong DLW GmbH v. Winnington Networks Ltd. [2012] EWHC (Ch) 10.

[55] Swift v. Dairywise Farms Ltd. (No.1) [2000] 1 W.L.R. 1177, [2000] 1 All. E.R. 320.

frozen sperm,[56] domain names,[57] and genetically modified plant cells[58] have all been brought within the realm of personal property with relative ease.

When confronted with the question of whether a new type of asset is capable of being owned, Canadian property law scholar Bruce Ziff argues that common law courts have generally developed two approaches.[59] The first is the *attributes* approach.[60] As explained by Ziff, judges "search for a strong family resemblance. The quest is to find a normative basis for recognition internal to (immanent in) the law of property, thereby expanding the field of ownership in a way that preserves the coherence of the law of property."[61] This method aligns with the traditional view of property law as the law of things, meaning property as a right in a thing (an "in rem right") enforceable against others.[62]

The second is the *functional* approach.[63] Courts assess whether a particular type of asset can be owned by considering "how property, as a tool of

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[56] Yearworth v. Northern Bristol NHS Trust [2009] EWCA (Civ) 37.

[57] *See Emke v. Campana, LLC*, No. CIV A 306-CV-1416-L, 2007 WL 2781661 (N.D. Tex Sept. 25, 2007); CRS Recovery v. Laxton, 600 F.3d 1138, 1143 (9th Cir. 2010); Jubber v. Search Mkt. Direct, Inc. (In re Paige), 413 B.R. 882, 918 (Bankr. D. Utah 2009); Sprinkler Warehouse v. Systematic Rain, 880 N.W.2d 16, 22 (Minn. 2016); Schott v. McLear (In re Larry Koenig & Assoc., LLC), 2004 Bankr. LEXIS 2311, at *21 (Bankr. M.D. La. 2004); Panda Herbal Int'l, Inc. v. Luby (In re Luby), 438 B.R. 817, 829-30 (Bankr. E.D. Pa. 2010); St. Luke's Cataract & Laser Inst., P.A. v. Sanderson, No. 806-cv-223-T-MSS, 2006 WL 8442534, at *8 (M.D. Fla. 2006). Xereas v. Heiss, 933 F. Supp. 2d 1, 6-7 (D.C. Cir. 2013). *See also* Nicholas Nugent, *Masters of Their Own Domains: Property Rights As A Bulwark Against Dns Censorship*, 19 COLO. TECH. L.J. 43 (2021); Daniel Hancock, *You Can Have It, but Can You Hold It?: Treating Domain Names As Tangible Property*, 99 Ky. L.J. 185 (2011); Frederick M. Abbott, *On the Duality of Internet Domain Names: Propertization and Its Discontents*, 3 N.Y.U. J. INTELL. PROP. & ENT. L. 1 (2013); Spence Howden, *Text Messages Are Property: Why You Don't Own Your Text Messages, but It'd Be A Lot Cooler If You Did*, 76 WASH. & LEE L. REV. 1073 (2019)

[58] Michael T. Busch, *From Beanstalks to Bilski: Patentable Subject Matter in the Information Age*, NAT'L AG. L. CTR., https://nationalaglawcenter.org/wp-content/uploads/assets/articles/busch_beanstalk.pdf.

[59] BRUCE ZIFF, PRINCIPLES OF PROPERTY LAW 60-61 (7th Ed. Thomson Reuters 2018).

[60] *Id. at 60*; P.T. Babie, *The Thing and Judicial Methodology in Resolving Novel Property Claims: It Matters When It Matters*, 61 ALBERTA L. REV. 69 (2023).

[61] Ziff, *supra* note 59 at 60-61; P.T Babie, *supra* note 59.

[62] A "unique thing about property law is the fact that it protects rights against the world rather than rights against particular individuals, as is the case with contract law." *See* Joseph William Singer, *Democratic Estates: Property Law in A Free and Democratic Society*, 94 CORNELL L. REV. 1009, 1021 (2009); *see also* J. AUSTIN, LECTURES ON JURISPRUDENCE OR THE PHILOSOPHY OF POSITIVE LAW 380 (3rd ed. London J. Murray 1869) (for an 19th century exposition of this theory of property at common law); W SWADLING, PROPERTY, *in* ENGLISH PRIVATE LAW 4.07 (Andrew Burrows ed., 3rd. ed., Oxford Univ. Press) (providing the traditional position in English law); JANE B. BARON, RADICAL CONTINGENCY AND THE BUNDLE OF RIGHTS, *in* RESEARCH HANDBOOK ON PROPERTY LAW AND THEORY (Chris Bevan ed., Edward Elgar Publ'g 2023); Henry E Smith, *Property as the Law of Things*, 125 HARV. L. REV. 1691, 1691 (2012).

[63] Ziff, *supra* note 59 at 60-61; P.T Babie, *supra* note 59

social life, should be used."[64] Such an "approach recognizes that property is not an acontextual entity that demands conceptual purity, but a purposive concept, to be used to meet social needs."[65] This method is conceptually proximate to the theories of Hohfeld,[66] legal realists,[67] and, more recently, the progressive property theorists,[68] according to whom property law should be conceptualized as a bundle of rights and other relations between persons in respect of things.

Consistent with this flexible approach to novel forms of property, common law courts have grappled with the issue of whether digital assets can constitute personal property without excessive difficulty. However, the analytical rigor and exhaustiveness of these decisions vary markedly, with a notable divergence between U.S. courts and those of other common law jurisdictions.

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[64] Ziff, *supra* note 59 at 60-61

[65] *Id.* For a collection of recent property theory scholarship across a spectrum, *see* David A. Dana & Nadav Shoked, *Property's Edges*, 60 B.C. L. REV. 753, n.21 (2019).

[66] Wesley Newcomb Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 YALE L.J. 16, 28–59 (1913).

[67] *See, e.g.*, Felix S. Cohen, *Transcendental Nonsense and the Functional Approach*, 35 COLUM. L. REV. 809, 815 (1935) ("The circularity of legal reasoning in the whole field of unfair competition is veiled by the 'thingification' of *property*.");

[68] *See, e.g.*, Gregory S Alexander et al., *A Statement of Progressive Property*, 94 CORNELL L. REV. 743 (2009); Timothy M. Mulvaney, *Progressive Property Moving Forward*, 5 CAL. L. REV. CIR. 349, 351 (2014); Hanoch Dagan, *Pluralism and Perfectionism in Private Law*, 112 COLUM. L. REV. 1409 (2012); Jedediah Purdy, *A Freedom-Promoting Approach to Property: A Renewed Tradition for New Debates*, 72 U. CHI. L. REV. 1237, 1258-60 (2005); Gregory S. Alexander, *The Social-Obligation Norm*, 94 CORNELL L. REV. 745 (2009); Eduardo M. Peñalver, *Land Virtues*, 94 CORNELL L. REV. 821 (2009); Eduardo M. Peñalver, *Property as Entrance*, 91 VA. L. REV. 1889 (2005); Singer, *supra* note 62; Joseph William Singer, *The Ownership Society and Takings of Property: Castles, Investments and Just Obligations*, 30 HARV. ENVTL. L. REV. 309 (2006); Joseph William Singer, *After the Flood: Equality & Humanity in Property Regimes*, 52 LOY. L. REV. 243 (2006); ERIC T. FREYFOGLE, ON PRIVATE PROPERTY: FINDING COMMON GROUND ON THE OWNERSHIP OF LAND (Beacon Press 2007); John A. Lovett, *Progressive Property in Action: The Land Reform (Scotland) Act 2003*, 89 NEB. L. REV. 739 (2011); Nestor M. Davidson & Rashmi Dyal-Chand, *Property in Crisis*, 78 FORDHAM L. REV. 1607 (2010); Christopher K. Odinet, *Of Progressive Property and Public Debt*, 51 WAKE FOREST L. REV. 1101 (2016).

A. Legal Treatment Abroad

In Australia,[69] England and Wales,[70] Hong Kong,[71] New Zealand,[72] and Singapore,[73] courts have all arrived at the conclusion that digital assets can be the subject matter of property. The vast majority of these decisions have, in our view, explicitly embraced the *attributes* approach, with courts finding particular guidance in the analytical indicia set forth in the 1965 *National Provincial Bank Ltd. v. Ainsworth* case decided by the House of Lords in the United Kingdom.[74] In his oft-cited dictum, Lord Wilberforce outlined four essential, though not exhaustive, criteria for an asset to qualify as the subject matter of property: "it

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[69] Comm'r of the Austl. Fed. Police v. Bigatton, [2020] NSWSC 245 (Austl.); Chen v. Blockchain Glob. Ltd., (2022) 66 VR 30 (Austl.); In Re Blockchain Tech Pty. Ltd. [2024] VSC 690 (Austl.).

[70] Vorotyntseva v. Money-4 Ltd., [2018] EWHC 2596 (Ch), [13]; Shair.Com Glob. Digit. Servs. Ltd. v. Arnold, 2018 CanLII 1512, [15] (Can. B.C.S.C.); A.A. v. Persons Unknown & Ors., Re Bitcoin, [2019] EWHC 3556 (Comm); Ion Sci. Ltd. v. Persons Unknown, [2020] EWHC (Ch) (Dec. 21 2020) (unreported), at [11]; Fetch.AI Ltd. v. Persons Unknown Category A [2021] EWHC 2254 (Comm), [9]; Mr. Dollar Bill Ltd. v Persons Unknown [2021] EWHC 2718 (Ch), [10]; Wang v. Darby [2021] EWHC 3054 (Comm), [55]; Danisz v. Persons Unknown [2022] EWHC 280 (QB), [13]; D'Aloia v. Persons Unknown [2022] EWHC 1723 (Ch); Tulip Trading Ltd., v. Bitcoin Ass'n for BSV [2023] EWCA Civ. 83, [24]. Under English law *see also* Law Comm'n, *Digital Assets*, LAW COM. NO. 256, (July 28, 2022) and *Legal Statement on Cryptoassets and Smart Contracts*, U.K. JURISDICTIONAL TASKFORCE (Nov. 2019).

[71] *See* Nico Constantijn Antonius Samara v. Stive Jean Paul Dan [2022] HKCFI 1254, 36-39. *See also* In Re Gatecoin Ltd., [2023] HKEC 1223, [59] (stating that crypto is a "property" in Hong Kong and is capable of forming the subject matter of a trust).

[72] Ruscoe v. Cryptopia Ltd. (in Liq) [2020] NZHC 728, [2020] 2 NZLR 809 (N.Z).

[73] *See* CLM v. CLN [2022] SGHC 46; B2C2 Ltd. v. Quoine Pte. Ltd., [2019] SGHC (I) 03, [2019] 4 SLR 17 at [142]; [2020] SGCA (I) 02, [2020] 2 SLR 20 at [144]; Janesh s/o Rajkumar v. Unknown Person ("CHEFPIERRE") [2022] SGHC 264 (Decided that a non-fungible token ("NFT") could be "property" for the purposes of an interim injunction); Bybit Fintech Ltd. v. Ho Kai Xin & Others ("ByBit") (Decided that Tether, a stablecoin, could be "property" capable of being held on trust.)

[74] Nat'l Provincial Bank Ltd. v. Ainsworth, [1965] AC 1175 (HL) 1247-1248. This analytical framework has also been embraced in extra-judicial initiatives dealing with the question of whether digital assets can be owned. *See* Law Comm'n, *Digital Assets*, LAW COM NO. 256, (July 28, 2022); *Legal Statement on Cryptoassets and Smart* Contract, U.K. JURISDICTION TASKFORCE (Nov. 2019). It should be noted that courts have also addressed two additional conceptual hurdles in applying property law to digital assets: first, whether they constitute mere information (which traditionally cannot be appropriated), and second, whether public policy considerations militate against their recognition as property. Both issues have been resolved in favor of treating digital assets as property. *See* Ruscoe v. Cryptopia Ltd. (in Liq.) [2020] NZHC 728 [117]-[133], [2020] 2 NZLR 809 (N.Z) (concluding that cryptocurrencies are not mere information as they confer exclusive rights of control and disposition); A.A. v. Persons Unknown & Ors., Re Bitcoin, [2019] EWHC 3556 (Comm) [57]-[59] (finding no public policy grounds for excluding Bitcoin from the ambit of property). It should be noted that the Ainsworth indicia have been the subject strong criticism by K. GRAY & S. GRAY, ELEMENTS OF LAND LAW 97 (5th ed., Oxford Univ. Press 2009) (describing the Ainsworth indicia as "riddled with circularity" and "radical and obscurantist nonsense.")

must be definable, identifiable by third parties, capable in its nature of assumption by third parties, and have some degree of permanence or stability."[75]

This analytical framework has proven remarkably adaptable across various types of digital assets. For instance, the New Zealand High Court and the Australian Supreme Court of Victoria have held that cryptocurrencies satisfy all four *Ainsworth* indicia.[76] Similarly, the Singapore High Court reached analogous conclusions regarding NFTs in *CLM v CLN* and *Rajkumar v Unknown Person*, while in *Bybit Fintech Ltd v Ho Kai Xin*, the court extended this reasoning to stablecoins.[77] English courts have similarly developed their jurisprudence through the Ainsworth framework. In *AA v Persons Unknown*, the High Court applied the criteria to Bitcoin, affirming its classification as property under English law.[78] Likewise, in *Osbourne v Persons Unknown*, the High Court recognized NFTs as property, implicitly aligning its reasoning with the *Ainsworth* indicia.[79]

In Canada, courts across multiple provinces have addressed the question of whether digital assets can be the object of property rights with varying approaches. Early decisions from the British Columbia Supreme Court in *Shair.Com* and *Copytrack* treated cryptocurrencies as property without providing theoretical analysis.[80] This trend continued in Nova Scotia's *QuadrigaCX* proceedings and Alberta's digital asset forfeiture cases.[81] By contrast, in *Cicada 137 LLC v. Medjedovic*, the Ontario Superior Court eschewed the classification of digital assets as property. Justice Myers adopted a cautious approach, finding it sufficient for the case that the tokens represented invested value subject to control, while explicitly reserving the broader question of their property status for future development.[82]

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[75] Nat'l Provincial Bank Ltd. v. Ainsworth, [1965] AC 1175 (HL) 1247-1248.

