

**EVERYTHING YOU NEED TO KNOW ABOUT  
DIGITAL LEDGER TECHNOLOGY, THE BLOCKCHAIN AND CRYPTOCURRENCIES®  
(Part 2 – July 2018)**

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*This is the second in a continuing series of blogs on digital ledger technology, the blockchain and cryptocurrencies.*

In my last blog, I introduced digital ledger technology, the blockchain and cryptocurrencies. In this blog, I will provide some additional details on the use of distributed ledger technology and the blockchain, including their applications for business transactions. First, I will provide an overview of the current regulation of cryptocurrencies.<sup>1</sup> I will provide a more detailed discussion of cryptocurrency regulation in future blogs.

### **The Regulation of Cryptocurrencies**

Digital ledger technology, the blockchain and cryptocurrencies are relatively new concepts. The current regulatory scheme that relates to the internet, finance (including the regulation of traditional fiat<sup>2</sup> currencies), tax, securities, and commodities, and the transmission of currencies was not designed to regulate these new concepts. Some have argued that these concepts require a new regulatory approach, including exempting them from some forms of regulation in whole or part.<sup>3</sup> However, for the most part, initial regulatory pronouncements have attempted

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<sup>1</sup> The information contained in this blog and in past and future blogs should not be construed as legal advice. Should you wish additional analysis or explanation of the subject matter, please contact me at my email address above. This invitation is not a solicitation for legal work in any jurisdiction where I am not authorized to practice law.

<sup>2</sup> A fiat currency is a currency, like the dollar, euro, yen or renminbi. These are currencies that have been declared by a governmental authority as legal tender for the payment of public and private debt obligations. A fiat currency is not backed by a physical commodity such as gold. Accordingly, they can fluctuate in value based on various macro and micro economic factors, such as inflation, and other factors affecting market conditions for the currency.

<sup>3</sup> For example, in a story published on April 19, 2018, *The New York Times* reported that a group of venture capitalists and their law firms (the “**Group**”) calling themselves, the “Venture Capital Working Group” met with the Securities and Exchange Commission (“**SEC**”) in late March 2018. At this meeting the Group proposed a “safe harbor” for some virtual currencies. The Group proposed that some tokens be categorized as “utility tokens” and granted a safe harbor from securities laws. Under the proposal, digital tokens would generally be exempt from the securities laws if they achieve “full decentralization” or “full functionality.” “Full decentralization” would be achieved “when the token creator no longer has control of the network based on its ability to make unilateral changes to the functionality of the tokens.” The proposal posited that “full functionality” would be achieved when a token can be used for its intended purpose on a computer network and has a function beyond use as a speculative investment.

to fit cryptocurrency and digital ledger technology and the blockchain within the existing regulatory framework.

What follows is a description of some of the regulatory issues affecting cryptocurrencies in the United States.<sup>4</sup> Similar regulatory issues are relevant to cryptocurrencies traded outside of the United States.<sup>5</sup>

### Overview

It is important to note that the overview of cryptocurrency regulation provided in this blog. My more detailed discussion of regulatory issues in future blogs are of a generalized nature, and not legal advice intended to fit a specific factual situation. My analysis of the application of the laws regulating cryptocurrencies is fact based and dependent on a changing regulatory environment. Any changes in the facts or assumptions used in my discussion, or the regulation of cryptocurrencies and related products ("**Cryptocurrency Investments**")<sup>6</sup>, or that of the participants in the cryptocurrency markets ("**Cryptocurrency Market Participants**")<sup>7</sup>, will likely affect the views expressed in this and future blogs.

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Some states have excluded cryptocurrency transactions from their securities and other money transmission statutes. See also the discussion under money transmission statutes below.

In a statement (which I will discuss in greater detail in a future blog) by William Hinman, the Director, Division of Corporation Finance, of the SEC, the SEC conditionally agreed with some of these premises, concluding that bitcoin and ether should not be deemed securities subject to the securities laws.

<sup>4</sup> I will discuss some of the regulatory issues affecting digital ledger technology and the blockchain and its proposed applications, in addition to cryptocurrencies, in a future blog.

