Blockchain in the U.S. Regulatory Setting: Evidentiary Use in Vermont, Delaware, and Elsewhere

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*Joanna Diane Caytas**

I. Introduction

In February 2017, the Delaware Court of Chancery faced a conundrum: following settlement of a shareholder action after a contested merger, shareholders representing 49,164,415 shares claimed settlement proceeds, but the class contained only 36,793,758 shares.[1] By definition, holders of over 12 million of these shares must have lacked entitlement to settlement disbursements, yet all claimant shareholders presented valid evidence of ownership. Investigation by class attorneys failed to establish the "current" owners of class shares, as did investigation at their request by the Depository Trust Company ("DTC"), a subsidiary of the Depository Trust & Clearing Corporation ("DTCC"), the major U.S. clearing house and equivalent of Euroclear and Clearstream. DTC was created in 1973 to facilitate clearing and settlement of U.S. and foreign securities by retaining custody and changing title by book-entry.[2] The Court cut the Gordian knot by disregarding present claims and ordering settlement proceeds distributed to holders of record identified for purposes of merger consideration – foregoing some valid beneficial owners but also preventing dilution of settlement proceeds by disbursing them to 25% more shareholders than should have existed at the time of merger.

This reflects a systemic issue affecting transactions where a centralized ledger held by DTC proves unable to determine ownership of registered shares at a specific point. An investigation helped to clarify what had produced a disparity as striking as 25% between holders of record with DTC and beneficial owners able to prove a valid claim.[3] But it was still impossible to ascertain the valid claimants.

In re Dole Food Co.'s main culprits for the discrepancy were delays in registering trades and short-selling. A U.S. equity market convention based on applicable law, market structures and technological determinants requires stock trades settled T+3, within three business days.[4] That means even if DTC applies a one-day freeze[5] on trading a company's stock, pending merger to determine shareholders of record, this snapshot still does not reflect trades within the previous two days. For actively traded stock, this can result in volumes of millions of shares temporarily unregistered by DTC. Even more difficult to trace are short sales where holders of record are unaware that their stock was borrowed by other investors for sale to third parties and returned after closing out their short position, which may result in contemporaneous ownership claims to the same share. Ample case law demonstrates similar identification issues with proxy voting and merger consideration payouts.[6]

As *Dole Food Co.* mentions, in a footnote no less,[7] these systemic issues could be prevented by using a decentralized ledger, where every broker-dealer could instantly record trades expeditiously made available to all participants, clarifying ownership for every share within the system at every moment with minimal delays. That is one rationale behind blockchain. Incidentally, *Dole Foods Co.* is the only court opinion in the entire Lexis Nexis database of every published and the majority of unpublished judicial opinions in the U.S. that mentions the term blockchain anywhere in its text – and even here, the term is used in a footnote, not in the text of the opinion itself, in the context of Governor Jack Markell's Delaware Blockchain Initiative. While a Westlaw search brings up some 75 cases addressing the subject, *Dole Food Co.* is still the only one that contains the term.

II. The mechanics of blockchain

Blockchain is an algorithm encoding information allowing amendment of a historical record – the "chain" – with subsequent transactions – "blocks" – in a way near-impossible to alter/forge retroactively. This is achieved by distributed ledgers keeping copies of a record on computers of all system participants ("network nodes" or "miners" in the context of virtual currencies). In large networks like bitcoin, millions of computers, often assembled in data centers, hold blockchain records. Inconsistencies between individual information chains are detected and corrected by the majority of the system's units' processor power. In this "proof of work" concept, the largest total computing power makes/executes decisions.[8] A record's validity is established "democratically": if the majority of the system's computing power presents one version of a full blockchain over another, that version prevails and overrides differing records held by remaining nodes.[9] This self-correcting system applies to historical but not to new records that are added to the chain as blocks encrypted using private and public keys, documenting every new transaction. Once verified and added, blocks in a chain become practically unalterable, creating robust security for distributed-ledger record keeping.[10] Forging an existing record requires simultaneously hijacking vast numbers of networked computers to override a target blockchain.