[76] *See* In Re Blockchain Tech Pty. Ltd. [2024] VSC 690 (Austl.); Ruscoe v. Cryptopia Ltd. (in Liq.) [2020] NZHC 728 (N.Z).; CLM v. CLN [2022] SGHC 46;

[77] Rajkumar v. Unknown Person [2022] SGHC 264; Bybit Fintech Ltd. v. Ho Kai Xin [2023] SGHC 199.

[78] A.A. v. Persons Unknown & Ors., Re Bitcoin, [2019] EWHC 3556 (Comm).

[79] *Id.*; Osbourne v. Persons Unknown, [2023] EWHC 39 (Ch).

[80] *See* Shair.Com Glob. Digit. Servs. Ltd. v. Arnold, 2018 CanLII 1512, [13] – [17] (Can. B.C.S.C.); Copytrack Pte. Ltd. v. Wall, 2018 CanLII 1709 (Can. B.C.S.C.). For a an analysis of these decisions *see* Janis Sarra & Louise Gullifer QC (Hon), *Crypto-claimants and Bitcoin Bankruptcy: Challenges for Recognition and Realization*, 28 INT'L INSOLVENCY REV. 233, 246–48 (2019).

[81] *See* Re Quadriga Fintech Solutions Corp., 2019 NSSC 65; Edmonton Police Serv. v. 2A Fresh Bitcoin, 2023 ABQB 513.

[82] Cicada 137 LLC v. Medjedovic, 2022 ONSC 369, [24].

B. Legal Treatment at Home

In the United States, the analysis of digital assets as property is complicated by the interplay between federal and state law. Property law falls within the jurisdiction of states as a general matter,[83] with federal law providing overarching regulatory frameworks in areas such as securities, commodities, taxation, bankruptcy, anti-money laundering, and interstate commerce.[84] Both federal and state courts have recognized digital assets as subject matter of property, albeit through disparate analytical approaches that privilege practical outcomes and pragmatism over theoretical clarity and doctrinal coherence.

At the federal level, this recognition has emerged primarily through bankruptcy proceedings, enforcement actions, and limited agency guidance. Bankruptcy courts have consistently treated digital assets as property of the estate, as exemplified in *In re Celsius Network, In re Voyager Digital Holdings, In re Genesis Global Holdings*, and *In re FTX Trading,* where the analysis centered on whether customer-deposited cryptocurrencies belonged to the debtor's estate.[85] Similarly, in criminal forfeiture and regulatory enforcement contexts, federal courts have readily accepted digital assets as property capable of seizure or transfer restriction.[86] The Securities and Exchange Commission, the Commodity Futures Trading Commission, and other regulatory agencies have further cemented this position through their enforcement actions in which a variety of digital assets have been implicitly recognized as personal property.[87] As far back

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[83] *See generally* SHELDON F. KURTZ ET AL., CASES AND MATERIALS ON AMERICAN PROPERTY LAW (7th ed. 2023) (explaining in detail the largely state-based law of property in the United States).

[84] *See* Bd. of Regents of State Colls. v. Roth, 408 U.S. 564, 577 (1972) (property interests are "not created by the Constitution," rather they stem from "existing rules or understandings that stem from an independent source such as state law."); *see also* Logan, 455 U.S. at 430 (emphasizing that "the hallmark of property" is "an individual entitlement grounded in state law").

[85] In re Celsius Network LLC (2023); In re Voyager Digital Holdings, Inc. (2022); In re Genesis Global Holdings, LLC (2023); In re FTX Trading Ltd. (2022*); see also* In re BlockFi Inc. (2022) (examining property rights in crypto lending relationships); In re Cred Inc. (2020) (analyzing ownership of pledged bitcoins); In re Three Arrows Capital (2022) (Chapter 15 proceeding addressing cross-border digital asset recovery); In re Hector DAO (2024) (Chapter 15 proceeding classifying DAO as eligible for bankruptcy protection).

[86] United States v. Ulbricht, 31 F. Supp. 3d 540 (S.D.N.Y. 2014); U.S. v. 50.44 Bitcoins, No. CV 15-5124 (D.N.J. 2016).

[87] The CFTC has carried out a series of enforcement actions that progressively expanded its oversight of digital assets as commodities and implicitly recognized them as personal property. *See* CFTC v. McDonnell, 287 F. Supp. 3d 213 (E.D.N.Y. 2018) (explicitly characterizing virtual currencies as commodities); CFTC v. My Big Coin Pay, Inc., 334 F. Supp. 3d 492 (D. Mass. 2018); In re Binance Holdings Ltd. (2023). The SEC has similarly developed its approach through enforcement actions focused on securities law violations yet implicitly treating the underlying digital assets as property. *See* SEC v. Terraform Labs, No. 23-cv-1346

as 2014, the Internal Revenue Service has considered cryptocurrencies to be a form of property.[88]

State courts have likewise generally arrived at the conclusion that digital assets are subject matter of property. However, they have largely eschewed the Property Question, adopting instead a pragmatic stance that appears to espouse, at least implicitly, the functional approach to property. For the most part, they have recognized digital assets as personal property almost as a *fait accompli* based on their widespread commercial circulation and social adoption, focusing primarily on remedial considerations.[89]

This functional approach is particularly evident in cases involving conversion claims, fraudulent transfers, and other traditional property-based causes of action. In *Temurian v. Piccolo*, for instance, the California court readily recognized cryptocurrencies as property to enable recovery in a fraud case, while in *Ox Labs v. BitPay*, conversion claims involving Bitcoin were adjudicated on the premise of its property status.[90] Similarly, in *Archer v. Coinbase*, the court accepted that cryptocurrencies could theoretically be subject to conversion claims, thereby implicitly reinforcing their status as property.[91] More recent cases have continued this trend while grappling with increasingly complex arrangements, such as in *Lee v. Binance* and *Coinbase v. Bielski*, where courts have had to navigate the intersection of property rights with custodial relationships and platform obligations.[92]

(S.D.N.Y. 2023) (stablecoins); SEC v. AriseBank, No. 3:18-cv-186 (N.D. Tex. 2018) (treating cryptocurrency as property subject to receivership); SEC v. Ripple Labs Inc.; SEC v. Telegram Group Inc., No. 19-cv-9439 (S.D.N.Y. 2019) (examining property rights in pre-functional tokens); SEC v. Kik Interactive Inc., No. 19-cv-5244 (S.D.N.Y. 2019).

[88] *See* I.R.S. Notice 2014-21, 2014-16 I.R.B. 938.

[89] *See* Christopher K. Odinet, *Bitproperty and Commercial Credit*, 94 WASH. U.L. REV. 649, 664 (2017) (noting that "at least one U.S. federal circuit court has held that a domain name is "an intangible property right" and has declared that such a right is similar to "staking a claim to a plot of land" and then recording title to it in a registry system to put others on notice.").

[90] Temurian v. Piccolo (2019); Ox Labs, Inc. v. Bitpay, Inc. (2020); Currier v. PDL Recovery Group, LLC (2019) (treating cryptocurrency holdings as property in debt enforcement). *See also* Nibi, Inc. v. John Doe, No. 5:24-cv-06184 (N.D. Cal. filed Aug. 30, 2024) (bringing conversion and replevin claims for misappropriated digital assets); Krishna Okhandiar v. John Duff III, No. 2:23-cv-01409 (D. Nev. filed Sept. 10, 2023) (alleging conversion and trespass to chattels of NFT-related assets); Eric Schiermeyer v. Wright Thurston, No. 2:23-cv-00589 (D. Utah filed Aug. 31, 2023) (asserting conversion claims for misappropriated tokens).

[91] Archer v. Coinbase, Inc. 53 Cal. App. 5th 266 (2020).

[92] Binance & Changpeng Zhao v. Anderson, 2024 WL 510399 (2d. Cir.), *petition for cert. filed*, (U.S. Dec. 10, 2024) (No. 24-336); Coinbase, Inc. v. Bielski, 599 U.S. 736, 143 S. Ct. 1915 (2023); *see also* Tiger Mines N. Y., Inc. v. Tether Holdings Ltd., No. 1:24-cv-5905, 2024 WL 3635177 (S.D.N.Y. filed Aug. 2, 2024) (addressing property rights in frozen digital assets); Vandelay Indus. TM LLC v. Bitwise Hold 10 Priv. Index Fund, LLC, No. 653436/2024 (N.Y. Sup. Ct. filed July 8, 2024) (examining property interests in managed cryptocurrency fund).

A more principled framework for analyzing whether digital assets constitute property might perhaps be extrapolated from *Kremen v. Cohen*.[93] In this 2003 decision, the U.S. Ninth Circuit, applying California law, confronted the then-novel question of whether domain names could be recognized as property.[94] Drawing from California precedent establishing that property encompasses "every intangible benefit and prerogative susceptible of possession or disposition,"[95] the court developed a three-part test that echoes the *Ainsworth* indicia: "[f]irst, there must be an interest capable of precise definition; second, it must be capable of exclusive possession or control; and third, the putative owner must have established a legitimate claim to exclusivity."[96]

We believe that digital assets such as cryptocurrencies, NFTs, and stablecoins appear particularly amenable to analysis under the *Kremen* framework. As data entries in distributed ledger systems, these assets typically satisfy the first part of the test. Each cryptocurrency token, NFT, or stablecoin unit has exact, mathematically defined properties and quantities. The second requirement of exclusive possession or control is generally achieved through cryptographic mechanisms, such as public-private key pairs, that afford their holders the ability to enjoy the benefits of these assets. Through the lens of Hohfeld's legal framework, this control represents a "privilege," which confers on keyholders the liberty to freely use and transfer the asset, while creating in all others a correlative "no-right" to prevent or interfere with such activities.[97] Finally, legitimate claims to exclusivity can be established through the technological architecture of the relevant protocols—whether through proof-of-work mining, proof-of-stake validation, or smart contract execution that creates or transfers tokens according to predetermined parameters. These protocol-level mechanisms create verifiable and transparent records that document the creation of each digital asset and all subsequent transfers, thereby providing objective evidence to support claims of exclusivity under traditional property frameworks.

This judicial recognition of digital assets as property in the U.S., though largely driven by practical imperatives, also finds theoretical support in legal scholarship—albeit from a relatively small cohort of scholars who have engaged with the fundamental property law questions rather than regulatory concerns.

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[93] Kremen v. Cohen 337 F.3d 1024 (9th Cir. 2003).

[94] *Id.*

[95] *Id.* at 1030 (quoting Downing v. Mun. Court, 88 Cal.App.2d 345, 350, 198 P.2d 923 (1948)).

[96] *Id.*

[97] *See* Wesley Newcomb Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 YALE L.J. 16, 28–59 (1913).

Juliet Moringiello provided an early theoretical foundation, arguing that "the idea of tangibility as tangibility has no relevance to property law" due to the fact that courts have historically adapted possession and control concepts to novel types of assets, regardless of their physical manifestation.[98] As she points out, the conceptual leap from determining possession of a wild fox to establishing control over a domain name is a small one, given courts' centuries-long history of refashioning possession concepts to accommodate new forms of property rights.[99] Shawn Bayern similarly suggested that the inherent flexibility of the common law enables it to specifically accommodate cryptocurrencies within existing property frameworks.[100] Joshua Fairfield subsequently developed a more comprehensive theory for this position, leveraging a functional view of property that emphasizes social recognition over formal categorization. He posited that "when digital assets are treated by owners as personal property, the law of personal property should apply"—an approach that has proved particularly prescient as digital assets have gained widespread market acceptance.[101]

III. CLASSIFICATION OF DIGITAL ASSETS WITHIN PROPERTY

Once established that digital assets can be owned, the next crucial step is to classify these assets within existing property law categories. This is necessary because legal systems do not craft bespoke regimes for each novel invention that emerges. Rather, they operate through general and abstract categories of property into which novel assets must be subsumed. As Judge Frank Easterbrook observed in rejecting calls for specialized "cyberlaw," there was never a "Law of the Horse" despite horses' centrality to nineteenth-century life and commerce.[102] The general principles of property, tort, and contract law adequately governed transactions involving horses.[103]

The classification exercise we undertake here involves again principles that vary substantially between common law and civil law systems. Moreover, even jurisdictions belonging to the same legal tradition often diverge in their

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[98] Juliet M. Moringiello, *False Categories in Commercial Law: The (Ir)relevance of (In)tangibility*, 35 FLA. ST. U. L. REV. 119, 164. (2007).

[99] Moringiello, *supra* note **Error! Bookmark not defined.** at 164-65.

[100] *See* Bayern, *supra* note 46.

[101] *See* Joshua Fairfield, *BitProperty*, 88 S. CAL. L. REV. 805 (2015); Joshua Fairfield, *Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property*, 97 IND. L.J. 1267 (2022); *See also* Odinet, *supra* note 89.

[102] Frank H. Easterbrook, *Cyberspace and the Law of the Horse* 1996 Univ. of Chi. Legal F. 207 (1996).

[103] *See* Lawrence Lessig, *The Law of the Horse: What Cyberlaw Might Teach* 113 HARV. L. REV. 501 (1999) (engaging with and partially challenging Easterbrook's position).

approach, despite their shared roots. In common law jurisdictions, the categorization of personal property has traditionally been framed by the *summa divisio* between *choses* in possession and *choses* in action.[104] This foundational distinction was famously described by the 19th century English jurist Lord Justice Edwards Fry in the following terms: "all personal things are either in possession or action. The law knows no tertium quid between the two."[105]

This binary classification has historically carried profound implications for the commercial circulation of assets. *Choses* in possession encompass all property rights in relation to things that are susceptible to physical taking.[106] These rights are typically transferred through a combination of intention and delivery of the thing.[107] Owners enjoy robust remedies against interfering third parties and benefit from various good faith purchase exceptions.[108] *Choses* in action, by contrast, include property rights "which can only be claimed or enforced by action, and not by taking physical possession."[109] They transfer through assignment, remain strictly subject to the *nemo dat quod non habet* rule, and provide their holders with a narrower set of remedies.[110]

The scope of *choses* in possession has remained uncontroversial.[111] However, the boundaries of *choses* in action have been the subject of sustained scholarly debate since the late nineteenth century.[112] Originally, disagreements concerned whether the category should be confined to rights of action in

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[104] The word 'chose' means thing in French. *See* In re Morales, 403 B.R. 629 (Bankr. N.D. Iowa 2009).

