How Tokenization Is Putting Real-World Assets on Blockchains
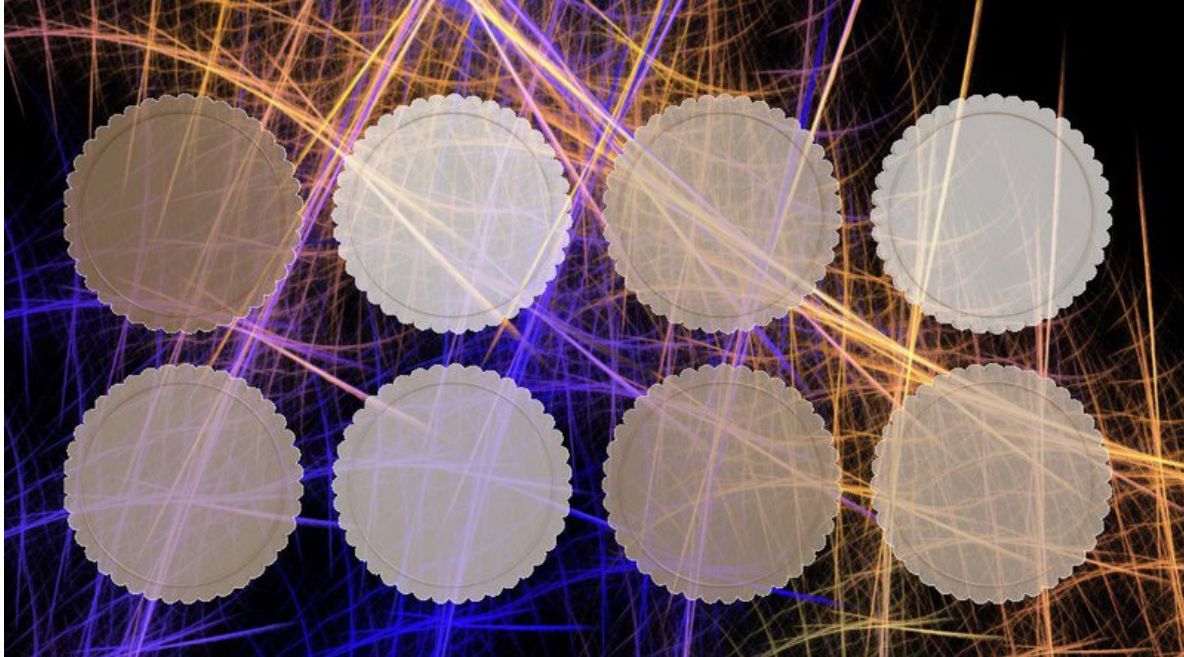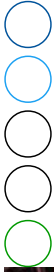
March 30, 2017, 02:58:50 PM EDT By Addison Cameron-Huff, Distributed

Tokenization is the process of converting rights to an asset into a digital token on a blockchain. There is great interest by financial intermediaries and technologists around the world in figuring out how to move real-world assets onto blockchains to gain the advantages of Bitcoin while keeping the characteristics of the asset.

Why Tokenize "Real World" Assets?

Our world is full of assets: stocks, real estate, gold, carbon credits, oil, etc. Many of these assets are difficult to physically transfer or subdivide, so buyers and sellers instead trade paper that represents some or all of the asset. But paper and complex legal agreements are cumbersome, difficult to transfer and can be hard to track. One solution would be to switch to a digital system along the lines of Bitcoin but linked to an asset.

Commodity exchanges have largely done away with physical paper by substituting electronic transactions and standardized agreements, but the overhead of these systems is enormous and they generally rely on trusted participants. Startups and major financial companies around the world are now racing to develop systems for the next phase of this evolution: tokenizing assets. But why would someone want a digital token that represents a physical asset and how can that be done?

Imagine Jane is a diamond wholesaler who owns $15 million of diamonds. Diamonds are difficult to transfer to buyers because they require security and careful inspection to ensure that a fake isn't introduced somewhere in the supply chain. Joe would like to invest a few thousand dollars in diamonds but doesn't want to deal with the hassle of physically receiving them. and in any event, Joe would ideally like to own a small piece of many diamonds to diversify his diamond position, since diamonds come in a variety of grades and cuts, and demand changes over time for each type.

It's not worth Jane's time to find Joe and sell him a couple diamonds; she just wants an easy way to subdivide her diamond stock and sell fractional pieces of it to a variety of people. Joe wants to be able to easily trade his fractional ownership to other people (rather than just with Jane). This ability to make all parties happy in such a scenario is the promise of blockchain tokens that represent real-world assets and an opportunity to democratize ownership of interesting asset classes.

There are many proposed methods for taking real-world assets and "putting them on a blockchain." The goal is to achieve the security, speed and ease of transfer of Bitcoin, combined with real-world assets. This is a new form of an old concept: "securitization" (turning a set of assets into a security), and in some cases the tokenization is of securitized assets. The rest of this article explores the types of assets that can be put on blockchains and some of the models being piloted by startups, financial intermediaries and governments.