Public blockchains are not controlled by any private or governmental party serving as record-keeper or accountant. Evolution occurs through user consensus producing publicly verifiable transactions. Public blockchains are accessible to anyone but inherently slow: updating a transaction on thousands of unaffiliated computers around the world may take hours.[11] Financial technologies relying on such "unpermissioned" networks[12] include virtual currencies like bitcoin.[13]

Private blockchains, maintained by consortia or private entities and protected by stringent security protocols, restrict access to preselected participants, thus increasing security and transaction speed. In a private network, it may be possible to alter blockchains after the fact, perhaps to correct errors.[14] This type appears more suitable for government-maintained record-keeping, which could be used, for example, to track ownership of assets such as real estate, securities, or gems.

Before expanding to general record-keeping transactions, blockchain was first used in bitcoin,[15] a virtual currency. Then, blockchain evolved towards self-executing smart contracts using ethereum technology[16] and may eventually reach an "Internet of Agreements."[17] Smart contracts are self-executing contracts written into lines of code that extend the utility of blockchain from keeping a record of transactions to automatically implementing the terms of the contract.[18] Ethereum provides an open-source, public distributed platform that offers smart contract scripting functionality through a Turing-complete virtual machine that can execute scripts through an international network of public nodes.[19] While its promise for applications such as virtual currencies and payments is obvious and currently explored by major financial institutions,[20] blockchain's real strength lies in authentication and keeping records up-to-date, especially for valuable, highly liquid assets like securities.

III. Regulatory responses

A. Federal government

Regulatory responses to emerging technologies, and to blockchain in particular, range from excitement to suspicion to indifference. The U.S. government's approach to blockchain and bitcoin issues exemplifies this: Congress held altogether seven hearings involving blockchain and digital currencies – all between 2013 and 2017 – addressing concerns ranging from Caribbean development to U.S.–China relations, to the impact of virtual currencies on protecting small business and national security from the impact of disruptive technologies and cybersecurity threats.[21] Still, just one federal bill on blockchain, regarding virtual currencies, was proposed: On December 1, 2014, and January 2, 2015, Congressman Steve Stockman (R-TX) proposed, within a month of each other, two virtually identical bills, the Cryptocurrency Protocol Protection and Moratorium Act [22] and the Online Market Protection Act of 2014.[23] Even these bills were far from revolutionary: they just proposed a five-year moratorium on federal and state regulation of cryptocurrencies.[24]

Additionally, the bills proposed a puzzlingly inconsistent tax treatment of virtual currencies: on the one hand, it required cryptocurrencies to be treated for tax purposes as currency rather than property.[25] On the other hand, it allowed taxation only upon monetization of cryptocurrency, *i.e.*, upon conversion into dollars or other government-issued currency,[26] which would also apply to taxing income from mining of cryptocurrencies, *i.e.*, from processing and recording cryptocurrency transactions in a distributed ledger.[27]

Referred to the Committee on Financial Services, to Ways and Means, and to Agriculture, the bills, unsurprisingly, never saw the light of day again.

Another federal legislative attempt mentioning blockchain (once) was a Congressional resolution proposed July 14, 2016, tabled after forty minutes' floor discussion and never resumed, formally titled "Resolution expressing the sense of the House of Representatives that the United States should adopt a national policy for technology to promote consumers' access to financial tools and online commerce to promote economic growth and consumer empowerment."[28] In the final paragraph of its preamble, this draft resolution recognized blockchain technology's potential of financial services, payments, health care, energy, property management, and intellectual property management.[29]

Since the federal government has not exercised its constitutional preemptive power to regulate blockchain to the exclusion of states[30] (as it generally does with financial regulation) or even expressed intention to do so, regardless of the interest of federal agencies,[31] states remain free to introduce their own rules and regulations. Some have attempted to do that, however haltingly.