[105] Colonial Bank v. Whinney [1885] 30 Ch.D 261, 285.

[106] W. SWADLING, PROPERTY, IN ENGLISH PRIVATE LAW 4.20 (Andrew Burrows ed., 3d ed. 2017).

[107] *Id.*

[108] *Id.*

[109] Torkington v. Magee 2 [1902] 2 K.B. 427, 430; *see also* Robert Stevens, *Crypto Is Not Property*, 139 L.Q.R. 2023, 615-628.

[110] See Adam J. Levitin, *Finding Nemo: Rediscovering the Virtues of Negotiability in the Wake of Enron*, 2007 COLUM. BUS. L. REV. 83, 167 (2007); *see also* RESTATEMENT (FOURTH) OF PROPERTY, § 1.1 (Tentative Draft No. 5, 2024).

("Subject to exceptions, a person may not transfer an estate or interest in property unless that person is the owner of the estate or interest in question or has the legal authority to act on that owner's behalf.")

[111] *See* SWADLING, *supra* note 106; see also W.H. HASTINGS KELKE, AN EPITOME OF PERSONAL PROPERTY LAW 2 (3d ed. 1910).

[112] *See also* W.S. Holdsworth, *The History of the Treatment of "Choses" in Action by the Common Law*, 33. HARV. L. REV. 997 (1928) (tracing the early history of choses in action in English and American law); Kevin Sobel-Read et al., *The Critical Role of Choses in Action: A Call for Harmonization across Common Law Jurisdictions*, 45 FORDHAM INT'L L.J. 513 (2022) (providing an overview of the modern history of choses in action across common law jurisdictions); BEN MCFARLANE, THE STRUCTURE OF PROPERTY LAW 15-27 (Hart Publ'g 2019) (discussing the historical development and tensions in the chose in action concept).

contract and debt, or whether it extended to other intangible rights such as causes of action in tort, equitable interests, and intellectual property rights.[113] In recent decades, these definitional challenges have resurfaced as courts grappled with novel intangible assets like milk quotas, carbon emission allowances, telecommunications licenses, and rights over hunting estuarine crocodiles.[114]

Digital assets present the latest challenge to this traditional dichotomy.[115] Mirroring the approach we followed in Part II, we first survey the treatment of this issue in foreign common law jurisdictions and then turn to the position in the United States.

A. Legal Treatment Abroad

In common law jurisdictions other than the United States, an uncontroversial consensus has emerged that digital assets cannot qualify as *choses* in possession. This is based on the view that possession requires tangibility.[116] To quote Thomas Merrill: "Possession is limited to tangible objects, that is, things that have physical dimensions."[117]

By contrast, the possible classification of digital assets as *choses* in action has sparked considerable debate. One view, grounded in Blackstone's classical conception, maintains that *choses* in action require the right holder to have an actual cause of action against another person.[118] Digital assets almost invariably

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[113] *See* the scholarly debate in T.C. Williams, *Terms Real and Personal in English Law*, 4 L. Q. Rev. 394 (1888); H.W. Elphinstone, *What Is a Chose in Action?*, 9 L. Q. Rev. 311 (1893); C. Sweet, *Choses in Action*, 11 L. Q. Rev. 238 (1895); T.C. Williams, *Is a Right of Action in Tort a Chose in Action?*, 10 L. Q. Rev. 143 (1894); F Pollock, *What Is a Thing?* 10 L. Q. Rev. 318 (1894). For modern analysis of this debate, *see* SARAH WORTHINGTON, EQUITY 58-62 (2nd ed., Oxford Univ. Press 2006).

[114] *See* Sobel-Read et al., *supra* note 112 (providing an overview of the modern history of choses in action across common law jurisdictions).

[115] His challenge was aptly illustrated by the Singaporean Court of Appeal in Quoine Pte. Ltd. v. B2C2 Ltd., [2020] 2 SLR 20 at [144], which noted the appeal of classifying cryptocurrencies as property while acknowledging the complexities involved in determining the precise nature of such property.

[116] THOMAS W. MERRILL, OWNERSHIP AND POSSESSION, *in* LAW AND ECONOMICS OF POSSESSION 25 (Yun-Chien Chang ed., Cambridge Univ. Press 2015); H.E. SMITH, THE ELEMENTS OF POSSESSION, *in* LAW AND ECONOMICS OF POSSESSION 65-102 (Yun-Chien Chang ed., Cambridge Univ. Press 2015); D.R. HARRIS, THE CONCEPT OF POSSESSION IN ENGLISH LAW, *in* OXFORD ESSAYS IN JURISPRUDENCE 69 (A.G. Guest ed., Oxford Univ. Press 1961). For a discussion of the academic literature on possession, *see* João Marinotti, *Possessing Intangibles*, 116 NW. U. L. REV. 1227, 1252-54 (2022). We note that although courts could theoretically redefine possession to eliminate the tangibility requirement, they have not yet done so.

[117] Merrill, *supra* note 116 at 25 (observing that, for example, "the law of adverse possession reflects the limitation of possession to tangible objects.").

[118] WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND, BOOK II: OF THE RIGHTS OF THINGS 396-397 (Simon Stern ed., Oxford Univ. Press 2016).

fail to satisfy this criterion—this is particularly evident with cryptocurrencies in decentralized networks like Bitcoin and Ethereum, but it also applies to many other digital assets, such as NFTs, that purport to create enforceable rights against specific persons.

Proponents of this view argue that digital assets belong in a *tertium quid*—a third category of personal property distinct from both *choses* in possession and *choses* in action—on the basis that they exist independently of the law as data objects.[119] Such supporters trace the origins of this third category to the UK Privy Council's decision in *Attorney-General of Hong Kong v Nai-Keung*,[120] which dealt with export quotas, and suggest it encompasses not only digital assets but also milk quotas and EU carbon emissions allowances.[121] This perspective calls for the development of a new body of rules tailored to this third category, either accomplished judicially or through statutory intervention. Notably, this thesis has gained significant traction in recent years, receiving judicial endorsement in England and Hong Kong,[122] as well as support from influential law reform bodies[123] and commentators.[124]

An alternative view rejects the necessity of a *tertium quid*, arguing instead that digital assets can and should be accommodated within the existing category of *choses* in action.[125] Advocates for this approach believe that courts should develop the commercial circulation regime for digital assets by carefully adapting established principles governing *choses* in action. This thesis builds upon the English legal historian Sir William Holdsworth's historical analysis, which revealed *choses* in action as a residual category that has progressively expanded beyond its original conception of mere rights enforceable through court action.[126] This broader conception has gained particular traction in Australia,

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[119] *See* Law Comm'n, *Digital Assets: Final Report*, LAW COMMISSION No. 412, ¶¶ 2.52-53, 3.3, 3.25-30, 3.36-58, 3.65-69, 4.1-5 (2023); *Legal Statement on Cryptoassets and Smart* Contract, U.K. JURISDICTION TASKFORCE [57] (Nov. 2019).

[120] Att'y-Gen. of Hong Kong v. Nai-Keung [1987] 1 WLR 1339, 1342; Swift v. Dairywise Farms Ltd., [2000] 1 WLR 1177; Armstrong v. Winnington Networks Ltd., [2013] EWHC (Ch) 156.

[121] *See* Law Comm'n, *supra* note 119.

[122] *See* A.A. v. Persons Unknown [2019] EWHC 3556 (Comm); Tulip Trading Ltd., v. Bitcoin Ass'n for BSV [2023] EWCA Civ. 83, [24]; In Re Gatecoin Ltd. (In Liq.) [2023] 3 HKC 401 [47], [56]–[59].

[123] *See* Law Comm'n, *supra* note 119.; *Legal Statement on Cryptoassets and Smart* Contract, U.K. JURISDICTION TASKFORCE [57] (Nov. 2019).

[124] Fox, *supra* note 49 at 139; Michels, *supra* note 49.

[125] Low, *supra* note 49.

[126] W.S. HOLDSWORTH, A HISTORY OF ENGLISH LAW VOL. 7 515-23 (2nd ed., Forgotten Books 2018); *see also* Holdsworth, *supra* note 112 at 997–1030.

where it is now settled law,[127] and courts across multiple jurisdictions have begun applying it to digital assets, though often without extensive doctrinal analysis.[128]

What is striking about this debate on whether digital assets are *choses* in action or a *tertium quid* is that it has stifled deeper investigations into the legal rules governing their commercial circulation. Indeed, the preoccupation with classification has impeded the development of a coherent framework for how property law applies to these assets in commercial transactions. This narrow framing has left fundamental questions largely unexplored, including the precise subject-matter of the property right, the mechanisms by which title passes, and the applicability of the *nemo dat* rule and its exceptions. Yet these issues are essential to resolving even basic property disputes. Consequently, significant uncertainty persists in these jurisdictions regarding whether a good-faith purchaser acquires valid title to a digital asset obtained through deceit or misrepresentation, raising, in turn, concerns about the finality of transactions. Similarly, the creation and perfection of security interests in digital assets remain unsettled. Moreover, the absence of clear rules governing priority conflicts has left undefined how competing claims should be resolved, particularly in insolvency proceedings or in disputes involving multiple claimants asserting proprietary rights over the same asset.

B. Legal Treatment at Home

In the United States, the classification of digital assets within property has attracted limited attention. Unlike other common law jurisdictions, there has been no debate regarding whether they are *choses* in possession or *choses* in action. Courts have not engaged with this issue, and commentators have only done so tangentially regarding specific and narrow issues rather than as a fundamental property law question.

We believe that this relative silence can be attributed to three interrelated developments in U.S. property law that differentiate it markedly from that of other common law jurisdictions. First, the orientation of American scholars in this field has traditionally centered on land and real estate, with much of the theoretical discourse centered on normative debates about property rights,

[127] In Australia, the High Court held unambiguously that choses in action are not limited to rights enforceable by a court in Nat'l Trs. Ex's and Agency Co. of Australasia Ltd. v. Fed. Comm'r of Tax'n (1954) 91 CLR 540. This conceptualization has not been doubted in Australia since, and was reiterated by Judge Gummow in Commonwealth v. WMC Resources Ltd., (1998) 194 CLR 1 at [180].

[128] In England, Fetch.AI Ltd. v. Persons Unknown Category A [2021] EWHC 2254 (Comm), [9]; in New Zealand Ruscoe v Cryptopia Ltd., (In Liq.) [2020] NZHC 728, [2020] 2 NZLR 809. Most recently in Australia, In Re Blockchain Tech Pty. Ltd. [2024] VSC 690.

ownership, and societal functions.[129] Consider, for example, Guido Calabresi and A. Douglas Melamed's seminal 1972 article *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, which presents a unified framework for understanding how legal systems protect entitlements.[130] The authors introduce three key methods of protection: property rules, liability rules, and inalienability rules.[131] While the authors indeed use both real and personal property examples to make their argument, the former dominate the analysis and carry the heaviest weight throughout the paper.[132] The article's most extensive and detailed applications center on real property (particularly in its extended discussion of pollution and nuisance law), the "Guidacres" eminent domain example, and various land use conflicts between neighbors.[133] In contrast, while personal property examples appear throughout the paper—including discussions of bodily integrity, theft, and transferable rights—these tend to be briefer, less detailed, and used more for supplementary explanation.[134]

Also, Harold Demsetz's 1967 paper *Toward a Theory of Property Rights* lays out a foundational economic theory explaining how and why property rights have emerged and evolved in society.[135] His article argues that property rights develop primarily to help people internalize externalities when the benefits of doing so exceed the costs.[136] In developing this theory, it is through land ownership that Demsetz works through his key theoretical concepts, including externalities, negotiation costs, and the internalization of benefits and costs.[137] His most extensive example examines the evolution of Native American land rights.[138] By contrast, his treatment of personal property is notably less prominent. Examples involving personal property (such as corporate shares, patents, or primitive tools and weapons) appear more briefly, often in footnotes or near the paper's end.[139] Indeed, his emphasis on real property is deliberate

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[129] *See also* Lovett, *supra* note 68 at 743-53 (discussing a scholarly debate from the 2000s between two main camps of property theorists—the "progressive" theorists who view property law as serving multiple social values and promoting human flourishing, and the "information" or " exclusionary" theorists who emphasize the fundamental importance of the right to exclude—while also examining other theoretical approaches to property law).

[130] Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV.. L. REV. 1089, 1089-92 (1972).

[131] *Id.* at 1092-93.

[132] *Id.* at 1106-10.

[133] *Id.* at 1106-08, 1115-24.

[134] *Id.* at 1124-27.

[135] Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347 (1967).

[136] *Id.* at 348.

[137] *Id.* at 354-56.

[138] *Id.* at 351-53.