<sup>5</sup> Regulatory authorities outside of the United States have taken a broad range of positions on the regulation of cryptocurrencies. These positions range from that of China which has banned cryptocurrency exchanges and so-called initial coin offerings ("**ICOs**") to Switzerland which has deemed that storing a customer's crypto assets does not qualify as taking deposits and thus does not require a banking license. Switzerland's financial market regulator, Finma, released principles-based guidelines to be applied on a case-by-case basis. Finma designated a category of cryptocurrency investments called a utility token, which are not considered securities. Regulators in Great Britain and Singapore also have been generally friendly to crypto start-ups. But this is not the global norm. And in any event, ultimately, given the global reach of the internet and thus trading in cryptocurrencies, a global approach will be required for trading in cryptocurrencies.

<sup>6</sup> "Cryptocurrency Investments" include derivative products such as options, futures and swaps, as well as cryptocurrency tokens, ICOs, and hybrids which are combinations of cryptocurrencies with equity or debt, including debt which is secured by physical assets. I will discuss the regulation of Cryptocurrency Investments in a future blog.

<sup>7</sup> "Cryptocurrency Market Participants" include cryptocurrency exchanges, broker-dealers, custodians, investment advisors and investment funds which may or may not be currently regulated (or required to be regulated) under the securities and commodities laws. I will discuss the regulation of Cryptocurrency Market Participants in a future blog.

Cryptocurrency transactions involve issues under U.S. federal and state securities laws and commodities laws.

Securities Regulation. The SEC is the primary regulator of U.S. federal securities laws, including transactions in cryptocurrencies deemed to be securities.<sup>8</sup> The SEC has indicated that most initial coin offerings (“**ICOs**”) are securities<sup>9</sup>. However, William Hinman, Director of the SEC’s Division of Corporation Finance, in a speech at the Yahoo Finance All Markets Summit: Crypto, advised that coins that are fully decentralized, that have achieved their purpose apart from investment, and have a decentralized management function where they are no longer dependent on the efforts of a centralized party are not securities. He specifically identified bitcoin and ether as cryptocurrencies that meet this criteria.<sup>10</sup>

Commodities Regulation. The Commodities Futures Trading Commission (“**CFTC**”) is the primary regulator of commodities transactions in the United States under the Commodities Exchange Act (“**CEA**”). The CFTC and at least one federal court has determined that cryptocurrencies are commodities subject to regulation under the CEA. However, this issue of

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<sup>8</sup> Cryptocurrencies that are characterized as securities under the laws of a state (and the states generally follow the federal analysis) are subject to the securities laws of each state where cryptocurrencies are traded.

<sup>9</sup> On July 25, 2017, the SEC issued a report (the “**Report**”) detailing its investigation into whether the DAO (an unincorporated “decentralized autonomous organization”), Slock.iotUG, its co-founders and intermediaries violated the federal securities laws. The SEC determined that the tokens issued by the DAO are securities under the Securities Act and the Securities Exchange Act of 1934, as amended. The SEC advised that persons who use distributed ledger or blockchain-enabled means for capital raising must comply with federal securities laws (e.g., register the offering or qualify for an exemption from registration). The Report notes that it is the responsibility of the offeror of the coins, the exchange on which the coins are traded and the purchaser of the coins to evaluate whether or not the coins being purchased are a security. The Report also warned of the possible application of the registration, antifraud and other requirements of the Investment Company Act of 1940, as amended, and the Investment Advisers Act of 1940, as amended, to Cryptocurrency Investments. I will discuss the Report in greater detail in a future blog.

On March 7, 2018, the SEC issued “Public Statement: Statement on Potentially Unlawful Online Platforms for Trading Digital Assets, Divisions of Enforcement and Trading and Markets (the “**Statement**”). In the Statement, the SEC warned that platforms that trade securities and operate as an “exchange” must register as a national securities exchange or operate under an exemption from registration, such as the exemption provided for alternative trading systems (“**ATS**”) under SEC Regulation ATS. *See also GDAX Digital Asset Framework* (Nov. 2017) at <https://www.gdax.com> (stating that the assets offered by GDAX using Coinbase’s Securities Law Framework may require GDAX to be registered as an exchange or an ATS). *See generally* <https://www.coinbase.com/legal/securities-law-framework.pdf>. I will discuss the issue of cryptocurrency exchanges as securities or commodities exchanges in greater detail in a future blog.