B. State jurisdictions

1. **Arizona**

In 2017, without much media attention, Arizona fast-tracked a blockchain records recognition bill amending existing legislation on electronic records.[32] Arizona House Bill 2417, introduced February 6, 2017, passed both state chambers and was signed into law March 29, 2017.[33] It amended Title 44, chapter 26, Arizona Revised Statutes, by adding article 5, Blockchain technology. This amendment recognized a signature secured through blockchain technology as an electronic signature; a record or contract secured through blockchain technology as an electronic record; smart contracts[34] as valid; and ownership and other rights in interstate or foreign commerce as remaining valid if subsequently secured by blockchain technology.[35]

2. **California**

California, home to Silicon Valley, failed to pass its virtual currencies bill after much media hype. California Assembly Bill 1326, an act to add Division 11 to the Financial Code (commencing with Section 26000), relating to virtual currency, was introduced on February 27, 2015, but failed in the Senate on August 11, 2016.[36] California has attempted no further regulation of blockchain or digital currencies to date.

AB 1326 tried to improve on New York's regulation of virtual currency businesses by nominally relaxing its requirements, exempting such businesses under certain circumstances from needing a money transmission license (as required by New York) in addition to a virtual currency license; and by exempting network administrators, software providers, and exchange services from California's proposed virtual currency law. But during public hearings, smaller fintech companies[37] voiced especially strong opposition, understandably considering the proposed regulations' reach: AB 1326 prohibited engaging in digital currency business without enrolling in the program by obtaining a license from the Commissioner of Business Oversight unless specifically exempted. It specified, *inter alia*, capital requirements, customer receipt requirements, cybersecurity information reporting, audit reports, and fees, as well as regulations on advertising.

3. **Delaware**

In May 2016, Delaware's then-Governor Jack Markell announced a state initiative to adapt regulations to blockchain technology.[38] In response to the Governor's request, the Delaware State Bar Association's Corporation Law Council presented, among other proposals, an amendment to the Delaware General Corporation Law that would allow Delaware entities to use distributed ledger technology to record stock transfers.[39] The initiative was enthusiastically welcomed by Delaware Chancery Court Vice Chancellor J. Travis Laster who, in his keynote address to the Council of Institutional Investors in September 2016, called blockchain "a plunger that you can use to clean up the plumbing" of capital markets for the benefit of investors.[40]

The initiative comprised three steps: "smart records" using distributed ledger for archival recording (implemented), "smart UCC filings" (implementation pending), and distributed ledger shares (the project's most ambitious part).[41]

"Smart records" technology implemented at the Delaware Public Archives in cooperation with Symbiont, a blockchain startup,[42] uses distributed ledger to automate compliance with document retention laws pertaining to destruction and retention of archival documents.[43]

"Smart UCC filings" will replace slow, error-prone paper filings by distributed ledger using the technology tested at the Delaware Public Archives. "Smart UCC filings" will automate the release or renewal of UCC filings and collateral, increase the speed of UCC searches, increase the accuracy of filings and thus prevent fraud and cut costs. [44]

Distributed ledger shares issued and tracked through blockchain render central accountants and custodians like DTC superfluous, reducing delays and improving accuracy of record-keeping, preventing many class actions in the current system where determination of beneficial owners or voting rights is possible only in a probabilistic manner. [45]

However, the DGCL amendments would only facilitate issuance of new shares registered on a distributed ledger. For existing shares, transition to distributed ledger would be more complicated, since only uncertificated shares would qualify.[46] Although DGCL Section 158 allows boards of directors to issue resolutions to qualify some or all of their corporation's stock as uncertificated shares, existing certified shares would not be covered until certificates were surrendered to the company.[47] Thus, a corporation unable to recover share certificates would be unable to transition to distributed ledger shares.

Furthermore, trading shares on secondary markets would not be subject to Delaware's new law, since trade registration is regulated separately and DGCL only affects transfers of record.[48] It remains unclear how secondary markets will respond to distributed ledger share registration since real-time clearing and settlement using blockchain would require participation of traders in record-keeping of distributed ledger transactions.

4. **Hawaii**

Hawaii introduced on January 25, 2017 House Draft "An act relating to economic development."[49] The bill establishes "a working group consisting of representation from the public and private sectors to examine, educate, and promote best practices for enabling blockchain technology to benefit local industries, residents, and the State of Hawaii." Hawaii's bill recognizes industries potentially affected by blockchain: (1) identity and access management (digital IDs); (2) health care (health care records); (3) legal ("tracking, verification, authentication, and record keeping of court orders, contracts, titles, and records"); (4) financial services (blockchain already in use); (5) manufacturing (provenance of goods and services and authentication of goods); and (6) tourism (local bitcoin payments).[50] It awaits final vote in the Senate Ways and Means Committee.