[139] *Id.* at 353 n.7, 358-59.

rather than coincidental—Demsetz explicitly states that land ownership provides a "particularly useful example" for developing his theory.[140]

Coming more into the modern era, work of prominent progressive property theorists of the last few decades has also tended to lean more heavily in the direction of real property. In his important article titled *Democratic Estates: Property Law in a Free and Democratic Society*, Joseph Singer explores property law through the lens of land and real estate, using examples of land ownership, transfer, and regulation to illustrate broader legal and philosophical concepts about property rights.[141] His analysis systematically examines how real property interactions reflect social relationships, democratic values, and the complex legal frameworks that govern land ownership and use.[142] Gregory Alexander's article on the *The Social-Obligation Norm in American Property Law* also primarily uses land as the focal point for illustrating the social-obligation norm in property law.[143] It discusses land-related doctrines like eminent domain, land reform, and environmental and historical preservation.[144] The emphasis is on the societal responsibilities of landowners and the community's interest in land use and distribution.[145] Personal property is referenced more sparingly.[146]

Relatedly, Eduardo Peñalver's important work also has tended to focus on real property, such as in *Land Virtues* which discusses land's complexity, memory, and its unique role in human flourishing.[147] In *Property as Entrance*, Peñalver develops a critique of property as both an *exit* and *entrance* mechanism, primarily through analysis of real property's role in community formation—particularly highlighting how territorial spaces like homes, neighborhoods, and separatist enclaves shape social interactions.[148]

Similarly, the works of leading so-called "exclusionary" or "information cost" theorists[149] Thomas Merrill and Henry Smith have relied heavily on the example of real property. In his seminal work, *Property and the Right to Exclude*, Merrill demonstrates a clear preference for using real property examples,

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[140] *Id.* at 354.

[141] Singer, *supra* note 62 at 1020-21.

[142] *Id.* at 1047-55. Personal property is discussed but not with the same focus as real property. *See id.* at 1045-46. *See also* Singer, *supra* note 68 at 314-16.

[143] Alexander, *supra* note 68 at 775-779.

[144] *Id.* at 782-784, 791-96, 774-75.

[145] *Id.* at 774-75.

[146] *Id.* at 800-01, 810-14.

[147] Eduardo M. Peñalver, *Land Virtues*, 94 CORNELL L. REV. 821, 828-30 (2009)

[148] Eduardo M. Peñalver, *Property as Entrance*, 91 VA. L. REV. 1889, 1940-44 (2005).

[149] *See* Lovett, *supra* note 68 at 746 (ascribing these monikers); *see also* Jane B. Baron, *The Contested Commitments of Property*, 61 HASTINGS L.J. 917, 918, 924-27 (2010).

particularly land, to illustrate its theoretical arguments.[150] The recurring hypothetical of "Blackacre" serves as the primary vehicle for explaining how exclusion rights operate and relate to other property rights.[151] While the article acknowledges personal property through examples like books and financial instruments, these receive significantly less attention and typically appear as brief illustrations rather than points of sustained analysis.[152] Similarly, in Smith and Merrill's influential co-authored work, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, the focus is again on real property—particularly estates in land—as the primary lens for understanding the numerus clausus principle.[153] Personal property appears mainly as a foil to show how property rights can be even more restricted, with the authors noting that "personal property is restricted to fewer available forms of ownership than real property."[154] And again, in their piece titled *What Happened to Property in Law and Economics?*, Smith and Merrill primarily examine real property (particularly land) to illustrate the traditional in rem conception of property as a right to exclude and secure investment.[155] Through historical references to Blackstone and Smith, as well as Coase's land dispute examples, the discussion emphasizes the security and standardization benefits tied to land ownership.[156]

That is not to say that personal property has not been explored at all. Indeed it has, but often with far less prominence. In Richard Posner's *Utilitarianism, Economics, and Legal Theory*, personal property examples are more prominently featured and discussed in greater detail compared to real property examples.[157] The personal property scenarios, like the diamond necklace, babies in the adoption market, body parts (organs), and the tooth/smile example, are used to explore complex ethical issues and the boundaries of wealth maximization theory.[158] These examples are particularly provocative and are designed to challenge conventional moral intuitions by pushing the implications of economic analysis to controversial limits. In contrast, the real property examples, such as pollution affecting residential property values, are more straightforward and generally used to illustrate

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[150] *See* Thomas Merrill, *Property and the Right to Exclude*, 77 NEB. L. REV. 730, 740-43 (1998).

[151] *Id.* at 740-744.

[152] *Id.* at 731-732, 750-751

[153] Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, 110 YALE L.J. 1, 12-15 (2000).

[154] *Id.* at 17. The article's treatment of personal property is largely confined to a single extended hypothetical about a watch and observations about the limitations on creating servitudes in personal property. *See id.* at 27-33, 18-19.

[155] Thomas W. Merrill & Henry E. Smith, *What Happened to Property in Law and Economics?*, 111 YALE L.J. 357, 360-364, 386-388

[156] *Id.* at 360-362, 368-369

[157] *See* Richard A. Posner, *Utilitarianism, Economics, and Legal Theory*, 8 J. LEGAL STUD. 103 (1979).

[158] *See id.* at 121-22, 126, 138-39.

conventional market transactions or externality problems.[159] Posner uses personal property cases to a greater extent because they allow him to explore ethically complex issues, such as the commodification of human constituents (e.g., body parts or identity), which test the limits of economic efficiency as a normative guide for legal rules.[160] Real property discussions, while still significant, are comparatively more conventional and less ethically provocative.

Consider also Margaret Jane Radin's powerful article *Property and Personhood* advances the theory that certain property becomes so fundamentally connected to human identity that it warrants enhanced legal protection.[161] While Radin employs both personal and real property examples to make this argument, these two categories serve distinct roles in her analysis. Personal property examples like wedding rings, family heirlooms, and personal effects appear frequently as accessible illustrations of her core concept.[162] However, real property (particularly the home) provides the substantive foundation for her most significant legal arguments.[163] Radin uses residential property to demonstrate how her theory operates within existing legal frameworks, particularly in Fourth Amendment case law, landlord-tenant law, zoning regulations, and eminent domain.[164] Though personal property examples help readers grasp the property-personhood connection intuitively, real property examples do the analytical heavy lifting, which we think understandably reflects both the greater frequency of real property disputes in courts and real property's central role in generating the legal doctrine through which Radin develops her theory.[165]

To be sure, none of this is surprising or blameworthy. The emphasis on real property in the property law literature aligns with the common law tradition's historical focus on land rights. This focus comes from the law's feudal origins where land ownership was the primary source of wealth, power, and social status. As such, legal doctrines were developed to protect landowners' interests and to regulate the transfer and use of land. Moreover, land has always held unique legal significance due to its immobility, permanence, and economic value, necessitating complex rules to govern its use and inheritance.

To see this historical emphasis on land even more clearly, one need look no further than the many modern property law casebooks used in American law

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[159] *See id.* at 120-21.
[160] *See id.* at 121-22, 126, 138-39.
[161] Margaret Jane Radin, *Property and Personhood*, 34 STAN. L. REV. 957, 957-959 (1982).
[162] *Id.* at 959-960.
[163] *Id.* at 991-1002.
[164] *Id.* at 993-1006.
[165] *Id.* at 957-958, 991-992.

schools—all of which overwhelmingly prioritize real property over personal property.[166] These textbooks dedicate extensive coverage to topics such as estates in land, land use regulations, servitudes, landlord-tenant law, and conveyancing, while offering far less treatment of personal property issues like possession, finders' rights, and bailments.[167] The disproportionate focus suggests that land remains the central organizing principle of property law, perpetuating the notion that legal complexity and importance are primarily associated with real estate. Consequently, students are trained to view property law through the lens of land ownership, reinforcing a hierarchy where personal property is secondary and consequently less legally significant.

Thus, with few notable exceptions,[168] this focus has left personal property relatively understudied, often treated as a secondary concern in both academic discourse and judicial development. Meanwhile, intellectual property has evolved as a largely autonomous field, with its own community of scholars

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[166] *See* JAMES C. SMITH ET AL., PROPERTY: CASES AND MATERIALS 143-161, 166-185, 416-438, 485-555, 607-690, 697-733, 755-782, 789-840 (3d ed. 2013) (covering, adverse possession, cotenancy, landlord-tenant law, private land use restrictions, zoning, natural resources, and takings, respectively); JOHN G. SPRANKLING & RAYMOND R. COLETTA, PROPERTY: A CONTEMPORARY APPROACH 98-134, 135-143, 150-158, 407-434, 543-662, 666-716, 716-760, 765-780, 783-855, 901-923, 925-979 (3d ed. 2015) (covering adverse possession, water law, concurrent ownership, leasing real property, selling real property, easements, land use restrictions, nuisance, land use regulation, eminent domain, and takings, respectively); JOSEPH W. SINGER, ET. AL., PROPERTY LAW: RULES, POLICIES, AND PRACTICES 3-39, 283-328, 333-409, 513-556, 556-574, 662 687, 809-902, 907-1011, 1013-1091, 1141-1262 (6th ed. 2014) (covering trespass, adverse possession, nuisance, easements, covenants, concurrent tenancies, leaseholds, real estate transactions, fair housing law, and takings, respectively); SHELDON F. KURTZ ET. AL., CASES AND MATERIALS ON AMERICAN PROPERTY LAW 209-272, 287-377, 437-496, 507-652, 679-834, 863-918, 923-949, 1083-1185, 1217-1292, 1307-1330, 1355-1426 (7th ed. 2020) (covering adverse possession, estates in land and future interests, property and cohabitants, leasehold estates, servitudes, nuisance, takings, zoning, real estate transactions, deed conveyances, and assuring good title, respectively).

[167] *See* JAMES C. SMITH ET AL., PROPERTY: CASES AND MATERIALS 79–95, 102–106, 121–134, 139–143, 305–314, 755–782 (3d ed. 2013) (covering finders' rights, bailments, gifts, possession, animal ownership, and natural resources, respectively); JOHN G. SPRANKLING & RAYMOND R. COLETTA, PROPERTY: A CONTEMPORARY APPROACH 161–167, 174–191, 198–203, 212–230, 237–308 (3D ED. 2015) (covering the rule of capture, finders' rights, adverse possession of chattels, gifts, and intellectual property, respectively); JOSEPH W. SINGER, ET. AL., PROPERTY LAW: RULES, POLICIES, AND PRACTICES 30–136, 141–146, 150–158, 171–236, 329–333 (6th ed. 2014) (covering wild animals, natural resources, finders' rights, intellectual property, and adverse possession of personal property, respectively); SHELDON F. KURTZ ET. AL., CASES AND MATERIALS ON AMERICAN PROPERTY LAW 8–49, 50–79, 117–177, 272–287, 426–437 (7th ed. 2020) (covering the rule of capture, finders' rights, gifts, adverse possession of chattels, and bank accounts, respectively).

[168] *See* Marinotti, *supra* note 116; Moringiello, *supra* note 98 at 121; Fairfield, *supra* note 101; Odinet, *supra* note 89 at 688; JOSHUA A.T. FAIRFIELD, OWNED: PROPERTY, PRIVACY, AND THE NEW DIGITAL SERFDOM (Cambridge Univ. Press 2017).

and distinct theoretical frameworks.[169] Consequently, the theoretical property law dimensions of digital assets are of interest only to the few scholars positioned at the intersection of personal property theory, commercial law, and technological innovation.

Second, when American legal scholars have engaged with personal property law, they have concentrated on the practical incidents of ownership, possession, control, transfer, and use as collateral.[170] For example, Juliet Moringiello argues in her innovative 2007 article *The (Ir)relevance of (In)tangibility* that the legal system's persistent focus on tangibility compared to intangibility in commercial law creates "false categories unrelated to significant legal distinctions" that "hinder the ability of commercial law to expand to adequately accommodate electronic assets."[171] Instead of fixating on whether an asset is tangible or intangible, she contends that courts and lawmakers should concentrate on "the relationships between the persons claiming rights in those assets and the assets themselves."[172] This pragmatic approach is particularly evident in her critique of how courts have struggled with electronic assets like domain names, where she argues they have become unnecessarily "confounded" by intangibility (i.e., things that "cannot easily be grabbed"[173]) rather than focusing on fundamental property relationships and the practical ability to control and transfer these assets.[174]

Similarly, Joshua Fairfield has argued in his insightful 2015 work *BitProperty* that property is fundamentally about information and its transfer, rather than rigid doctrinal categories based on physical tangibility.[175] Rather than fixating on traditional property categories, Fairfield examines the practical incidents of digital property ownership, analyzing the mechanics of transfer through tokenization and side-chains, the role of possession and control in creating ownership claims, the potential use of digital assets as collateral, and the

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[169] *See generally* U.S. COPYRIGHT OFFICE, THE LAW: A COMPILATION OF THE COPYRIGHT AND INTELLECTUAL PROPERTY LAWS OF THE UNITED STATES (10th ed. 2021); HUGH C. HANSEN, ED., U.S. INTELLECTUAL PROPERTY LAW AND POLICY (Edward Elgar Publ'g. 2006); MARY LAFRANCE ET AL., FUNDAMENTALS OF UNITED STATES INTELLECTUAL PROPERTY LAW: COPYRIGHT, PATENT, AND TRADEMARK (8th ed. 2023).

[170] *See* Moringiello, *supra* note 98 at 119; Fairfield, *supra* note 101; Fairfield, *supra* note 168; Jeanne L. Schroeder, *Bitcoin and the Uniform Commercial Code*, 24 U. MIAMI BUS. L. REV. 1, 14, 27-28, 43 (2016); Odinet, *supra* note 89 at 688. One recent exception to this trend is João Marinotti's 2022 article *Possessing Intangibles*, which "critiques the pragmatic, flexible approach" described above in favor of developing a more rigid conceptual framework for intangible property. *See* Marinotti, *supra* note 116 at 1229-30, 1252.

[171] Moringiello, *supra* note 98 at 119.

[172] *Id.* at 133.

[173] *Id.* at 156-57.

[174] *Id.* at 133-34.