Intangible Assets

Many assets are what lawyers refer to as "intangible." They exist only due to the operation of law and there is no physical object. Examples of intangible assets include patents, carbon credits, brand names, copyrights, etc. Intangible assets, lacking a physical form, may be easier to combine with digital blockchain-based systems.

The challenge with intangible assets is ensuring that the blockchain system's model of asset transfer lines up with the real-world legal model of transfer. There may also be jurisdictional differences that can make transfers difficult (although similar, copyright laws differ around the world). That said, intangible assets are often easier to tokenize than physical objects because there are fewer concerns regarding storage and shipment.

Fungible Assets

Lawyers make a distinction between assets that are fungible and those that are not. A fungible item is one that can be replaced by another identical item. Think wheat, gold or water. Fungible assets are much easier to convert to tokens because they can generally be broken down into smaller units (like bitcoin), and a token can stand for a group of objects (e.g., a pile of gold) rather than a set of individual objects (e.g., a warehouse full of unique works of art).

Assets that aren't fungible require an abstraction layer in order to tokenize. For example, a company that will group the assets together and offer them as a package. This is the method used for securitizing mortgages, whereby a set of mortgages that have unique characteristics are bundled together into a group of mortgages with approximately similar characteristics.

Fungible assets are typically easier to tokenize because the general set of tokens are linked to a general set of interchangeable asset components (e.g. 10kg of gold).

Transfers of Ownership vs. Transfer of Limited Rights

There are many kinds of transfers of assets and many types of asset rights. Sometimes only limited rights connected to an asset are transferred, such as a lease to use land for a limited time rather than a transfer of land ownership. Thousands of years of property ownership has led to a wide variety of types of ownership and control such as holding property on behalf of another person ("bailment"). The details depend on the jurisdiction, type of law (common law vs. civil law), asset, and the rights intended to be transferred.

Some intangible assets can be licensed out to millions of people at once, such as music rights. When a customer "buys" a song from iTunes, they're not gaining ownership over the song (a change in ownership), they're purchasing the right, a license, to listen to the music under certain conditions.

Blockchain projects can generally be divided into those that involve tokenizing partial rights, like music licensing, and those that involve tokenizing full ownership, e.g. selling real estate.

The Key Legal Issue: Ensuring Token Consistency

In a digital system like Bitcoin there is always consistency. Transactions obey the rules of the software and there are no exceptions. In the real world, there are often exceptions. Gold bars are stolen, houses burn down, music samples turn out not to be properly licensed, diamonds fail to be delivered - humans

sometimes don't obey the rules. Therefore the key challenge for any system that involves tokenizing real-world assets is to ensure that the digital token stays linked to the real-world asset.

Imagine a token that represents a fractional interest in a set of gold bars in a vault. If a gold bar is taken from the vault, how will that be reflected in the digital token? Who will make sure that the token value stays linked to the gold bars that should be in the vault, rather than the gold bars that are in the vault? Who will bear the risk and how?

If the buyer of a token can't be sure that the token is properly linked to the real-world asset, then the value of the token will fall or become zero (if no one has faith in it).

Legal Models

1. Licensing

Music licensing relies heavily on paperwork and trust. Musicians hope that sales of their music and merchandise are properly calculated and reported to them. As streaming and digital downloads eliminate physical sales of media containing songs, the music would appear to be a great candidate for tokenization. If music ownership was represented on a blockchain, the many participants in creating the music could have their shares set electronically. The dream would be to have every listen of their music require "unlocking" and payment, with payment then being distributed to the appropriate holders. The holders could then transfer their interest in the music (e.g., if the drummer wants to convert their ownership to a down payment on a house) to someone else, who would then receive the payment stream.

More accurate reporting would be a benefit to everyone, but there are other changes that tokenization could trigger. Tokenization of music ownership could allow new business models such as investing in music creation by the public. If a new band could sell 20 percent of their new song to fans, what would that do to the creation of music? How would that affect intermediaries?

An example of music ownership/licensing tokenization is SingularDTV .

2. Trading Systems

Imagine a group of companies that want to trade oil with one another. Normally they'd exchange paperwork and keep their own lists of trades. If they could move to a blockchain-based system for trading their oil, they could potentially reduce paperwork and have more robust record-keeping. There are many consortiums sprouting up that aim to replace paper trading systems with blockchain trading systems. They generally don't aim to tokenize real-world assets directly, but rather to use a blockchain system to enable trading of real-world assets. This is a hybrid of the old paper record approach and the new blockchain approach. The tokens only have value within the context of a contractual system involving all of the past and future participants.

An example of this form of tokenization is the IBM-Natixis-Trafigura oil trading project . There are also tokenization schemes that involve limited use of property enforced by digital locks, such as Slock.it .