5. **Illinois**

On March 21, 2017, the Illinois House of Representatives passed House Joint Resolution 25, which created a task force to study blockchain benefits for recordkeeping by local governments.[51] It went to the Senate Committee on Assignments on March 28, 2017 and is still pending. If adopted, this task force study would be a first step for Illinois to transferring record keeping to distributed ledger.

The bill was partly a response to Chicago's Cook County exploration of blockchain-based records of property title transfers and liens, the first such attempt by a local Recorder's Office in the U.S.[52] The program was announced in October 2016.[53]

6. **Maine**

Maine's draft bill introduced March 7, 2017 under emergency procedures, would have established a Commission to Study Using Blockchain Technology in Conjunction with Paper Ballots in Maine Elections.[54] The proposed Commission's purpose was to "study the potential uses for blockchain technology to support and enhance Maine's current paper ballot election system for the purpose of improving paper ballot security, increasing election transparency and reducing costs."[55] The bill failed at first vote.

7. **Nevada**

On March 20, 2017, the Nevada Senate introduced Bill 398, a bill with a high likelihood of passing at least the first committee vote.[56] It amends NRS Title 59 relating to electronic transactions and provides for recognition of validity of blockchain records, blockchain-enabled electronic signatures, and smart contracts. More interestingly, the act prohibits taxation or regulation of blockchain or smart contracts, including through licensing, permits and certifications.[57] This is the opposite of the New York and California approach and may reflect Nevada's pro-business ambitions along continuing attempts to compete with Delaware as incorporation jurisdiction of choice.

8. **New York**

Although New York did not enact state-wide legislation recognizing blockchain for record-keeping purposes, in June 2015 it became the first state in the U.S. to regulate virtual currency companies[58] through state agency rulemaking.[59] Entities engaging in virtual currency business not covered by an exemption from New York's virtual currency rules must obtain a BitLicense from New York's Department of Financial Services.[60] In almost two years, exactly three such licenses were granted.[61] New York requires virtual currency businesses to hold both BitLicenses and money transmission licenses (MTAs), further increasing regulatory burden on smaller companies and prompting start-ups unable to comply to withdraw from operations in New York.[62]

9. **Vermont**

Vermont gained considerable tech media attention on June 13, 2015, when then-Governor Peter Shumlin signed into law Act 51, "An act relating to promoting economic development."[63] The Act contained a section, titled "Study and Report; Blockchain Technology," mandating a report on "recommendations on the potential opportunities and risks of creating a presumption of validity for electronic facts and records that employ blockchain technology."[64] Vermont was rumored to contemplate switching to blockchain-based public record keeping. But the January 15, 2016 report[65] quelled the tech community's excitement[66] with findings such as: "[i]n light of the very limited possible benefits and the likely significant costs for either entering into a private or public blockchain or setting up a state-operated blockchain, at this time, blockchain technology would be of limited value in conducting state business."[67] This damning assessment appears to have indefinitely tabled prospects of distributed ledger public record keeping.[68]

In June 2016, Vermont passed "An act relating to miscellaneous economic development provisions,"[69] adding an entire section[70] on recognizing validity of blockchain records and their admissibility in courts as evidence without need for authentication:[71] "A digital record electronically registered in a blockchain shall be self-authenticating pursuant to Vermont Rule of Evidence 902, if it is accompanied by a written declaration of a qualified person, made under oath…"[72]

Although far from the revolutionary switch to distributed ledger public records discussed in tech media, the bill was unique in explicitly affirming the evidentiary value of blockchain records. The relevance of blockchain records in Vermont judicial proceedings remains to be seen. While no financial center or cutting-edge jurisdiction, Vermont's precedent might be adopted by New York, California, and especially Delaware, where such evidence is more likely to be used.

IV. Implications

Delaware's however hypothetical project to maintain corporate records by distributed ledger, Vermont's bill on authentication and evidentiary value of blockchain, and Arizona's recognition of smart contracts present new trends for states employing originally purely financial technology for legal purposes. While regulation by restriction or prohibition of blockchain-based virtual currencies was a given in the financial industry's expansive regulatory environment, state recognition of blockchain's value for authentication of title to personal and real property constitutes a step towards incorporation of distributed ledger technology into the legal sphere, where "code is law" might adopt a literal meaning.