<sup>10</sup> Director Hinman, however, also indicated that offerings of coins when combined in a blockchain, having investment as their primary purpose and which are dependent on the efforts of a central party, may be securities. As mentioned, I will discuss Director Hinman’s analysis of when a cryptocurrency or other Cryptocurrency Investment may be a security in greater detail in a future blog.

whether cryptocurrencies are a commodity is not free from doubt and in any event may not trigger the registration requirements of the CEA.<sup>11</sup>

Money Laundering. Cryptocurrency transactions pose compliance issues relating to money laundering and currency transactions regulated by the U.S. Treasury Department’s Financial Enforcement Network (“**FinCEN**”). These issues relate to disclosure and compliance with regulations regulating money transmission under the Bank Secrecy Act<sup>12</sup> by participants in cryptocurrency transactions. FinCen is also focused on the origin and use of the cryptocurrency traded by participants in cryptocurrency transactions.<sup>13</sup>

Taxes. Bitcoin and other cryptocurrencies are considered property under guidance provided by the Internal Revenue Service (“**IRS**”). Income derived from cryptocurrency transactions are

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<sup>11</sup> See *In the Matter of Coinflip, Inc.*, CFTC No. 15-29 (Sept. 17, 2015) (where in an administrative settlement, the CFTC first announced its view that bitcoin and other virtual currencies are commodities within the meaning of the CEA); and *CFTC Issues Proposed Interpretation on Virtual Currency “Actual Delivery” in Retail Transactions*, 82 CFR 60335 (Rel. No. 7664-7) (Dec. 15, 2017) (where the CFTC stated its view that it had authority over cryptocurrencies based on Section 2(c)(2)(D) of the CEA and its interpretation of what constitutes “actual delivery” for purposes of that section). See also *CFTC v. McDonnell (“McDonnell”)*, No 18-cv-0361, Dkt. 29 at 22 (Mar. 6, 2018)(citing 7 U.S.C. Sec 2(c)(2)(C) 1(i)(II) (bb)(AA) (where the court in issuing a preliminary injunction in favor of the CFTC held that the CFTC had standing based on the court’s view that “virtual currencies can be regulated by the CFTC as a commodity” because they “fall well-within the common definition of ‘commodity,’” as well as the CEA’s definition of commodities). The *McDonnell* court’s holding was based on its finding that allegations of fraud alone were sufficient for claims based on Section 2(c)(2)(D) of the CEA.

On July 12, 2018, the *McDonnell* court denied a motion by the defendant to reconsider the defendant’s motion to dismiss and reaffirmed the court’s view that cryptocurrency fraud is subject to the CFTC’s anti-fraud and manipulation enforcement authority. In making its ruling, the court held that a recent decision by the U.S. District Court for the Central District of California, *CFTC v. Monex Credit Co. (“Monex”)*, C.D. Cal., No. 8:17-cv-01868-JVS-DFM (May 1, 2018), was not a controlling precedent and that the actual delivery exception is irrelevant to the *McDonnell* court’s prior decision because the CFTC’s complaint never alleged any transaction entered into on a leveraged, margined or financed basis.

The CFTC has filed an appeal of the court’s decision in *Monex*. I will discuss the *McDonnell* and *Monex* cases, as well as their possible impact on the CFTC’s proposed guidance on transactions in virtual currency, in greater detail in a future blog.

Cryptocurrencies are traded on numerous cryptocurrency exchanges (e.g., Bitfinex, Kraken). Cryptocurrencies and their Cryptocurrency Investments are already traded on some commodities exchanges (e.g., the CME and the CBOE).

<sup>12</sup> Currency and Foreign Transactions Reporting Act (commonly referred to as the “**Bank Secrecy Act**”), 31 U.S.C. 310 and regulations promulgated under 31 CFR Part 103.

<sup>13</sup> *FinCen Issues Guidance on Virtual Currencies and Regulatory Responsibilities* (Mar. 18, 2013), available at <https://www.fincen.gov/news/news-releases/fincen-issues-guidance-virtual-currencies-and-regulatory-responsibilities>; see generally, “New FinCEN Guidance on Virtual Currency Transactions,” available at <https://www.perkinscoie/en/news-insights/new-fincen-guidance-on-virtual-currency-transactions.html>.

considered ordinary income or capital gain if earned from trades in cryptocurrencies. Such income must be reported to the IRS and applicable state taxing authorities.<sup>14</sup>

Money Transmission. Cryptocurrency transactions will also generally fall within the definition of money transmission for purposes of state money transmission statutes. However, some states, such as Wyoming and New Hampshire, exempt cryptocurrency transactions from their money transmission, securities and other laws. In addition, other states do not regulate money transmissions and some states either prohibit engaging in cryptocurrency trading altogether or have not yet determined whether cryptocurrency transactions fall within the definition of money transmission for purposes of their statutes.<sup>15</sup>

## **Current and Contemplated Uses of Digital Ledger Technology and the Blockchain**

### **Distributed Ledger Technology and Public and Private Blockchains**

Users of distributed ledger technology (“DLT”) are able to create databases which can exchange value or append records without using a central coordinator among multiple trustless users.