3. Redemption

Imagine an art print by a famous artist with 1000 prints. The art prints could be tokenized by having ownership held by a company that has a standing offer to the public to redeem tokens for either a single art print or, if the redeemed tokens are less than a certain threshold, a fraction of the assessed value of the art print. Physical delivery of the prints could be made at a certain location or shipped to a specified address. In this way, buyers could obtain an easy-to-transfer token and third-party markets could transact in fractions of the art prints. This could potentially be a source of financing for the artist and a way for the broader public to participate in the art market.

The above model relies on the company holding the art to continue to offer redemptions. An obvious risk for token holders is that the company will no longer honor its commitment to exchanging the digital tokens for the real-world goods in its possession. Another issue would be how the company holding the artwork will be compensated for storage costs.

An example of this model in action for foreign currencies is Tether , although note that section 3 of the terms of service indicates that redemption is not guaranteed.

4. Vaults & Smart Contracts

Imagine a vault of gold. The gold is owned by "Goldowner Inc." and the vault is owned by "Vault Inc." Vault Inc. has a sterling reputation and third-party auditors who verify the amount of gold in its vault.

Goldowner Inc. could offer a digital token to the public that represents ownership of the gold and through a smart contract with Vault Inc. maintain a public off-chain registry that relates fractional interest in the gold with the tokens. For every token sold, Goldowner Inc. transfers ownership to Vault Inc., who holds it on behalf of the token owner. Vault Inc. guarantees redemption of gold by anyone who can prove ownership through a digital signature.

Goldowner Inc. can take advantage of the fact that Vault Inc. is trusted (and audited). Owners of the tokens rely on Vault Inc.'s representations and not on Goldowner Inc. (even though Goldowner Inc. is the token issuer).

Obviously there are many risks in the above example that wouldn't exist if the gold was a digital item that could be transferred electronically. Gold has a physical embodiment that requires physical storage (which also costs money). So why tokenize the gold? One advantage would be that buyers of the tokens could know that they are the only person who has received the token, whereas a buyer of a paper certificate has no way of knowing that the same certificate hasn't been sold to multiple people.

Two examples of gold tokenization startups are Vaultoro and Orebits . There are also many related projects that seek to use digital tokens to track real-world items moving through supply chains, where the token is used for provenance rather than value.

Intersection With Global Securities Laws

Selling a fractional interest in an asset to the public (without permission from the government) is often prohibited by securities laws. Given the global-by-default nature of blockchains, this can pose a problem for the entities involved in the tokenization, or the operators of marketplaces where these tokens are traded. These issues are particularly complicated because they often involve overlapping jurisdictions (e.g., a Chinese seller and American buyer).

Digital tokens are linked to real-world assets and ultimately involve a real-world entity that has value and can be tracked down by the relevant regulator. This makes it harder to avoid regulation than a platform that is pitched as purely software, or that involves peer-to-peer activities (think BitTorrent vs. a store selling pirated movies).

Some forward-thinking regulators are contemplating legal changes that will enable asset transfers to be accomplished through digital token transfers. The U.S. State of Delaware has already begun legislative efforts to enable companies to use blockchains for their books and records regarding shareholders. These efforts are part of a move away from the complicated indirect securities ownership scheme in the United States that requires intermediaries. The Depository Trust & Clearing Corporation (DTCC), the largest U.S. intermediary, currently has custody of over $37 trillion worth of shares .

For an example of the failings of the current indirect ownership system for shares, see last month's Delaware Court of Chancery decision: In Re: Dole Foods Company, Inc., C.A. No. 8703-VCL. For an interesting look at the challenges involved in debt markets, see the 2014 New York Times Magazine article " Paper Boys ."

The Centralization Issue

One of the main advantages to Bitcoin over non-blockchain systems is that it's decentralized. But real-world assets generally have a single owner, or a small group of owners.

Many of the models for asset-backed tokens involve an open offer for redemption by a company that holds the real-world asset. The entire token can fail if the central asset holder fails.

The challenge for any tokenization scheme is how to connect the single owner of the real-world asset with the many owners of the token. How can the risk of centralization be mitigated? The answer is typically a combination of clever digital token schemes, contracts, insurance, auditing and third-party guarantees.

One answer to the problem of centralization is to rely on a centralized party that has trust because it is the relevant government authority that decides who owns what. Sweden's land registry system has been piloting a blockchain-based property transfer system . Britain's Royal Mint is also pursuing a digital token plan that relies on its status as a trusted central party.

Legal Changes Needed?

It will not be possible to move some types of physical assets onto blockchains until statutory changes enable digital transfers. In some countries there are legal rules in place that require transfers to take place using a certain form or be registered in a certain way with the government authority that is not amenable to a token-based system. For example, secured lending laws may give priority ownership to a person who lends money and registers that interest over someone who possesses a token indicating ownership.

Tokenizing real-world assets is a challenging problem that requires innovative solutions that go beyond technology. In some cases this will require legal reform, and in other cases it will involve clever combinations of existing legal rules, new business structures and new digital token systems .

This guest post was contributed by Addison Cameron-Huff. The views expressed are his own and do not necessarily represent those of The Distributed Ledger *.*

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