Blockchain has downsides: besides the cost and technical difficulties of implementing distributed ledger record-keeping, risks of network hacking or fraudulently obtaining private or public keys could jeopardize this record system and all blockchains contained therein.[73] The facial anonymity of users may facilitate money laundering and terrorist financing, a main regulatory concern with virtual currencies. Widespread blockchain network access could contribute to herding behavior and increase market volatility under financial system stress,[74] while "kill switches" similar to those used by stock exchanges to prevent market collapse when share prices plummet may prove near-impossible to implement across distributed ledgers.

But overall, the increased robustness and security of blockchain record keeping is difficult to match by existing technologies. Especially for corporate record keeping, the time has come to fix a system failing to serve its purpose, as demonstrated by the Dole Foods share incident and others with similarly unresolvable shareholder identification issues.

V. Conclusion

The most important developments for blockchain's regulation and implementation in an evidentiary context occurred in Arizona (recognition of smart contracts), Vermont (blockchain as evidence), Chicago (real estate records), and, most importantly, Delaware (pending initiative authorizing registration of shares of Delaware companies in blockchain form). Since 64 percent of Fortune 500 companies and over 1 million entities are incorporated there,[75] the Delaware initiative's enactment will change regulatory landscape for securities by setting precedent in the most important corporate jurisdiction of the U.S. Other states competing for corporate taxes and fees would be sure to follow.

* J.D., Columbia Law School, 2017, Harlan Fiske Stone Scholar. M.Sc. Candidate (Nanotechnology), University of Oxford, St. Catherine's College, 2017. Global Alliance Program in Global Business Law and Governance, Sciences Po and Université Paris I Panthéon-Sorbonne, 2017. B.A. (Mathematics), Columbia University, summa cum laude.

[1] In re Dole Food Co., No. 8703-VCL, 2017 Del. Ch. LEXIS 25 (Del. Ch. Feb. 15, 2017)

[2] *The Depository Trust Company (DTC)*, DTCC, http://www.dtcc.com/about/businesses-and-subsidiaries/dtc.aspx (last visited May 27, 2017).

[3] *Dole Food Co.*, 2017 Del. Ch. LEXIS 25, at *2-12.

[4] DTCC, A White Paper to the Industry, Embracing Disruption: Tapping the Potential of Distributed Ledgers to Improve the Post-Trade Landscape 3, 16 (Jan. 2016), http://www.dtcc.com/en/news/2016/january/25/blockchain-white-paper.

[5] *Fast Answers: DTC Chills*, U.S. Sec. & Exchange Comm'n, https://www.sec.gov/fast-answers/answersdtc-chillshtm.html (last updated Aug. 2, 2012).

[6] *See, e.g.*, In re Appraisal of Dell Inc. (Dell Continuous Ownership), 2015 WL 4313206 (Del. Ch. July 30, 2015).

[7] *See Dole Food Co.*, 2017 Del. Ch. LEXIS 25, at *11 n.1.

[8] Vinay Gupta, *A Brief History of Blockchain*, Harv. Bus. Rev. (Feb. 28, 2017), https://hbr.org/2017/02/a-brief-history-of-blockchain.

[9] David Yermack, *Corporate Governance and Blockchains*, Harv. Bus. Rev. (Jan. 6, 2016), https://corpgov.law.harvard.edu/2016/01/06/corporate-governance-and-blockchains/.

[10] *Id* at 14.

[11] Joanna D. Caytas, *Developing Blockchain Real-Time Clearing and Settlement in the EU, U.S., and Globally*, Colum. J. Eur. L.: Preliminary Reference (June 22, 2016), http://cjel.law.columbia.edu/preliminary-reference/2016/developing-blockchain-real-time-clearing-and-settlement-in-the-eu-u-s-and-globally-2.

[12] Tim Swanson, *Consensus-as-a-Service: A Brief Report on the Emergence of Permissioned, Distributed Ledger Systems*, R3 CEV (Apr. 6, 2015), http://www.ofnumbers.com/wp-content/uploads/2015/04/Permissioned-distributed-ledgers.pdf.