[175] Fairfield, *supra* note 101 at 811.

critical function of information rights and verification in maintaining property systems.[176] Along those lines, in 2016 Jeanne Schroeder observed the need for a fundamentally pragmatic, policy-oriented approach to digital assets that prioritizes functional outcomes over rigid taxonomies.[177] She explicitly rejects formalistic approaches, arguing that "the conflation of possession with physical custody of tangible things, if ever justified in the past, is hopelessly unsophisticated and increasingly unworkable in the 21st century."[178]

The pragmatic orientation found in the scholarly work of these legal academics mirrors the general movement in American 20th century legal thought toward flexible, policy-oriented frameworks and away from rigid common law taxonomies. While the distinction between *choses* in possession and *choses* in action remains part of American common law, these categories have receded from prominence in both judicial reasoning and scholarly writing. Indeed, the last significant legal scholarship on the *chose* in action category was during the first quarter of the 20th century—largely led by Walter Cook and Samuel Williston—with the animating focus being issues involved in the assignment of debts.[179]

Notably, the few U.S. scholars who have considered whether digital assets are *choses* in action or a *tertium genus* have ultimately suggested that it is a fruitless analytical approach. Discussing Bitcoin, Shawn Bayern observed that it "is not a contract or a bailment. Indeed, it is probably not a *chose* in action of any kind because it represents no claim against others. … In a meaningful sense, it is something new."[180] However, rather than dwelling on this classification conundrum, Bayern advocated for a functional approach. In his view, traditional categories should be given limited attention, focusing instead on practical outcomes: "a bitcoin is an important economic right to many who participate in the network. It is clearly proper to criminalize its theft. It matches parties' expectations if bitcoin is treated as intangible, moveable personal property. Contracts involving bitcoins should be enforced."[181]

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[176] *Id.* at 825-28, 850-51, 863-64.

[177] Schroeder, *supra* note 170 at 14, 27-28, 43.

[178] *Id.* at 27.

[179] *See, e.g.*, Walter W. Cook, *The Alienability of Choses in Action*, 29 HARV. L. REV. 816 (1916); Samuel Williston, *Is the Right of an Assignee of a Chose in Action Legal or Equitable?*, 30 HARV. L. REV. 97 (1916); Walter W. Cook, *The Alienability of Choses in Action: A Reply to Professor Williston* 30 Harv. L. Rev. 449 (1917); W.S. Holdsworth, *The History of the Treatment of Choses in Action by the Common Law*, 33 HARV. L. REV. 997 (1920); Paul Bruton, *The Requirement of Delivery as Applied to Gifts of Choses in Action*, 39 Yale L. J. 837 (1930); L. L. Briggs, Assignment of Choses in Action, 49 J. ACCT. 321 (1930). Kevin Sobel-Read, *Recalibrating Contract Law: Choses in Action, Global Value Chains, and the Enforcement of Obligations Outside of Privity*, 93 TUL. L. REV. 1 (2018). For a notable, more modern exception, *see* Kevin Sobel-Read, *supra* note 112.

[180] Bayern, *supra* note 46 at 34.

[181] *Id.*

Third, this functional approach to property law has ushered in new categories for personal property in the U.S. that have structurally curtailed the significance of the *summa divisio* between *choses* in possession and *choses* in action. This new taxonomy finds its primary expression in the regime established by the Uniform Commercial Code (UCC) for a wide range of commercial transactions, including sales, leases, negotiable instruments, documents of title, investment securities, and security interests. At its core, the UCC establishes a distinctly American framework of personal property categories—including goods, accounts, payment intangibles, investment property, and intangibles—that, while bearing traces of the traditional *chose* distinction, operates largely independently from these historical classifications.[182] In the U.S., the crucial question is whether and how digital assets fit within these UCC categories and their corresponding regimes. Common law treatment, and consequently the potential classification of digital assets as *choses* in action, plays a consequential but residual role confined to those areas where the UCC does not apply.

IV. COMMERCIAL CIRCULATION OF DIGITAL ASSETS IN AMERICAN LAW

The preceding analysis has shown that the classification of digital assets within property differs markedly in the U.S. compared to other common law jurisdictions. This distinctiveness reflects both the more functional orientation of U.S. property law and the prominent role of the categories codified in the Uniform Commercial Code. In this section, we focus on three fundamental aspects of this framework: the voluntary transfer of ownership of digital assets, their use as collateral in secured transactions, and digital asset tokenizations.

A. Prior to the 2022 UCC Amendments

Our examination is divided into two periods: before and after the 2022 UCC Amendments. This chronological organization brings into sharp relief the trajectory of U.S. personal property law in relation to digital assets. We begin with the period from 2009 to 2022, during which time courts and scholars grappled with applying existing state common law principles and UCC categories to this entirely novel type of intangible.

1. Transferring Ownership of Digital Assets

From the early days of the Bitcoin network, the commercial circulation of digital assets has predominantly occurred through arrangements in which parties agreed to exchange these assets for money, other digital assets, or

[182] *See infra* Part IV and the definition of "goods" under UCC Article 2. *See* U.C.C. § 2-105(1).

alternative forms of consideration. In the United States, these transactions largely fall within the domain of state law.[183]

Market participants have always referred to the trading of tokens as "sales." However, this colloquialism has no dispositive effect in law. Across almost all fifty states, local enactments of UCC Article 2 govern sale contracts,[184] defined as agreements in which a seller transfers title to "goods" to a buyer for a price. Crucially, under this statute, "goods" means "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, investment securities … and things in action."[185] Therefore, whether a contract for the transfer of ownership of digital assets is a *sale* depends on whether these assets are "movable" and not "things in action."

The difficulty with this somewhat formalistic assessment is that UCC Article 2 does not define either of these terms. Regarding the former, historically, all things that are neither real estate nor fixtures of real estate have been classified as movables.[186] As such, it would appear relatively uncontroversial to include digital assets in this category. By contrast, determining whether digital assets are "things in action" is more problematic.

Because Article 2 does not define this concept, attention must turn to the common law as it supplements the UCC whenever not displaced by its provisions.[187] Logically, this issue—whether digital assets constitute things in action and thus fall outside the scope of "goods"—should have been the prompt for analyzing the classification of digital assets within U.S. property law categories. Yet, as discussed in Part III, U.S. property law scholarship and

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[183] *See* Bd. of Regents of State Colls. v. Roth, 408 U.S. 564, 577 (1972) (noting that property interests are "not created by the Constitution," rather they stem from "existing rules or understandings that stem from an independent source such as state law."); Bob & Tom Coal Co. v. United States, No. CIV. A. 93-127, 1995 WL 619003, at *3 n.1 (E.D. Ky. Aug. 1, 1995) ("With rare exceptions, property law is state law."). "Property interests are created and defined by state law. Unless some federal interest requires a different result, there is no reason why such interests should be analyzed differently simply because an interested party is involved in a bankruptcy proceeding." *See* Butner v. United States, 440 U.S. 48, 55 (1979).

[184] There is an exception, however, in Louisiana, where the Civil Code governs the law of sales, rather than Article 2. *See* LA. CIV. CODE ANN. art. 2439 et seq. *See also* MELISSA T. LONEGRASS ET AL., SALE, LEASE, AND ADVANCED OBLIGATIONS: CASES AND READINGS (Carolina Acad. Press 2019).

[185] U.C.C. § 2-105 (2022).

[186] *See Property*, BLACK'S LAW DICTIONARY (12th ed. 2024) (describing personal property as "[a]ny movable or intangible thing that is subject to ownership and not classified as real property.").

[187] U.C.C. § 1-103(b) (2022) ("Unless displaced by the particular provisions of [the Uniform Commercial Code], the principles of law and equity . . . supplement its provisions.").

jurisprudence largely abandoned the systematic examination of the distinction between *choses* in action and *choses* in possession during the latter half of the twentieth century.

In this context of legal uncertainty, prior to the 2022 UCC amendments, practitioners and commentators generally concluded that transfers of ownership in digital assets fell outside Article 2's scope, despite the absence of judicial decisions directly addressing this issue and limited scholarly examination. Instead, these transactions were understood to be governed by state law rules applicable to the assignment of intangibles.[188]

We agree that this was the correct interpretation of the pre-2022 legal framework. In our view, whether digital assets are "things in action" or some novel *tertium genus* does not alter the conclusion that transactions for their transfer fall outside Article 2. If one believes that digital assets are things in action, they are outside the definition of "goods" and, thus, beyond the confines of Article 2. But even if one espouses the view that digital assets are not things in action but rather encompassed in a novel *tertium genus*, bringing transactions for their transfer under Article 2 would be doctrinally unsound.

Article 2 is founded on the premise that the object of sale contracts are corporeal things over which a person can have physical dominion.[189] This is especially noticeable regarding the concepts of "possession" and "delivery" which are cornerstones of this statute and assume that the parties are dealing with tangible things. Even if one redefined the category of things in action to exclude digital assets, this would not have overcome the inherent incompatibility of Article 2 with intangibles. Notably, this was the reasoning that led courts and commentators to repeatedly rebuke calls to bring transactions involving data, digital images, and other intangibles under Article 2.[190]

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[188]Kate Allass, *Cryptoassets: A Guide on Key Legal Issues*, FARRER & CO https://www.farrer.co.uk/news-and-insights/cryptoassets-a-guide-on-key-legal-issues2/; *What Sort of Property Is a Cryptoasset*?, NORTON ROSE FULBRIGHT https://www.nortonrosefulbright.com/en/knowledge/publications/26ade77a/what-sort-of-property-is-a-cryptoasset; AMY HELD, CRYPTO ASSETS AND DECENTRALISED LEDGERS: DOES SITUS ACTUALLY MATTER?, *in* BLOCKCHAIN AND PRIVATE INTERNATIONAL LAW 209–258, https://brill.com/edcollchap-oa/book/9789004514850/BP000017.xml?language=en.

[189] According to U.C.C. § 2-105(1), "goods" are defined as "all things (including specially manufactured goods) which are movable at the time of identification to the contract for sale." *See* U.C.C. § 2-105(1).

[190] *See* Holly D. Haines, *The Unlikely Intersection of Patent Law and Agricultural Biotechnology: The Case of the Genetically Modified Organism*, 10 U. ARK. LITTLE ROCK L. REV. 185 (2007*); see also* Michael L. Rustad & Elif Kavusturan*, A Commercial Law for Software Contracting*, 76 WASH. & LEE. L. REV. 775 (2019).

While the exclusion of digital asset transfers from Article 2 was doctrinally correct, subjecting these transactions to the law governing assignments of intangibles presented three grave problems. First, this body of rules varies considerably across states, being largely dominated by local case law rather than uniform statutory rules.[191] Imposing such legal fragmentation on digital asset markets, which are inherently borderless and require velocity in trading, was especially problematic. This lack of uniformity created significant friction in cross-border transactions and impeded the development of standardized trading practices, as market participants had to navigate potentially conflicting rules across different jurisdictions.

Second, state rules for the assignment of intangibles were developed primarily to govern receivables—monetary claims against specific persons.[192] These rules focused on issues of enforceability and defenses between creditors and debtors,[193] making them conceptually ill-suited for digital assets that exist as self-contained data objects rather than claims against identifiable parties. Moreover, states largely ceased developing these rules independently in the 1960s, when the transactions involving most receivables were subsumed under UCC Article 9.[194]

Third, and most problematically, common law rules for intangible assignments across all states shared one crucial feature: the strict application of the *nemo dat* principle without any good faith purchaser exception.[195] This meant that anyone acquiring a digital asset would need to verify the complete chain of title back to its creation—such as a block reward for mining or its original minting. The implications of this rule were severe. Every transaction carried a

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[191] *See* 1 ANDERSON U.C.C. § 1-103:69 (3d. ed.) (discussing the relationship between UCC Article 9 and the common law of assignments); *see also* MODERN LAW OF CONTRACTS § 21:2 (2024) ("An assignment is a present transfer of intangible rights (or a portion of those rights) under a contract or intangible rights in a claim to a transferee.").

[192] Prior to the 1940s, transfers of accounts receivable and chattel paper (two hugely important sources of business financing) were governed by the common law for the assignment of *choses* in action.

[193] Walter W. Cook, *The Alienability of Choses in Action* (1916) 29 HARV. L. REV. 816; Samuel Williston, *Is the Right of an Assignee of a Chose in Action Legal or Equitable?*, HARV. L. REV. 97 (1916); Walter W. Cook, *The Alienability of Choses in Action: A Reply to Professor Williston* 30 HARV. L. REV. 449 (1917).

[194] After two decades of state-by-state statutory "fixes" throughout the 1940s and 50s aimed at addressing legal uncertainly, these issues were largely resolved with the adoption of Article 9 of the Uniform Commercial Code. Article 9 provides clear rules governing the assignment of accounts and other payment rights: U.C.C. §§ 9-109(a)(3), -309(3), -310(a), -318(a)-(b), -404, -406(d). *See* Thomas E. Plank, *Article 9 of the UCC: Reconciling Fundamental Property Principles and Plain Language*, 68 BUS. LAW 439, 406-16 (chronicling the history leading up to Article 9).

[195] RESTATEMENT (FOURTH) OF PROPERTY, § 1.1 (Tentative Draft No. 5, 2024).

potential lawsuit—specifically, the risk of being unwound if any defect was discovered in the chain of title, no matter how remote.[196] A purchaser could never be certain of acquiring an asset free from competing claims, even when acting in good faith and paying full value. The only exception was acquiring assets directly from their creator or original recipient. Given the pseudonymous nature of digital asset markets, the high velocity of trading, and the complex web of transactions typical in these markets, such verification was not only practically impossible but fundamentally at odds with the operation of the market. This legal uncertainty posed an existential threat to the development of digital asset markets and severely limited their potential for mainstream adoption.

2. Collateralization of Digital Assets

While the commercial circulation of digital assets initially centered on outright transfers, by the mid-2010s market participants began exploring their potential as collateral in secured lending arrangements. This development accelerated rapidly with the rise of centralized exchanges offering margin trading and specialized lending platforms deploying increasingly sophisticated mechanisms to collateralize digital assets. As these secured lending practices became more prevalent and complex, legal scholars recognized the urgency of determining the applicable legal framework.