As I discussed in my first blog, one type of DLT is the blockchain. Blockchains eliminate trust as a requirement in a system using cryptography and game theory. This permits users to transparently interact without, in many cases, relying on a third party.

The blockchain’s central premise is “decentralization.” Decentralization minimizes the potentially adverse effects of a central authority which include potential breaches in security and network downtime or outages.

DLT is already in use in areas such as finance and dispute settlements. These areas have historically required placing trust in a central authority to administer transaction data and enforce agreements.

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<sup>14</sup> See IRS Notice 2014-21 available at <https://www.irs.gov/pub/irs-drop/n-14-21.pdf>;

The federal and state governments tax income both at the entity level and at the individual level. Certain states, including Nevada and Wyoming, have adopted laws exempting income earned from trading bitcoin and other cryptocurrencies. Generally, taxes for entities and individuals are assessed based on “residence.” For an entity, this generally means the state where they are organized and/or have their primary offices. This issue, however, must be distinguished from the issue of tokens used as a payment for the purchase of goods and services. I will discuss this distinction further in a future blog.

<sup>15</sup> Money transmission laws are territorial. Accordingly, even where the money transmitter is located in a state that does not regulate cryptocurrency transactions, if the other party or parties to a cryptocurrency transaction reside in a state that does regulate money transmission, the transaction may still need to comply with one or more state laws. This creates a significant compliance burden for cryptocurrency transactions between the states. I will discuss money transmission laws in greater detail in a future blog.

In my last blog, I briefly discussed public and private blockchains. Both types of blockchains share many characteristics. Public and private blockchains each:

- Operate as decentralized peer-to-peer networks with each participant having identical ledgers;
- Maintain the ledgers and permit changes only through consensus; and
- Provide for immutability of the ledger, providing protection against faulty or malicious attempts to change the ledger.

Two variations on private blockchains are blockchains which are consortiums (sometimes called federated blockchains) and semi-private blockchains. I will discuss these variations in further detail below in my discussion of private blockchains. But first an explanation of the differences between a public and private blockchain.

The critical distinction between a public and private blockchain is who is allowed to participate in the network, make changes through the consensus protocol and maintain the shared ledger. In a public blockchain, anyone can participate, make changes to the ledger through consensus and maintain the shared ledger. Bitcoin is one of the largest public blockchain networks.

Substantial computational (and electrical) power by each node in a public blockchain is necessary to solve the algorithms (proof of work [**“PoW”**]) required to establish and maintain a distributed ledger conducted on the large scale often seen in public blockchains.<sup>16</sup>

In a private blockchain, permission to make changes to the distributed ledger is generally restricted to one or a few organizations. The ability to view the distributed ledger may be granted to either the public generally or restricted to certain permissioned participants who are invited. This creates certain advantages compared to a public blockchain.

- Administrators of a private blockchain can change the rules by which the blockchain operates, and reverse or revise the terms of transactions (e.g., national land registries or healthcare databases) where they feel it necessary;
- Since the administrators or others controlling validation of transactions on the blockchain are known, the risk of collusion by other participants can be minimized or eliminated;

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<sup>16</sup> See e.g., Jennifer Schlesinger; Andrea Day, “The new miners: Wave of crypto mining at colleges, businesses raise hacking concerns” (Aug. 11, 2018), at <https://www.cnbc.com/2018/08/10/the-new-miners-wave-of-cryptomining-at-colleges-businesses-raising-h.html>. Cryptocurrency mining by students as a means to earn money is apparently prevalent on many college campuses because of the availability of free (to the student) electricity and internet service. According to a source cited in the article, it costs about \$4,700 to mine one bitcoin. In addition to the cost, crypto mining can open the school’s network to the risk of malware and hacking. Similar costs and risks exist if employees use their company’s computer’s and systems to mine while on the job. Colleges and businesses are looking at ways to monitor and prevent the use of their resources for crypto mining.