[13] Marco A. Santori, *Governor Jack Markell Announces Delaware Blockchain Initiative*, Global Del. Blog (June 10, 2016), http://global.blogs. delaware.gov/2016/06/10/delaware-to-create-distributed-ledger-based-share-ownershipstructure-as-part-of-blockchain-initiative/.

[14] Caytas, *supra* note 11.

[15] For a thorough overview of bitcoin technology and history, *see* Notice of Rulemaking, 81 Fed. Reg. 45,554 (July 14, 2016).

[16] Gupta, *supra* note 8.

[17] World Gov't Summit, *Building the Hyperconnected Future on Blockchains* (Feb. 2017), http://internetofagreements.com/files/WorldGovernmentSummit-Dubai2017.pdf; *see also* Vinay Gupta, *The Promise of Blockchain Is a World Without Middlemen*, Harv. Bus. Rev. (Mar. 6, 2017), https://hbr.org/2017/03/the-promise-of-blockchain-is-a-world-without-middlemen.

[18] Eric Piscini, Gys Hyman, Wendy Henry, *Blockchain: Trust Economy*, Deloitte U. Press (Feb. 7, 2017), https://dupress.deloitte.com/dup-us-en/focus/tech-trends/2017/blockchain-trust-economy.html.

[19] Travis Patron, *What's the Big Idea Behind Ethereum's World Computer?* CoinDesk (Mar. 13, 2016), http://www.coindesk.com/whats-big-idea-behind-ethereums-world-computer/.

[20] The boom for blockchain companies is reflected in their overvaluation reaching as many as five times their performance-based value, resulting in a "frothy market" for financial technology (fintech). *See* Oscar Williams-Grut, *Fintech Investor: 'Anything That Has Machine Learning or Blockchain in it, the Valuation Goes up, 2, 3, 4, 5x'*, Business Insider (Apr. 20, 2017), http://uk.businessinsider.com/motive-partners-andy-stewart-on-frothy-fintech-investment-market-2017-4?r=US&IR=T. *See also* John Ream, Yang Chu & David Schatsky, *Upgrading Blockchains: Smart Contract Use Cases in Industry*, Deloitte U. Press (June 8, 2016), https://dupress.deloitte.com/dup-us-en/focus/signals-for-strategists/using-blockchain-for-smart-contracts.html.

[21] LexisNexis Advance search results for query: blockchain, in: Legislative Histories, jurisdiction: U.S. Federal.

[22] H.R. 5777, 113th Cong. (2014) ("CryptPMA").

[23] Online Market Protection Act of 2014, H.R. 5892, 113th Cong. (2015) (summarized as "A Bill to Protect Cryptocurrencies.").

[24] *Id.* § 2(a):

Neither the Federal Government nor any State or political subdivision thereof shall impose any statutory restrictions or regulations specifically identifying and governing the creation, use, exploitation, possession or transfer of any algorithmic protocols governing the operation of any virtual, non-physical, algorithm or computer source code-based medium for exchange (collectively, "cryptocurrency" as defined herein) for a period beginning June 1, 2015, and extending five years after the enactment of this Act (such period, the "moratorium period"), except for statutes already enacted and effective prior to the date of enactment of this Act, and further suspending the enactment and effectiveness of any and all pending statutes and regulations until the end of the aforementioned moratorium period, except as otherwise provided in this section.

[25] *Id.* § 5(c).

[26] *Id.* § 5(d).

[27] *Id.* § 5(e).

[28] H.R. Res. 835, 114th Cong. (2016).

[29] "Whereas blockchain technology with the appropriate protections has the potential to fundamentally change the manner in which trust and security are established in online transactions through various potential applications in sectors including financial services, payments, health care, energy, property management, and intellectual property management." *Id.*, Preamble.

[30] *See* U.S. Const. art. VI, cl. 2 ("This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding."). Furthermore, federal law preempts conflicting state law. *See, e.g.*, Maryland v. Louisiana, 451 U. S. 725, 746 (1981) ("Consistent with that command, we have long recognized that state laws that conflict with federal law are 'without effect.'").