In the United States, as with transfers of ownership, secured transactions fall within the domain of state law, with UCC Article 9 serving as the primary source of rules across all fifty states. Article 9 applies to "a transaction, regardless of its form, that creates a security interest in personal property or fixtures by contract" with a security interest defined as "an interest in personal property or fixtures which secures payment or performance of an obligation."[197]

Article 9 is not built on traditional common law categories of personal property such as *choses* in possession and *choses* in action. Instead, it establishes its own taxonomy of collateral types, including goods, investment property, instruments, documents, chattel paper, accounts, and deposit accounts.[198] For each of these categories, Article 9 articulates distinct rules governing the creation of security interests (attachment), their effectiveness against third parties (perfection), and their relative ranking when multiple creditors claim interests in

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[196] This is often referred to as the problem of "merchantability." To see the issue more clearly, consider merchantability in the familiar context of real estate sales. *See* 17 ROBERT S. HUNTER, ESTATE PLANNING & ADMINISTRATION IN ILLINOIS, ILL. PRAC. SERIES, § 48:12 (4th ed.) ("Every purchaser of real estate expects to own and enjoy it free from the claims of others who allege they own it or have some lien on it. They also want to be sure that, when the time comes to sell it, title can be transferred to a new buyer without any hesitation or problem. Thus, title must be merchantable.").

[197] U.C.C. § 9-109(a)(1) (scope provision); § 1-201(b)(35) (definition of security interest).

[198] U.C.C. § 9-102(a) (definitions).

the same collateral (priority).[199] On the whole, this statute establishes a functional framework generally applicable to all secured transactions principles, while also incorporating bespoke rules that address the unique characteristics and practices associated with different types of collateral. It balances theoretical elegance with commercial pragmatism.[200]

The Article 9 taxonomy was originally developed in the 1950s and has been periodically amended to accommodate emerging asset classes and commercial practices. Unsurprisingly, prior to the 2022 UCC Amendments, this architecture did not include any classification specifically designed for digital assets. As a result, digital assets fell within the residual category of "general intangibles"—a catch-all designation that has historically served as the default for novel intangible assets, from intellectual property rights to franchise agreements.[201]

As a result, prior to the 2022 UCC Amendments, the regime for use as collateral of digital assets could be summarized as follows. For creation (attachment) of a security interest, three requirements had to be met: the secured party had to give value, the debtor needed rights in the collateral, and the parties had to enter into an authenticated security agreement describing the collateral.[202] Regarding perfection, secured parties had only one option: filing a financing statement in the appropriate public registry.[203] Unlike with certain other types of collateral, Article 9 did not provide alternative perfection methods such as possession or control.[204] As for priority, the general rule of "first-to-file-or-perfect" governed competing claims, meaning that the first secured party to either file a financing statement or otherwise perfect their security interest through another available method had priority over subsequent secured

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[199] U.C.C. § 9-317.

[200] *See* GRANT GILMORE, SECURITY INTERESTS IN PERSONAL PROPERTY (1965); Grant Gilmore*, The Secured Transactions Article of the Commercial Code*, 16 LAW & CONTEMP. PROBS. 27 (1951); Grant Gilmore, *The Good Faith Purchase Idea and the Uniform Commercial Code: Confessions of a Repentant Draftsman*, 15 GA. L. REV. 605 (1981); Grant Gilmore, *Article 9: What It Does Not Do for the Future*, 26 LA. L. REV. 300 (1966).

[201] "General intangible" means any personal property, including things in action, other than accounts, chattel paper, commercial tort claims, deposit accounts, documents, goods, instruments, investment property, letter-of-credit rights, letters of credit, money, and oil, gas, or other minerals before extraction. The term includes payment intangibles and software. *See* Schroeder, *supra* note 170 at 9-15, 19-21 (explaining why digital assets, including Bitcoin, would not fit in the categories of UCC Article 9 "money" and "deposit accounts").

[202] U.C.C. § 9-203(b)(1)-(3)(A).

[203] U.C.C. § 9-310(a).

[204] *See* U.C.C. § 9-312(b) (listing perfection methods for various types of collateral but providing no alternative to filing for general intangibles)

parties.[205] Moreover, security interests would automatically attach to digital assets received as proceeds of original collateral and remain perfected.

Thus, prior to the 2022 UCC Amendments, the framework for using digital assets as collateral was both clear and well understood. Market participants could rely on long-standing Article 9 principles for their secured transactions.[206] The system accommodated blanket liens on all present and future digital assets of a debtor, permitted straightforward perfection through filing, and provided clear priority rules based on temporal filing order. This predictability and simplicity, in principle, allowed parties to structure digital asset financing with relative confidence.

Regrettably, this regime was fundamentally misaligned with market realities, commercial practices and technology of digital assets. Perfection through filing—the sole method available—was particularly problematic. The slow pace and inherent time lag associated with public registration systems stood in stark contrast to the near-instantaneous execution of digital asset transfers and the frenetic pace of their trading environments. Furthermore, the pseudonymity of DLT networks severely impaired both the identification of appropriate filing jurisdictions and the searching for existing liens. Even more telling was the emergence of arrangement that ignored the Article 9 framework entirely. In these transactions, debtors would transfer their digital assets directly to lenders as security for loans, with the mutual understanding that the assets would be returned upon repayment. Typically consummated with minimal documentation and no public filings, these dealings reflected secured parties' preference for taking control over digital assets collateral, rather than relying on registries. By the early 2020s, both scholars and practitioners had come to view that the status quo was unsustainable.[207]

3. Tokenizations

As described in Part I, the market for digital assets extends beyond cryptocurrencies like Bitcoin and Ether that participants trade for their intrinsic value and technological utility. A significant segment of the DLT ecosystem centers on tokenization: using digital assets, typically NFTs, to purportedly

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[205] U.C.C. § 9-322(a)(1).

[206] Odinet, *supra* note 89.

[207] *See* Schroeder, *supra* note 170 at 67; Ronald J. Mann, *Reliable Perfection of Security Interests in Crypto-Currency*, 21 SMU SCI. & TECH. L. REV. 159, 172-73 (2018); Xuan-Thao Nguyen, *Lessons from Case Study of Secured Transactions with Bitcoin*, 21 SMU SCI. & TECH. L. REV. 181, 182-83 (2018); James P. Nehf, *Security Interests in Virtual Currencies*, (March 2, 2020), https://ssrn.com/abstract=3547540; TriBar Opinion Comm., *Third-Party "Closing" Opinions Under the 2022 Amendments to the Uniform Commercial Code*, 79 BUS. LAW. 555 (2024), https://www.americanbar.org/groups/business_law/resources/business-lawyer/2024-spring/tribar-report-on-opinions-under-2022-amendments/.

represent ownership of other assets—both tangible and intangible—or rights enforceable against persons, such as money claims.[208]

Tokenization emerged several years after Bitcoin's creation, made possible by the capabilities of the Ethereum network.[209] The first major breakthrough came with CryptoKitties in 2017, a project that enabled holders of NFTs to appropriate, control, and trade unique digital cats.[210] Building on the success of this experiment, enthusiasts started advocating for the use of digital assets to represent a variety of assets, not merely digital cats.[211]

The market's response was explosive. By August 2021, monthly NFT trading volume reached an unprecedented $2.8 billion.[212] The art world led the charge, exemplified by Christie's landmark $69 million sale of Beeple's digital artwork in March 2021.[213] Sports leagues joined the movement, with NBA Top Shot generating over $800 million in trading volume from tokenized basketball highlights.[214] Entrepreneurs rushed to tokenize an ever-expanding range of assets—from real estate and fine art masterpieces to luxury automobiles—with platforms like Propy, Maecenas, and CurioInvest claiming their tokens represented fractional ownership in these physical assets.[215]

Amid this whirlwind of excitement and grandiose predictions about transforming ownership, commercial transactions and society as a whole, a small group of legal scholars and practitioners questioned the private law foundations of tokenization.[216] They posited that, as a matter of private law, these digital assets did not embody ownership rights or personal claims enforceable against third parties—despite issuers' proclamations to the contrary.[217] These isolated voices denounced a profound disconnect between marketing promises, popular assumptions and the law.[218]

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[208] *See* Moringiello & Odinet, *supra* note 25
[209] *See id.*
[210] *Id.*
[211] *Id.*
[212] *Id.*
[213] *Id.*
[214] *Id.*
[215] *Id.*
[216] *Id. See also* Odinet & Tosato, *supra* note 25
[217] *See* Moringiello & Odinet, *supra* note 25; *see also* Odinet & Tosato, *supra* note 25
[218] *See* Moringiello & Odinet, *supra* note 25; *see also* Odinet & Tosato, *supra* note 25.

In our view, these critics were correct. Prior to the 2022 UCC Amendments, digital asset tokenizations were almost invariably flawed.[219] This becomes evident upon examining the applicable private law framework.[220]

For all the revolutionary rhetoric surrounding digital assets tokenizations, the concept of representing rights in one thing through another has been a cornerstone of commercial law for centuries.[221] Legal systems have long recognized certain paper documents as embodiments of rights: negotiable instruments carry payment rights, share certificates represent fractional corporate ownership, deeds embody property interests in land, bills of lading and warehouse receipts confer title to goods in transit and storage respectively.[222]

Through centuries of development, the law has crafted sophisticated frameworks for each of these tokenization mechanisms. These regimes establish clear rules ensuring both transacting parties and affected third parties understand their rights and obligations. Their complexity stems from their unique position at what Thomas Merrill and Henry Smith call the "property/contract interface."[223] Traditional tokenization mechanisms blend contractual and proprietary elements, each governed by distinct rules. The law affords parties extensive freedom in shaping their respective rights and obligations in contract, while property-based dimensions are subject to strict constraints.[224]

For the purpose of our inquiry, it is important to highlight that property law constraints tokenizations in two fundamental respects. First, it limits what types of personal property can be tokenized. For instance, payment rights are embodied in negotiable instruments, goods in transit are represented by bills of lading, and stored commodities are tokenized through warehouse receipts.[225] These categories are not left to private discretion but are instead determined by law.[226] For example, one cannot deposit corporate securities certificates in a warehouse and seek to obtain a warehouse receipt representing ownership of those securities, just as one cannot convert a barber's promise of a future haircut into a negotiable check.

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[219] *See* Moringiello & Odinet, *supra* note 25; *see also* Odinet & Tosato, *supra* note 25.

[220] *See* Moringiello & Odinet, *supra* note 25; *see also* Odinet & Tosato, *supra* note 25.

[221] *See* Moringiello & Odinet, *supra* note 25.

[222] *See id.*

[223] Thomas W. Merrill & Henry E. Smith, *The Property/Contract Interface*, 101 COLUM. L. REV. 773 (2001).

[224] *Id.*

[225] *See* Moringiello & Odinet, *supra* note 25.

[226] *See id.*

Second, where tokenization is permitted, the property law imposes mandatory requirements regarding both the form and substance of these devices. A promissory note, for instance, must contain an unconditional order to pay a fixed sum of money, be signed by the drawer, and identify a specific payee.[227] Similarly, warehouse receipts must specify the location of the warehouse, describe the stored goods, and include the date of issue.[228] These formal requirements cannot be modified by private agreement—parties cannot create their own alternative versions of these instruments or alter the prescribed elements. The standardization serves to protect both the immediate parties and subsequent transferees by ensuring that each type of instrument maintains consistent, recognizable features that signal its legal character and effects.

These constraints on tokenization reflect what has been described as one of the key tenets of property: *numerus clausus*.[229] This principle establishes that parties cannot create new forms of property rights beyond the finite list of standardized categories recognized by law, ensuring property interests remain uniform and readily comprehensible.[230] In real property, parties must select from established categories like the fee simple, life estate, or leasehold—they cannot create novel hybrid forms at will.[231] Similarly, for personal property, the law recognizes only certain standardized interests: parties cannot invent new forms of property rights in chattels, such as a negotiable instrument that is transferable on "Fridays-only" or a bill of lading that is only "negotiable in bad faith."[232]

Prior to the 2022 UCC Amendments, proponents of digital asset tokenization fundamentally misread this legal framework. While they readily embraced the flexibility of the applicable contract law rules, they either

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[227] U.C.C. § 3-104(a) (Am. L. Inst. & Unif. L. Comm'n 2002).

[228] U.C.C. § 7-202(b) (Am. L. Inst. & Unif. L. Comm'n 2003).

[229] On the history of *numerus clausus see* BERNARD RUDDEN, ECONOMIC THEORY V. PROPERTY LAW: THE NUMERUS CLAUSUS PROBLEM, *in* 3 OXFORD ESSAYS IN JURISPRUDENCE 239, 241 (John Eekelaar & John Bell eds., 1987); Nestor M. Davidson, *Standardization and Pluralism in Property Law*, 61 VAND. L. REV. 1597, 1600 (2008) ("Versions of the numerus clausus are found in Roman law and recur throughout the history of feudal and post-feudal English common law. Likewise, some form of a standard list appears in disparate modern civil law and common law systems throughout the world."); Anna di Robilant, *Property and Democratic Deliberation: The Numerus Clausus Principle and Democratic Experimentalism in Property Law*, 62 AM. J. COMP. L. 367 (2014); Henry Hansmann & Reinier Kraakman, *Property, Contract, and Verification: The Numerus Clausus Problem and the Divisibility of Rights*, 31 J. LEGAL STUD. 373 (2002)

[230] Merrill & Smith, *supra* note 223.

[231] *See* Keppell v. Bailey, [1834] EWHC (Ch) J77 (1834); 39 Eng. Rep. 1042, 1049 (Ch. 1834); London & Blenheim Estates Ltd. v. Ladbroke Retail Parks Ltd., [1993] EWCA Civ J0525-6 (Eng.) ("incidents of a novel kind" cannot "be devised and attached to property at the fancy or caprice of any owner.")

[232] *See generally* Merrill & Smith, *supra* note 223; Danielle D'Onfro, *Contract-Wrapped Property*, 137 HARV. L. REV. 1058, 1064 (2024)

misunderstood or simply ignored the strictures imposed by property law. Captivated by the capabilities of DLT networks, they mistakenly assumed that these technical features would automatically resolve the complex private law issues that arise whenever one thing is purported to represent rights in another.[233]

The fundamental defect in these digital asset tokenizations becomes evident in a simple example. Suppose a seller attempts to tokenize an item of personal property—whether tangible (like artwork, luxury watches, or automobiles) or intangible (like accounts receivable or intellectual property rights)—by issuing an NFT that purportedly represents ownership of the asset. The seller transfers the NFT to Alice, claiming that this transfer conveys ownership of both the token and the underlying asset. However, before Alice takes delivery or control of the underlying property, the seller transfers the actual property to Bob, who takes immediate delivery or receives a valid assignment. Despite holding the NFT, Alice cannot claim the underlying property from Bob—the NFT does not legally embody ownership rights in the related asset, regardless of the seller's intentions. The rules governing each type of property determine how ownership rights in that thing can be transferred: the law of sales for goods like artwork or watches, Article 9 of the UCC for accounts receivable, and federal law for intellectual property rights. Without explicit legal recognition of tokenization in the relevant legal framework, the mere issuance of an NFT cannot transform it into a valid representation of ownership rights, leaving Alice only with a claim for damages against the seller.