- Transactions are generally easier and thus less costly since fewer nodes are required to verify transactions, giving each node greater credibility and requiring less computing power for validation and reducing time for execution<sup>17</sup>; and
- Private blockchains restrict permissions and therefore provide a greater level of privacy.

Consortium or federated blockchains are blockchains that use a pre-selected set of nodes to control the consensus process. For example, a consortium of 25 businesses, each of which operate a node in the blockchain, where the consensus for changes to the blockchain requires the approval of 15 of the businesses for validity. In a consortium blockchain the right to read the blockchain may be public, or may be restricted to the participants. Examples of consortium blockchains are R3, the participants of which are banks, and EWF, which relates to energy-related-businesses. Consortium blockchains reduce transaction costs and data redundancies while replacing legacy systems which permit simplification of document handling and compliance systems that require, at least in part, human interaction.<sup>18</sup>

Semi-private blockchains are run by a single company who grants access to any user who qualifies, typically in a business to business (B to B) transaction. Semi-private blockchains are managed in the same manner as the company would manage its private web applications.<sup>19</sup>

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<sup>17</sup> PoW algorithms which are used generally with respect to public blockchains require the greatest amount of computational power as described above. The PoW algorithm is used by Bitcoin, Ethereum, Litecoin and Dogecoin among others.

Proof of stake (“**PoS**”) is the most common alternative to PoW. In this type of consensus algorithm, a participant in the blockchain validates the block by investing in coins. This does not involve coin creation. Instead of achieving consensus based on the number of coins a participant creates validators (also called stakeholders) achieve consensus based on the number of coins owned by the validator. The number of coins owned by a stakeholder also determines that stakeholder’s likelihood of being chosen to create the next block in the blockchain. Once created, the block must be committed to the blockchain. The way this is accomplished depends on the type of coin. Some coins still require a majority of coins in the blockchain to achieve consensus. PoS is more decentralized than some of the other alternatives and is more energy efficient to utilize. This algorithm is used by Decred and Peercoin among others.

Other proofs exist to determine consensus. Each have their own unique advantages and disadvantages. Examples are Delegated Proof of Stake (“**DPoS**”) (cheaper, scalable and energy efficient; but partially centralized; e.g., Steemit, FOS and Bitshares); Proof of Authority (“**POA**”) (high throughput and scalable, but a centralized system; e.g., POA.Network, and Ethereum Kovan testnet); Proof of Weight (“**PoWeight**”) (customizable and scalable, but incentivization can be an issue; e.g., Algorand, Filecoin and Chia); Byzantine Fault Tolerance (“**BFT**,” e.g., Hyperledger, Stellar, Dispatch and Ripple);” subdivided into Practical Byzantine Fault Tolerance, “**PBFT**” (high throughput, low cost and scalable, but centralized, permissioned); and Federated Byzantine Agreement, “**FBA**” (high throughput, low cost and scalable; but only semi-trustable (PBFT is centralized/permissioned with pre-selected validators) while FBA includes both pre-selected validators (Ripple) and validators inclusive of all participants (Stellar); and Directed Acyclic Graphs (“**DAGs**”) (low cost; network scalability, potentially unlimited number of transactions executed quickly, but can be subject to centralized administration and Sybil and other types of attacks; e.g., Iota, Hashgraph Railblocks/Nano).

<sup>18</sup> I will discuss some examples of consortium blockchains in a future blog.

<sup>19</sup> I will discuss specific semi-private blockchains in a future blog.

Government entities sometimes operate semi-private blockchains for a variety of purposes, including land registries and other public records.<sup>20</sup> Some states are exploring the use of the blockchain as a way to more secure elections.<sup>21</sup>

### Use Cases for the Blockchain

The use cases for the blockchain extend far beyond the use of cryptocurrencies as a medium of exchange of value. The application of the blockchain for our business and home lives is only beginning to be explored. What follows are some examples of the ways that the blockchain is and can be used transform our business and home lives.

Capital Formation. Many entrepreneurs, mostly through crowd funding, have utilized the immutable nature of the blockchain to launch ICOs to fund the development of new and innovative applications for almost every type of business, ranging from banking and finance to healthcare and manufacturing. Hedge funds, venture capitalists and private equity firms<sup>22</sup> as

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<sup>20</sup> I will discuss a variety of specific government initiatives that employ the blockchain and DLT in a future blog.