[31] *See, e.g.*, Notice of Filing of Proposed Rule Change, 81 Fed. Reg. 45,554 (July 14, 2016); *FTC Announces Agenda for March 9 FinTech Forum on Artificial Intelligence and Blockchain Technology*, Fed. Trade Commission (Feb. 27, 2017), https://www.ftc.gov/news-events/press-releases/2017/02/ftc-announces-agenda-march-9-fintech-forum-artificial.

[32] The Arizona bill defines blockchain and smart contracts as follows:

1. For the purposes of this section:
2. "Blockchain technology" means distributed ledger technology that uses a distributed, decentralized, shared and replicated ledger, which may be public or private, permissioned or permissionless, or driven by tokenized crypto economics or tokenless. The data on the ledger is protected with cryptography, is immutable and auditable and provides an uncensored truth. 2. "Smart contract" means an event-driven program, with state, that runs on a distributed, decentralized, shared and replicated ledger and that can take custody over and instruct transfer of assets on that ledger.

2017 Ariz. Sess. Laws 97 § 2(E).

[33] H.R. 2417, 53d Leg., 1st Reg. Sess. (Ariz. 2017), 2017 Ariz. Sess. Laws 97 (amending Ariz. Rev. Stat. § 44-7003; adding Ariz. Rev. Stat. § 44-7061).

[34] *See supra* note 32.

[35] Ariz. Rev. Stat. § 44-7061 (2017).

[36] A.B. 1326, Gen. Assemb., 2015-2016 Reg. Sess. (Ca. 2015).

[37] Fintech describes companies seeking to apply new technology in the delivery of financial services to compete with traditional financial institutions. *See* Tom W. Lin, *Infinite Financial Intermediation*, 50 Wake Forest L. Rev. 643 (2015).

[38] Santori, *supra* note 13.

[39] Jeff Mordock, *Delaware Betting Big on Blockchain*, Del. Online (Apr. 7, 2017), http://www.delawareonline.com/story/money/2017/04/07/delaware-betting-big-blockchain/100162782/.

[40] J. Travis Laster, Vice Chancellor, Del. Chancery Court, The Block Chain Plunger: Using Technology to Clean Up Proxy Plumbing and Take Back the Vote, Keynote Speech at Fall 2016 meeting of Council of Institutional Investors (Sept. 29, 2016), http://www.cii.org/files/09_29_16_laster_remarks.pdf.

[41] Andrea Tinianow & Caitlin Long, *Delaware Blockchain Initiative: Transforming the Foundational Infrastructure of Corporate Finance*, Harv. L. Sch. F. on Corp. Governance & Fin. Reg. (Mar. 16, 2017), https://corpgov.law.harvard.edu/2017/03/16/delaware-blockchain-initiative-transforming-the-foundational-infrastructure-of-corporate-finance/.

[42] *Governor Markell Launches Delaware Blockchain Initiative*, PR Newswire, May 2, 2016, http://www.prnewswire.com/news-releases/governor-markell-launches-delaware-blockchain-initiative-300260672.html.

[43] Tinianow & Long, *supra* note 41.

[44] Andrea Tinianow, Mark Smith, Caitlin Long & Marco Santori, *Delaware's 2017 Resolution: Make Blockchain a Reality*, Coindesk (Jan. 3, 2017), http://www.coindesk.com/what-expect-delaware-blockchain-initiative-2017/

[45] Tinianow, Smith, Long & Santori, *supra* note 39.

[46] Matthew J. O'Toole & Michael K. Reilly, *The First Block in the Chain: Proposed Amendments to the DGCL Pave the Way for Distributed Ledgers and Beyond*, Harv. L. Sch. F. on Corp. Governance & Fin. Reg. (Mar. 16, 2017), https://corpgov.law.harvard.edu/2017/03/16/the-first-block-in-the-chain-proposed-amendments-to-the-dgcl-pave-the-way-for-distributed-ledgers-and-beyond/.

[47] *Id.*

[48] *Id.*

[49] H.R. 1481, 29th Leg., Reg. Sess. (Haw. 2017).