B. After the 2022 UCC Amendments

By 2018, it was increasingly apparent that the UCC faced challenges in accommodating DLT and digital assets. In response, the Uniform Law Commission (ULC) and the American Law Institute (ALI) established a joint committee to explore possible amendments to address legal uncertainties.[234] The committee consulted broadly with stakeholders, legal practitioners and scholars, concluding that substantial revisions to the existing private law framework were

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[233] *See Tokenization: Opening Illiquid Assets to Investors*, BNY MELLON INSIGHTS (June 2019), https://www.bnymellon.com/emea/en/insights/all-insights/tokenization-opening-illiquidassets-to-investors.html; [https://perma.cc/2H5M-EQEN]; Katy Burne, *Tokens of Appreciation?: The Benefits of Digitizing Assets Using Blockchain*, BNY MELLON: AERIAL VIEW MAG. (Feb. 2020), [https://perma.cc/6N7M-BXL7]; Patrick Laurent et al., *The Tokenization of Assets Is Disrupting the Financial Industry. Are You Ready*?, DELOITTE: INSIDE MAG., Oct. 2018, at 62, [https://perma.cc/D37Q-PT4R].

[234] Unif. L. Comm'n, *Uniform Commercial Code and Emerging Technologies* 2 (drft. 2022), https://www.uniformlaws.org/viewdocument/2022-annual-meeting-7?CommunityKey=cb5f9e0b-7185-4a33-9e4c-1f79ba560c71&tab=librarydocuments [https://perma.cc/Z8UM-PMKP].

required to address legal uncertainty and the disconnect with emerging commercial practices.[235]

Between 2020 and 2022, proposed revisions to the UCC underwent multiple rounds of drafting and extensive public review.[236] This iterative and collaborative process incorporated suggestions and criticisms from a diverse coalition of industry participants, academics, lawyers, and members of the judiciary. [237]

The ALI approved the resulting 2022 Amendments in May 2022, with the ULC following suit two months later.[238] Implementation efforts began promptly, with legislative bills introduced across multiple states. Despite encountering some initial resistance, primarily stemming from misconceptions as to whether the amendments paved the way for a federal central bank digital currency, these concerns have largely dissipated.[239] The 2022 Amendments have since gained significant momentum and are steadily progressing towards nationwide adoption.[240]

1. A New Category: Controllable Electronic Records

At the heart of the 2022 Amendments lies the novel Article 12. This significant expansion of the UCC establishes a bespoke private law framework for transactions involving "controllable electronic records" (CERs). CERs are a new category of personal property, distinctly grounded in American functional pragmatism and without a parallel in traditional common law taxonomies.

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[235] *See* Unif. L. Comm'n, *supra* note 234 at 250 ("Uncertainty as to the criteria for resolving [electronic records-related] claims creates commercial risk.").

[236] *Id.* The interim drafts of the Drafting Committee are available at https://www.uniformlaws.org/viewdocument/archive-committee-55?CommunityKey=1457c422-ddb7-40b0-8c76-39a1991651ac&tab=librarydocuments [https://perma.cc/5CHN-FXKW].

[237] *See* Unif. L. Comm'n, *supra* note 234 at 1-3 (noting that members of the Drafting Committee solicited advice from the Loan Syndication and Trading Association, the ABA Business Law Section, the American College of Commercial Finance Lawyers, and more).

[238] *Id.* For the official text of the final amendments, *see* Unif. L. Comm'n & Am. L. Inst, Uniform Commercial Code Amendments (2022), https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=d5bcf850-366f-b4b5-e7d6-6749ba2382c6 [https://perma.cc/RB3W-AA2J].

[239] *See* Carla L. Reyes & Andrea Tosato, *Crypto's Future Is at Stake in a Dispute over Commercial Law's Definition of Money, Barron's* (Apr. 7, 2023, 4:00 AM). https://www.barrons.com/articles/crypto-commercial-laws-definition-of-money-5fbd8fe4.

[240] As of this writing, the 2022 Amendments have been enacted in 25 states and introduced in 12 more; *see* Legislative Bill Tracking, Unif. L. Comm'n, https://www.uniformlaws.org/committees/community-home?communitykey=1457c422-ddb7-40b0-8c76-39a1991651ac [https://perma.cc/2T4J-P9KH] (last visited Jan. 28, 2025) (providing real-time tracker and updated map of state legislation adopting the 2022 UCC Amendments).

CERs are defined as a "record stored in an electronic medium that can be subjected to control."[241] This definition consists of three essential components, structured like a classical archway where each element serves a critical function. The first component, "record," is the foundation stone, meaning information that is both stored in a medium and "retrievable in perceivable form."[242] Like a foundation that must exist before anything can be built upon it, "record" establishes the most basic requirement: information that exists and can be understood.

The second component, "electronic," forms the two supporting columns by encompassing any "technology having electrical, digital, magnetic, wireless, optical, electromagnetic, or similar capabilities."[243] Notably, with these two components alone, the definition of CER would be vast, encompassing virtually all digital content stored on any electronic medium such as magnetic drives, optical discs, and flash storage.[244]

It is the third component, "control," that completes the structure and serves as its arch.[245] It delimits this category and gives it both its distinctive shape and character. The concept of control requires that a person possesses three specific powers over the electronic record, creating a carefully calibrated test that determines which assets qualify for the special treatment afforded by Article 12.

First, a person must hold the power to "avail [themselves] of substantially all the benefit from the electronic record."[246] The concept of "benefit" is deliberately crafted to be functional and technology-agnostic, encompassing both "the rights that are afforded by the controllable electronic record and [its] uses."[247] Assessing whether someone holds this power necessitates examining the specific characteristics of the electronic record in question. For Bitcoin, the benefit consists in holding and transferring the digital

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[241] U.C.C. § 12-102(a)(1) (Am. L. Inst. & Unif. L. Comm'n 2022).

[242] *Id.* § 1-201(b)(31).

[243] *Id.* § 1-201(b)(16A).

[244] *Id.* § 12-102 cmt. 2. (Am. L. Inst. & Unif. L. Comm'n 2022).

[245] It should be noted that the UCC uses the word "control" different across its Articles. For examples, *see* § 9-104(a) (defining the factors that demonstrate a secured party has control of a deposit account); *id.* § 9-104 cmts. 1-3 (noting that § 9-104's definition of control is itself "derive[d] from Section 8-106 of Revised Article 8, which defines 'control' of securities and certain other investment property"; *id.* § 9-314 (discussing "perfection of control"); *id.* § 7-106 (defining control of an electronic document of title).

[246] *Id.* § 12-105(a)(1)(A).

[247] *Id.* § 12-105 cmt. 3 (Am. L. Inst. & Unif. L. Comm'n 2022).

asset;[248] for Ether, it would also include the ability to pay the fees necessary to execute smart contracts on the Ethereum network.[249]

The second power involves the ability to "prevent others from availing themselves of substantially all the benefit from the electronic record."[250] The person must have, materially, the capability to exclude all others from using the electronic record and any of the rights it might convey. Critically, this represents a factual determination rather than an assessment of legal entitlements. A clear example is provided by an NFT on the Solana network: only the individual with the private key to the wallet where the NFT resides holds this power of exclusion, even if another person might legally "own" this digital asset or has superior legal title.[251]

Importantly, this exclusivity is nuanced and sophisticated. Section 12-105(b) expressly qualifies this requirement to accommodate modern technological architectures. A power can remain "exclusive" even when system-level protocols might modify the digital asset, or when the power is shared with another person.[252] This flexible approach enables control to be possible even when a digital assets is held through multi-signature arrangements, as well as in systems with programmatic limitations or governance mechanisms. The drafters recognized that rigid conceptions of exclusivity would be impractical in decentralized systems, where some degree of protocol-level control is inherent.[253]

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[248] The Bitcoin network enables "owners" to "spend" their bitcoins by controlling private keys that authorize transactions, which involve spending Unspent Transaction Outputs (UTXOs) and broadcasting valid transactions that transfer these UTXOs to new addresses. *See* Satoshi Nakamoto, *supra* note 1 at 2-3 (explaining, for the first time, the technical and theoretical foundation of Bitcoin and the application of blockchains to digital currencies).

[249] For an explanation of the fees associated with the execution of smart contracts on the Ethereum network, see https://ethereum.org/en/developers/docs/gas/

[250] U.C.C. § 12-105 (a)(1)(B)(i).

[251] Moringiello & Odinet, *Blockchain Real Estate and NFTs*, Wm. & Mary L. Rev. 1131, 1150-62 (2023) (explaining Ethereum and NFTs).

[252] U.C.C. § 12-105(b) ("Subject to subsection (c), a power is exclusive under subsection (a)(1)(B)(i) and (ii) even if: (1) the controllable electronic record, a record attached to or logically associated with the electronic record, or a system in which the electronic record is recorded limits the use of the electronic record or has a protocol programmed to cause a change, including a transfer or loss of control or a modification of benefits afforded by the electronic record; or (2) the power is shared with another person.").

[253] *See* U.C.C. § 12-105 cmt. 5 (Am. L. Inst. & Unif. L. Comm'n 2022) ("Subsection (b)(1) takes account of the fact that the powers of a purchaser of a controllable electronic record necessarily are subject to the attributes of the controllable electronic record, records associated with the controllable electronic record, and the protocols of any system in which the controllable electronic record is recorded.")

The third power encompasses the ability to transfer both previous powers to another person, along with ensuring that recipient can further transfer these powers to others.[254] This transferability requirement is essential to the commercial utility of controllable electronic records, as it enables the continued circulation of these assets in commerce. Specifically, a person must be able to confer upon another the capacity to enjoy substantially all benefits of the electronic record,[255] maintain exclusivity over those benefits,[256] and re-transfer these powers to someone else.[257]

Thus, CERs are a distinct personal property category that exemplifies the shift of American personal property law toward functional pragmatism over theoretical formalism. Taking leave from traditional classifications, Article 12 drafters consciously built CERs around the notion of control. In doing so, they emphasized a key characteristic of these novel assets: their ability to be used and enjoyed without relying on intermediaries. This functional distinction becomes clear when comparing Bitcoin, which users can spend directly, to other digital assets like Gmail accounts and Instagram photos that can only be accessed through their respective platforms. While in practice many users opt to interact with digital assets through centralized exchanges, such as Coinbase and Binance, for convenience and security, Article 12 recognizes the underlying direct control capability that distinguishes these assets from data objects held with the likes of social media platforms.

Doctrinally, the UCC sacrifices the elegance of broad abstract categories, such as *choses* in action and *choses* in possession, in favor of a more atomized taxonomy. Yet gains nuance in addressing squarely the unique features of emerging digital assets. Notably, the 2022 UCC Amendments have an historical echo. In the 1950s, UCC Article 9 marked an American deviation from how other common law jurisdictions governed secured transactions by introducing an array of collateral types and adopting a functional approach. Article 12 repeates this choice, forging a new personal property category—one that is based on operational characteristics rather than doctrinal purity. This approach, as we shall see in the following subsections, enables a regime that aligns with commercial practices and market expectations.

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[254] U.C.C. § 12-105(a)(1)(B)(ii).

[255] *Id.* § 12-105(a)(1)(A).

[256] *Id.* § 12-105(a)(1)(B)(i). But see id. § 12-105(b) (providing that a power is exclusive even if the power is shared with another person).

[257] *Id.* § 12-105(a)(1)(B)(ii). As the official comments explain, this power includes the ability to cause another person to obtain control of another derivative controllable electronic record that results from the transfer. This accommodates blockchain-based assets like Bitcoin, where transfers generate new unspent transaction outputs (UTXOs) rather than transferring the identical record. *See id.* § 12-105 cmt. 6. (Am. L. Inst. & Unif. L. Comm'n 2022)

2. Transferring Controllable Electronic Records

The 2022 Amendments unquestionably accept that CER are objects of commerce. The new provisions do not articulate a comprehensive body of rules for these transactions such as those in Article 2 for sale of goods. Rather, they refer to other law, as the case may be, depending on the transaction in question.[258] Nevertheless, Article 12 establishes two "key tenets"[259] that apply across all voluntary transactions—whether sale, lease, security interest, gift, or "any other voluntary transaction creating an interest in property."[260]

The first tenet is that "[a] purchaser of a [CER] acquires all rights . . . the transferor had or had power to transfer."[261] This rule constitutes one of the foundational pillars of the conveyancing framework of the UCC.[262] At its core, it embodies the idea that property owners should be free to transfer their rights to others without limitations. A direct consequence of this rule, known as the "shelter" principle, is that a transferor with clear title can pass it to a transferee, shielding them from competing claims.[263] Coextensively, transferees cannot receive rights exceeding those of their transferor—a modern incarnation of the *nemo dat* maxim.[264]

Unlike the first tenet, the second emerges from the coalescence of multiple Article 12 provisions. It introduces a "take-free" exception that significantly moderates the rigidity of the security of property principle outlined

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[258] *See, e.g.*, U.C.C. § 12-104(d) ("Except as provided in this section, law other than this article determines whether a person acquires a right in a controllable electronic record and the right the person acquires."); *id.* § 12-104(f) (deferring to "law other than this article" in whether the purchaser of a CER takes a right to payment relative to the existing property claims).

[259] Giuliano G. Castellano & Andrea Tosato, *Commercial Law Intersections*, 72 HASTINGS L.J. 999, 1042 (2021) (defining key tenets as "the dispositive rules and principles that articulate the legal framework necessary to realize the policy aims of a commercial law branch").