<sup>21</sup> See Nafeesa Syeed, "Is Blockchain Voting the Future?" *Bloomberg Businessweek* (Aug. 13, 2018) at page43.

<sup>22</sup> According to Autonomous NEXT, crypto funds currently manage more than \$5 billion in assets. Hedge funds account for roughly 65% of all cryptocurrency funds while venture capital funds constitutes about 32%. Private equity firms hold just 3% of the total assets managed by crypto funds. Angel and institutional investors as well as small investors participating through crowd funding also provide capital to fintech companies. The interest of venture capitalists in the future of the blockchain has grown exponentially. Hundreds of venture capital firms have made investments in promising block chain platforms before token sales occur and have purchased equity stakes before crowd funding occurs.

I will discuss the process and legal issues that relate to the formation and operation of crypto funds in a future blog.

Crypto Fund Research ranked the following venture capital firms as the most important and influential of VCs investing in blockchain and cryptocurrency companies (list as of July 1, 2018):

1. Digital Currency Group
2. Pantera
3. Blockchain Capital
4. Andressen Horowitz
5. Nodes Capital
6. Boost VC
7. IDG Capital
8. Draper Associates
9. Ceyuan Ventures
10. Lightspeed Venture Partners



well as certain angel investors have also jumped on the bandwagon to fund fintech businesses that serve nascent blockchain industries.

Companies have raised funds through the sale of tokens to fund fintech companies providing cloud storage, Wi-Fi, security services, cryptocurrency exchanges and brokers, and hardware and software that is blockchain facing. Venture capital firms and angel investors are particularly focused on companies that provide blockchain as a service (“**BaaS**”), including companies that provide:

- Merchant transaction services (e.g., ABRA, BitGo [wallets]; Ripple [international payment and remittances]);
- Enterprise blockchain solutions (e.g., r3, AXONI, Chain [financial services]; FILAMENT, EXIMCHAIN [supply chain]; CHAINANALYSIS; FACTOM Libra [compliance]);
- Exchanges and trading (e.g., PRASO, Polychain Capital, Coinbase, PANTERA, [crypto-investment]; Kraken; Bitstamp [crypto-exchanges]; PAXOS, LedgerX [clearing & settlement]);
- Identity, authentication and security (e.g., everledger, TRUSTED KEY [data& document authentication]; SafeChain [security]; docswallet, SOLIDX, Algebraix [digital identity];
- Social, networks & games (e.g., CryptoKitties [games]; matchpool, synereo [social & networks]); and
- Hardware and software related to the blockchain ecosphere (e.g., BitFury, BITMAIN [mining]; Ledger New Continuum, Canaan [hardware & data storage]; Blockstream, BLOCKCYPHER, RCHAIN, Hedra Hashgraph [infrastructure & application development]).

Venture capital, private equity and angel investors have primarily sought an equity interest in the companies, including units consisting of equity and cryptocurrency and cryptocurrency convertible into equity. Some investors have focused on ownership of the intellectual property, particularly in situations where the technology is not owned by a company, but rather controlled by a foundation or an informal group of programmers.

Financial Services. The blockchain can be used to solve the problem of duplicative administrative processes and assist with the reconciliation of transaction data. Using DLT, financial firms can coordinate the systems of their back offices and provide uniform beginning to end visibility of transactions. Embedding “smart contracts” in the blockchain can eliminate many transaction disputes.

Using DLT, a company which wishes to finance the purchase of goods and services can provide the required information on the blockchain. Using the blockchain, the information is presented to users as a distributed ledger, eliminating the problems of incompatibility and incongruity presented by partner firms and suppliers and customers using different systems.

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Crypto Fund Research ranked the VCs based on four criteria: (i) value of total blockchain investments, (ii) total number of blockchain investments, (iii) length of blockchain investment experience and (iv) level of investment activity in the last 12 months.

In trade finance, DLT permits businesses to streamline and provide transparency for the process of obtaining approvals from multiple legal entities (customs, port authorities, transportation firms and others) for the movement of goods across borders. DLT can also expedite the processing of payments and the acceptance of goods.

In a syndicated loan transaction, using DLT eliminates duplication and facilitates reconciliation by producing a single ledger of the financial transactions that is shared among multiple institutions. DLT can also simplify and expedite the process of creating and monitoring security interests in the collateral securing the loans.<sup>23</sup>

Insurance. Insurers can use the blockchain to process claims, verify the occurrence of an insurable event (e.g., an accident) and facilitate and expedite payment of claims. Policy terms and conditions can be embedded into the blockchain through “smart contracts.” Using smart contracts whenever an insurable event is reported by a trusted source, the insurance policy’ terms are automatically triggered and processed in accordance with the terms of the policy.