[50] *Id.*

[51] H.R.J. Res. 25, 100th Gen. Assemb., Reg. Sess. (Ill. 2017) (creating the "Illinois Legislative Blockchain and Distributed Ledger Task Force to study how and if State, county, and municipal governments can benefit from a transition to a blockchain based system for recordkeeping and service delivery.").

[52] Kyle Torpey, *Chicago's Cook County to Test Bitcoin Blockchain-Based Property Title Transfer*, NASDAQ (Oct. 6, 2016), http://www.nasdaq.com/article/chicagos-cook-county-to-test-bitcoin-blockchain-based-public-records-cm689901.

[53]*Id.*

[54] S.P. 305, 128th Leg., 1st Reg. Sess. (Me. 2017).

[55] *Id.*

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

[57] *Id.* §§ 4, 6.

[58] Nathaniel Popper, *Bitcoin Exchange Receives First License in New York State*, N.Y. Times, May 7, 2015, https://www.nytimes.com/2015/05/08/business/dealbook/bitcoin-exchange-receives-first-license-in-new-york-state.html?_r=0

[59] N.Y. Comp. Codes R. & Regs. tit. 23 § 200.1 *et seq.*, http://www.dfs.ny.gov/legal/regulations/adoptions/dfsp200t.pdf

[60] Pete Rizzo, *New York Releases Final BitLicense*, Coindesk (June 3, 2015), http://www.coindesk.com/new-york-releases-final-bitlicense/.

[61] Despite 22 initial filings, Circle, Ripple, and Coinbase were the only three companies holding a New York BitLicense in January 2017. *See* Michael del Castillo, *Bitcoin Exchange Coinbase Receives New York BitLicense*, Coindesk (Jan. 17, 2017), http://www.coindesk.com/bitcoin-exchange-coinbase-receives-bitlicense/

[62] Yessi Bello Perez, *The Real Cost of Applying for a New York BitLicense*, Coindesk (Aug. 13, 2015), http://www.coindesk.com/real-cost-applying-new-york-bitlicense/

[63] Brian Cohen, *Vermont Considering Blockchain Tech for State Records, Smart Contracts*, The Cointelegraph (Aug. 5, 2015) https://cointelegraph.com/news/vermont-considering-blockchain-tech-for-state-records-smart-contracts.

[64] S. 138, 2015-2106 Leg. Sess. (Vt. 2015), 2016 Vt. Acts & Resolves No. 51.

[65] James Condos, Vt. Sec'y State et al., Blockchain Technology: Opportunities and Risks (Jan. 15, 2016), http://legislature.vermont.gov/assets/Legislative-Reports/blockchain-technology-report-final.pdf.

[66] *See* Stan Higgins, *Vermont Says Blockchain Record-Keeping System Too Costly*, Coindesk (Jan. 20, 2016), http://www.coindesk.com/report-blockchain-record-keeping-system-too-costly-for-vermont/

[67] Condos, *supra* note 65, at 14.

[68] Alec Liu, *Vermont Realizes They Don't Need the Blockchain*, Ripple (Jan. 20, 2016), https://ripple.com/insights/vermont-realizes-they-dont-need-the-blockchain/.

[69] H. 868, 2015-2016 Leg. Sess. (Vt. 2016), 2016 Vt. Acts & Resolves No. 157.

[70] *Id.* § I.1. ("12 V.S.A. § 1913 is added to read: § 1913. Blockchain Enabling . . . .").

[71] Vt. Stat. Ann. tit. 12 § 1913 (2016).

[72] *Id.* § 1913(b)(1).

[73] Angelos Delivorias, *Briefing: Distributed Ledger Technology and Financial Markets*, PE 593.565 EN, European Parliamentary Research Service (Nov. 2016), http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593565/EPRS_BRI(2016)593565_EN.pdf (referencing Caytas, *supra* note 11).

[74] *Id.*

[75] Mordock, *supra* note 39.

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About Joanna Diane Caytas

J.D., Columbia Law School, 2017, Harlan Fiske Stone Scholar. M.Sc. Candidate (Nanotechnology), University of Oxford, St. Catherine's College, 2017. Global Alliance Program in Global Business Law and Governance, Sciences Po and Université Paris I Panthéon-Sorbonne, 2017. B.A. (Mathematics), Columbia University, summa cum laude.

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