



Trusted Tokenized Assets

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This paper provides an overview of tokenization of assets in the Sweetbridge platform. For general information about what tokenization represents, the opportunities it unlocks and the abilities of the Sweetbridge platform see our paper on Trusted Tokenization. For information on the tokenization of rights see our paper on Trusted Tokenized Rights. If you are interested in knowing more about our Synchronized Accounting protocol, see our paper on Synchronized Accounting and Trusted Financial Information.

Summary

The Sweetbridge Synchronized Accounting platform provides real-time auditing of controls with full transparency of legal and accounting details. This opens up the opportunity to create tokenized real-world assets that can be trusted. Such a system represents a significant increase in efficiency, but more importantly lays the foundation to unlock new value through the tokenization of rights.

Similar to how the derivatives markets have enabled the creation of value in the 100's of trillions of dollars, the ability to tokenize assets and rights will likely create many multiples of the value of the underlying assets, goods, and services in the underlying markets.

The tokenization of assets has received a lot of hype. Most of the claims and proposals in the market today are more aspirational than practical. Many projects and entities talk about a piece of the puzzle, but few are examples of a holistic system of thinking or design.

The Sweetbridge Tokenized Asset and Rights protocol has been designed to address these gaps and provides a complete solution for tokenization of real-world assets with built in controls that allow tokens to be audited in real time. It is built to address the issues lawyers, accountants, governmental regulators and others must address to tokenize real world assets. Therefore, it is built from the ground up for GRC (Governance, Risk, and Compliance) and to ensure continuous assurance that agreements, regulations, and workflows are followed.

The goal of any tokenization process should not be perfection. Tokenization will be most successful when measured by the process's ability to produce something that can be proven to be as good or better than the process today. Then, as experience with the process builds and areas of weakness become better understood, the processes can be improved.

Tokenization of assets

Digital tokenization of assets provides the following benefits:

- Ease of transfer vs physical transfer of assets
- Lower cost and increased speed due to reduced intermediaries
- Automatic enforcement of behavior, regulations, rules and agreements on transfer
- Fractional transfers of ownership
- Audit trails that provide transparency and keep all relevant information in a single place
- Identity for something that is very difficult to counterfeit and can prove something is genuine
- Separating the rights on an asset from the ownership of the asset

Tokenizing assets creates a digital representation that can be standardized with consistent market valuations creating a form of value transfer that does not require money. An exchange can enable these things to be traded directly without the need to use cash. This enables the equivalent of barter but without the need to move real things around.

What you must do to successfully create a trustworthy tokenized asset varies depending on the type of asset. Tokenizing different types of assets requires different intermediaries, processes, and audits. Tokenizing a tangible asset frequently requires more effort than tokenization of an intangible asset. The Sweetbridge platform breaks assets down into various types and forms with different features to support the unique issues faced with the tokenization of each asset type.

Tokenization of tangible assets

Tangible assets are things you can touch and see such as real property, commodities like gold, equipment, inventory, etc. These assets have physical form. They don't need to be recognized by the law to exist — they simply exist in physical space.

Tokenizing a tangible asset allows ownership of the asset to be moved without physically changing the location of the asset or exposing the asset to risk of loss, substitution, or theft. For example, the transfer of something like diamonds can be high risk and expensive. Diamonds have to be inspected again at receipt to ensure they have not been substituted with lower grade or fake ones. But having them stored by a trusted intermediary as part of the tokenization process allows ownership to be tokenized and transferred digitally without the expense and risk. Anyone with the proper token can then redeem the real diamonds by surrendering their tokens.

The tokenization process can make the transfer of the asset faster and more efficient. This is because the transfer can be done without the need for lawyers or accountants once the asset has been properly tokenized. It can also be used to enable fractional ownership of an asset without the need for custom agreements if the original contracts used in the tokenization process allow for this to be done.

Physical assets typically require insurance to protect the asset from various forms of loss or damage. This could be self insurance in the case of institutionally graded companies or be provided by one or more insurance companies. Regardless, the tokenization process must make sure that the forms of risk are clearly articulated and the means used to mitigate risk are known. The Sweetbridge platform is designed to track risks and methods used to mitigate the risks for each asset or a pool of assets.

Special tangible assets — like real estate

Some tangible assets such as real estate are very complex and have unique characteristics. Real estate, for example, actually represents a whole set of special assets such as physical land, buildings, land and buildings combined, and investments. It includes:

- Commercial, industrial, or residential real estate
- Title holding trust, land trust, etc.
- Leasehold and freehold real estate
- Mobile or manufactured homes and buildings
- Real estate partnerships, real estate investment trusts, etc.

Real estate transactions have a long history, are highly controlled, and ripe for transformation via tokenization. The Sweetbridge platform has special features to make creating tokenized real estate assets simpler while continuing to work within the confines of existing practices and regulations.

Control of assets

Proving that assets exist, who owns the asset, and where the asset is located is key to both the financial audit and the tokenization process. Physical verification of tangible assets is typically a requirement in any audit. In financial and legal terms this is proving control of the asset. Control over an asset is different than ownership or possession although they can be the same. Control over an asset means authority over the asset. In the case of an asset custodian it is possession. In the case of real estate it might be the government through a registry. In the case of inventory in a company warehouse the company would have control over the asset, as verified by an independent physical audit.

To create tokens that can be trusted, the Sweetbridge platform supports the tracking of changes in control and the ability to store digitized records that prove location, existence, and the condition of the assets under control. There are generally two ways control of an asset is handled. One is a registry and the other is a custodian. The Sweetbridge platform supports both but always uses its own registry internally. This registry tracks distinct assets or fungible assets that are aggregated with an identity.