[260] U.C.C. § 1-201(b)(29).

[261] *Id.* § 12-104(d).

[262] *See, e.g.*, U.C.C. § 2-403(1) (for transfers of goods); § 3-203(b) (for negotiable instrument transfers); § 7-504(a) (for transfers of documents of title); § 8-302(a) (for transfers of securities). This rule is often referred to as "the security of property" principle. *See* Plank, *supra* note 194 at 439-42, 442 n.6 & 449 (2012)(tracing the origins of this rule back to Roman law and its trajectory into the UCC); John F. Dolan, *The U.C.C. Framework: Conveyancing Principles and Property Interests*, 59 B.U. L. REV. 811, 812-20 (1979).

[263] This is often referred to as the "shelter" principle. *See* U.C.C. § 12-104 cmt. 4 (Am. L. Inst. & Unif. L. Comm'n. 2022) ("Subsection (d) sets forth the familiar 'shelter' principle, under which a purchaser of a controllable electronic record acquires whatever rights the transferor had or had power to transfer."); Menachem Mautner, *"The Eternal Triangles of the Law": Toward a Theory of Priorities in Conflicts Involving Remote Parties*, 90 MICH. L. REV. 95, 97-99 (1991). *See generally* Steven L. Harris, *Using Fundamental Principles of Commercial Law to Decide UCC Cases*, 26 LOY. L.A. L. REV. 637 (1993).

[264] RESTATEMENT (FOURTH) OF PROPERTY, § 1.1 (Tentative Draft No. 5, 2024).

above.[265] The rule centers on the concept of a "qualifying purchaser" defined as a person that "obtains control of [a CER] for value, in good faith, and without notice of [conflicting claims]."[266] Qualifying purchasers acquire their rights in the CER free from third-party property claims,[267] and are shielded from any actions challenging their rights, "whether . . . framed in conversion, replevin, constructive trust, equitable lien, or other theory."[268] This take free exception follows the familiar pattern of good faith purchaser rules that appear throughout commercial law and has the effect of rendering CER negotiable assets, similarly to checks, promissory notes, and investment securities.[269] Consider this example: when a thief misappropriates a CER and transfers control to a person who qualifies as a qualifying purchaser, that person takes free of the original owner's claim. Even if the owner locates and identifies the qualifying purchaser, they cannot recover the CER and are left only with a damages claim against the thief—the same result as when a holder in due course acquires a stolen negotiable instrument.[270]

Thus, the combined effect of these two tenets is to create a regime for ownership transfers of CERs that reduces title inquiry burdens, facilitates transactional certainty, and minimizes ownership disputes through its embrace of negotiability. This framework exemplifies the pragmatic orientation of American property law, particularly as embodied in the UCC—prioritizing rules that align with actual market practices rather than preserving doctrinal classifications. Indeed, this market-aligned approach directly responds to what industry stakeholders advocated for during the drafting of the 2022 Amendments.

3. Collateralizing Controllable Electronic Records

The 2022 Amendments also introduce a special regime for the use of CERs as collateral in secured transactions. The overarching approach is to classify these digital assets as "general intangibles" under UCC Article 9,[271] thereby subjecting them to the general framework applicable to this class of collateral, while at the same time also establishing asset-specific rules tailored to their unique characteristics. The key policy choice of the 2022 Amendments is

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[265] U.C.C. § 12-104 cmt. 7 (Am. L. Inst. & Unif. L. Comm'n. 2022)

[266] U.C.C. § 12-102(a)(2).

[267] *Id.* § 12-104(e).

[268] *Id.* § 12-104(g).

[269] *See id.* § 12-104 cmt. 7 (Am. L. Inst. & Unif. L. Comm'n. 2022) (explicitly stating that Section 12-104(e) is "derive[d] from Section 3-306," for negotiable instruments); see also id. §§ 3-201-203 (for negotiable instruments); § 8-303(b) ("A protected purchaser acquires its interest in the security free of any adverse claim.").

[270] *See id.* § 12-104 cmt. 7 (Am. L. Inst. & Unif. L. Comm'n. 2022) (exploring the legal outcomes of the transfer of a stolen CER).

[271] *See id.* § 9-102(a)(42).

that control of a CER is accorded similar legal significance and effects as the possession of a tangible good.

The 2022 Amendments introduce specialized rules for CERs across all three fundamental aspects of secured transactions: attachment, perfection, and priority. For attachment, the new regime provides two distinct pathways to create an enforceable security interest in a CER. The first retains the pre-existing rule whereby a creditor and debtor enter into a signed security agreement containing an adequate description of the CER collateral.[272] The second pathway represents a significant innovation: while still requiring an agreement between the parties, it eliminates the need for that agreement to be signed when the secured party has acquired control of the CER.[273] In effect, control itself is deemed to be sufficient evidence of the parties' intentions regarding the specific CERs to be encumbered, providing certainty both for the immediate parties and any third parties with potential interests in the collateral.[274]

The 2022 Amendments also establish a distinctive perfection regime for security interests in CERs. Under the new rules, perfection—the process whereby a security interest becomes effective against third parties—can be achieved through traditional methods or through a new pathway. As with all types of collateral under Article 9, secured parties retain the option to perfect by filing a financing statement in the appropriate public registry.[275] However, the amendments create a powerful alternative: secured parties can now perfect their interest by taking control of the CER, either directly or through another person on their behalf.[276]

Crucially, control-based perfection has substantial advantages. Not only is it faster and more streamlined than filing, it also eliminates the jurisdictional complexities associated with determining the correct filing location based on the debtor's physical presence—a particularly thorny issue in the context of digital

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[272] *See id.* § 9-108.

[273] *See id.* § 9-107A ("[For the purposes of attachment, a] secured party has control of a [CER] as provided in Section 12-105."). The parties still need an agreement, but if the creditor takes control of the CER, the formality of a written and signed document is no longer necessary.

[274] *See Id.* § 9-104 cmt. 2 (Am. L. Inst. & Unif. L. Comm'n. 2022) ("'Control' . . . may substitute for a signed security agreement as an element of attachment.").

[275] *See id.* § 9-310 & cmt. 2 (Am. L. Inst. & Unif. L. Comm'n. 2022) ("Filing a financing statement is necessary for perfection of security interests and agricultural liens. However, filing is not necessary to perfect a security interest that is perfected by another permissible method . . . .").

[276] *See id.* § 9-310(b)(8) ("The filing of a financing statement is not necessary to perfect a security interest . . . which is perfected by control under Section 9-314."); *see also id.* § 9-310 cmt. 3 (Am. L. Inst. & Unif. L. Comm'n. 2022) ("Subsection (b) lists the security interests for which filing is not required as a condition of perfection, because . . . they are perfected by another method, such as by the secured party's taking possession or control (subsections (b)(3), (b)(4), (b)(5), (b)(6), (b)(7), (b)(8), and (b)(8.1)).").

assets. Moreover, secured parties taking CERs as collateral have a compelling reason to use control-based perfection: provided they acquire control for value, in good faith, and without notice of competing claims, they can achieve qualifying purchaser status and thereby obtain their security interest free from any prior property rights in the CER that might otherwise have priority.[277]

The highly consequential nature of perfection by control becomes even more evident when analyzing the priority regime introduced by the 2022 Amendments for security interests in CERs. Under the new 9-326(A), a secured creditor who perfects by control "has priority over [] conflicting security interest[s] held by a secured party that does not have control."[278] This provision establishes a non-temporal priority rule, creating an exception to the general first-to-file-or-perfect hierarchy mandated by Article 9.[279] As a result, if Lender A perfects a security interest in a CER by filing a financing statement, and Lender B later perfects a security interest in that same CER by obtaining control, Lender B has priority—despite Lender A's earlier perfection.

Thus, the rules introduced by the 2022 Amendments for the use of CERs as collateral exemplify the same pragmatism that characterizes the new regime for ownership transfers. They build on the adaptable architecture of Article 9 by introducing a new class of collateral and designing asset-specific rules tailored to commercial realities. Significantly, the amendments leverage the concept of "control"—the defining characteristic of CERs themselves—as the organizing principle. By elevating control to a determinative role in attachment, perfection, and priority, the amendments create a cohesive system that recognizes the distinctive features of digital assets while maintaining doctrinal consistency with the pre-existing structure of Article 9.

4. Tokenizations

The 2022 Amendments take a notably restrained approach to tokenization, despite the significant legal uncertainties and market controversies surrounding this practice. The amendments largely preserve the status quo with Article 12 explicitly stating that rights in property evidenced by a CER are governed by "law other than this article."[280] Thus, after the 2022 Amendments even if a CER is purported to embody rights in a vintage car, a painting, or a digital image, that asset remains subject to whatever law ordinarily applies to it.

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[277] *See* U.C.C. § 12-102(2), 104 (Am. L. Inst. & Unif. L. Comm'n. 2022). It should also be noted that, for a secured party, failure to perfect by control poses a significant danger. The debtor could transfer control of the encumbered CER to a qualifying purchaser that would then take the asset entirely free from competing claims, including any security interest despite prior perfection by filing.

[278] *Id.*

[279] *See id.* §§ 9-322(a); 9-326(a).

[280] U.C.C. § 12-104(f) (Am. L. Inst. & Unif. L. Comm'n. 2022).

The car, painting, or digital image is not governed by the 2022 Amendments regime for CERs. This limited intervention was a deliberate choice, reflecting the UCC's inherent jurisdictional boundaries—the drafters recognized that comprehensively reconfiguring property rights across myriad asset categories would exceed the appropriate scope of commercial law codification.

Yet, there are three notable exceptions. The first involves electronic documents of title under Article 7. Following the amendments, electronic bills of lading and warehouse receipts can now be issued in the form of CERs, in turn enabling the tokenization of rights in goods being transported or stored.[281] This innovation maintains the traditional function of these documents while accommodating the possibility of issuing them as digital assets maintained in DLT networks.

The second and third exceptions are "controllable accounts" and "controllable payment intangibles."[282] A controllable account builds upon the familiar UCC definition of an "account"—a right to payment for goods sold or leased, services rendered, or similar obligations.[283] What transforms an ordinary account into a controllable account is that it is evidenced by a CER and, crucially, the account debtor (the person obligated to pay) has agreed to pay the person who has control of that CER.[284] Similarly, a controllable payment intangible starts with a "payment intangible"—a general intangible under which the principal obligation is monetary[285]—and adds the requirements that it be evidenced by a CER and that the obligor has agreed to pay whoever controls that CER.

The 2022 Amendments establish that these controllable accounts and controllable payment intangibles benefit from the same take-free rule that applies to CERs themselves: a qualifying purchaser of such rights takes them free from any competing claims.[286] Additionally, the amendments allow an account debtor to agree with its original creditor not to assert claims or defenses against subsequent transferees.[287] The combined effect creates highly negotiable payment rights, allowing qualifying purchasers to acquire these tokenized rights with confidence that they are obtaining them free from competing claims or defenses—contingent only on the creditworthiness of the account debtor.

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[281] *See* U.C.C. § 7-106 (Am. L. Inst. & Unif. L. Comm'n. 2022).
[282] *See* U.C.C. § 9-102(a)(27)(A), (27)(B) (Am. L. Inst. & Unif. L. Comm'n. 2022).
[283] *See* U.C.C. § 9-102(a)(2) (Am. L. Inst. & Unif. L. Comm'n. 2022).
[284] *See* U.C.C. § 9-102(a)(27)(A) (Am. L. Inst. & Unif. L. Comm'n. 2022).
[285] *See* U.C.C. § 9-102(a)(61) (Am. L. Inst. & Unif. L. Comm'n. 2022).
[286] U.C.C. § 9-317(i) (Am. L. Inst. & Unif. L. Comm'n. 2022).
[287] *See* U.C.C. § 9-403(b) (Am. L. Inst. & Unif. L. Comm'n. 2022).

Controllable accounts and controllable payment intangibles further exemplify the functional pragmatism and adaptive capacity of American property law. Rather than remaining fixed in historical paradigms, the 2022 Amendments accommodate emerging commercial needs while preserving its foundational principles. Previously, the UCC only recognized tokenization of payment obligations in paper form—primarily through negotiable instruments like promissory notes and checks. These paper-based regimes relied on possession of physical documents and centuries-old principles derived from the law merchant. The 2022 Amendments createwhat are effectively electronic negotiable instruments by enabling payment obligations to be evidenced by CERs with comparable legal protections for good faith purchasers. The official comments to the 2022 Amendments explicitly acknowledge this achievement, noting that the lack of electronic instruments under the UCC had been a significant gap lamented by many market participants.[288]

CONCLUSION

The response of the U.S. legal system to digital assets reveals a distinctly American approach to the evolution of private law. While courts abroad have grappled with fundamental questions about the nature of property rights in these novel assets, American law has charted its own course—one that prioritizes practical solutions over theoretical coherence. This divergence is neither accidental nor merely pragmatic. Rather, it reflects a deeper transformation in American commercial law that began in the early twentieth century and crystallized with the adoption of the UCC: the gradual displacement of classical common law categories by a more flexible, function-oriented framework designed to facilitate commercial innovation.

The 2022 UCC Amendments, with their creation of "controllable electronic records," exemplify this distinctive approach. Instead of forcing digital assets into traditional property categories or developing new theoretical scaffolding to justify their treatment as property, American law has opted for a direct solution: establishing a practical framework that provides market participants with clear rules for trading and collateralizing digital assets, while leaving deeper jurisprudential questions largely unresolved. To be sure, this approach may lack the theoretical elegance of other jurisdictions. Yet, the American treatment offers something perhaps more valuable: a workable legal infrastructure that provides legal certainty, conforms to stakeholders' expectations, and sustains innovation. As these markets continue to evolve, other jurisdictions may find that the American pragmatic functionalism, despite its theoretical untidiness, provides a more effective model for adapting private law to emerging technologies in the digital age.

[288] *See* U.C.C. § 12-104, cmt. 10 (Am. L. Inst. & Unif. L. Comm'n. 2022).