Government. Federal, state and local governments expend considerable time and resources recording transactions and tracking ownership of assets. DLT can make this process more efficient and transparent, and secure from tampering.

Already, state governments are preparing the legal framework for organizing legal entities, and maintaining and transferring interests in legal entities using DLT. Some states and localities have developed blockchain-enabled land registries, simplifying and expediting the process for construction and sales transactions.

DLT-enabled registries have been developed which can be used to issue digitally authenticated birth certificates that are unforgeable, time-stamped and accessible to anyone in the world. This provides a solution to concerns about identity documentation in countries lacking a centralized record system and assists in verifying identities for the millions of refugees and their children seeking sanctuary. Such registries can also assist in combating human trafficking, voter fraud and illegal immigration, protecting against fraud and error.

Supply Chain Management. DLT and the blockchain can be used to provide an immutable record of the complete provenance, through supply chain management, of each component in a product that is comprised of multiple components, such as an aircraft or automobile. This immutable record can be accessible to each manufacturer in the production process. DLT can also be used by the assembler of those products, distributors and those charged with maintaining the completed product, as well as government regulators.

A DLT-powered supply-chain management system provides increased trust to the participants in the manufacture and assembly process because no one party “owns” the provenance

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<sup>23</sup> I will discuss some of the issues and procedures relating to using DLT for loan transactions in a future blog.

information. Such supply-chain management systems also are significantly more efficient in distributing information necessary to diagnose and remedy a fault in the product reducing the time and cost involved.

The ability to pinpoint a fault allows for a more focused remedy, avoiding cross fleet/generic recalls of a product. This can lead to reduced costs and a more effective and efficient resolution. DLT supply-chain solutions can also be used for the food supply chain to more efficiently allocate agricultural products. This can result in decreased spoilage, while also assisting in identifying tainted food products. This can lead to a reduction in costs.

Healthcare. Probably no industry is in greater need of the efficiency and security that use of DLT brings than the healthcare industry. DLT can be used to manage medical records, preauthorize payments and share diagnostic and treatment protocols among professionals. Use of DLT can avoid duplicative testing and drug interactions, and generally provide an improved patient care experience at a reduced cost.

The blockchain can provide a tamper-resistant means of storing a patient's medical history. The blockchain's immutability (and this security) and decentralization reduces the time require to process insurance claims while providing more accurate and cost-effective treatment and prescriptions for patients. In this way, the blockchain can reduce over-all care costs. With access to a complete medical history for a patient, physicians would be able to make better targeted drug and treatment recommendations.

The blockchain can simplify and expedite the costly and time-consuming process of collecting, sharing and processing the information required to submit and pay a healthcare insurance claim. In addition, DLT can be used to offer less expensive and equally effective alternative services and medications based on a patient's history and insurance coverage options.

The Internet of Things ("IoT"). IoT is the interaction of machines with one another. DLT can be used to record and improve the efficiency and accuracy of these interactions at a reduced cost. This is accomplished by a process similar to the process employed in the supply chain use case described above where many different parties, manufacturers, forwarders, shippers, custom agents and insurers interact and depend on one another.

In the IoT use case, information is shared simultaneously and immutably among machines located in various locations. This can relate to the manufacturing and assembly process where products from different vendors and service providers, in different locations, can be seamlessly coordinated to produce both uniform or custom designed products.

In the consumer use case, an appliance can automatically interrelate with other systems to request maintenance or repair or resupply of necessary components or accessories (e.g., for an automobile, order oil changes, brakes, tires; or in the case of a refrigerator, order groceries off a preselected list, or shop various groceries looking for best pricing and selection). The

blockchain can also be used to schedule changes in home lighting and temperature based on the time of day or year.

DLT produces greater transparency and improves efficiency, builds trust as all transactions are indelibly recorded and improves accuracy and cuts costs. Participants in manufacturing and shipment gain the ability to optimize and automate business processes through IoT, while consumers gain the ability to automate and customize home processes to create efficiencies and cost savings.

### **Next Up**

In my next blog, I will take a deeper dive into the regulation of Cryptocurrency Investments and Cryptocurrency Market Participants and look at the present and future of finance powered by DLT.