Registries

Real estate, vehicles, stocks, and other titled forms of assets frequently have registries which are either maintained by a governmental agency or a trusted private entity. When these registries are used, they control the official record of ownership and typically support the granting of rights against this ownership. For example, a vehicle registry might be used to track the ownership of a vehicle and any liens against the vehicle. To transfer ownership, the liens must be released by being paid off before the ownership record can be updated to a new owner.

Tokenization of assets that are controlled by registries must include the process to update the registry or they must place the asset ownership under the control of some third party which becomes the registered owner. This is similar to the third parties used today when someone leases a vehicle. The vehicle is actually owned by the financing entity with a contractual right granted to the lessee to use the vehicle in exchange for making payments for a specific period of time. Both updating current registries and placing assets under the control of a third party are supported by the Sweetbridge platform.

The Sweetbridge platform contains plugin points for adopters that allow anyone to create interfaces to existing registries that are either manual or automated. This allows the tracking of a manual workflow for an existing process or the creation of a new automated workflow. It supports both partial automation or total automation. A process can start by automating the tracking and audit of a process and support gradually moving to a fully automated process.

Custodians

Our use of the word custodian in this document is the most general use of the term. We do not mean it must be a financial fiduciary such as the financial asset custodians used by investment firms. Custodians can be a wide variety of organizations from 3rd party logistics entities (3PLs) to warehouses. What we mean is simply an independent agent that has control over the asset who can verify its location, existence, and, in some cases, its condition.

Precious stones, commodities, equipment, inventory, and raw materials are all examples of tangible assets that typically need a trusted third party to verify that the assets really exist. Today, this is done by traders, warehouses, pipelines, shipping companies, and many other entities who provide evidence to banks, buyers, regulators, and auditors that assets exist.

Tokenization of assets represents a significant new business opportunity for these organizations as they are typically low margin businesses. Since these entities are needed to ensure control of the asset and provide trust, tokenization provides an incentive for customers to use these businesses to control and monitor their assets. Real-time audit, lower cost liquidity, anti-counterfeiting, provenance, greater efficiency, and trust, etc. are all examples of the benefits that come from the tokenization process that these custodians can offer their customers as greater incentive for using their services.

These asset custodians must operate independently of ownership of the assets and have proper levels of insurance or bonding to ensure they can be trusted. Many organizations already have these assurances today, therefore, little to no change is needed. Trust is created by ensuring the UBO (Ultimate Beneficial Owners) of the assets and the holders of the assets are independent and insurance exists that covers loss and fraud. This requires full KYC (Know Your Customer) and UBO discovery of all counterparties. The Sweetbridge platform has support for both the audit of KYC processes and UBO discovery as a result.

In most cases, the tokenization of tangible assets can't be done without trusted intermediaries. The Sweetbridge platform is designed to track, purchase, ensure enforcement, and provide evidence that these requirements are in place and claims have been verified. It is designed to provide the single source of truth that all counterparties share and can be used to validate, audit, and prove claims are true.

Tokenization of Intangible assets

Intangible assets exist because the law says they do, not because they have a physical form. These may be things that you can't touch or see such as patents, trademarks, carbon credits, etc., or things which have a representation you can see such as an invoice, website address URL, etc.

Some intangible assets have registries such as trademarks, patents, etc., and others don't — such as copyrights on music, books, or movies. When registries exist, ownership rights to tokenize the asset must be verified by lawyers and confirmed in contracts with warranties that grant the right to be tokenized.

Intangible assets are highly susceptible to fraud as ownership can be difficult to prove or prior encumbrances discovered. This is no different than today, but the advantage of putting these assets into a tokenization platform such as Sweetbridge is that the ability to prove ownership and encumbrances going forward becomes much simpler and auditable. The cost and effort needed to prove ownership and encumbrances for tokenization is frequently similar to providing them for a single ownership transfer.

Tokenization of intangibles does not need custodians and therefore frequently does not require intermediaries once the asset has been properly verified, tokenized, and audited. This means there is very little ongoing cost to tokenize intangible assets. One of the primary benefits of tokenizing these assets is the reduction of friction and increase in trust tokenization creates.

Invoices

Invoices come out of agreements or standard pricing structures when goods or services are sold. They represent a very special form of intangible asset because they are:

- **Valuable** - The global value trapped in receivables at any given time is between \$25T to \$30T
- **Plentiful** - There are tens of billions of invoices created every month.
- **Temporal** - The asset is temporal and typically does not exist longer than 90 days
- **Converted** - The asset is converted to cash at the end of its life which is valuable
- **Perishable** - The older the invoice is the less likely it will be paid
- **Binary** - It tends to be worth its face value or nothing
- **Disputed** - It is highly susceptible to both error and fraud therefore frequently disputed

Invoices represent such a special class of intangible assets that the Sweetbridge platform contains special features designed just to deal with invoices. At its core the platform provides shared legal, identity, accounting, payment application, and workflow states needed to address the special issues with invoices.

Distinct assets (non-fungible)

Distinct assets are assets that can be identified uniquely from others of its same class, model, type, etc. They have a natural indivisible unit such as a car, home, part, etc. that has an identity. They are unlike oil, gold, or electricity which has no identifier. To be a distinct asset the asset must have a unique identifier or moniker such as an address, vehicle identification number, or serial number.

The Sweetbridge platform provides an internal registry for all distinct assets. These are divided by asset class, type, etc. This means that any distinct asset that is loaded into the platform can have all of its ownership and rights tracked. This is true even if the asset has an external registry such as real estate. This is done so that rights that can't be supported by the external registry can be enforced and to allow an automatic state transition to occur.

Once loaded onto the platform, distinct assets must have all asset ownership and rights modifications performed through the platform until the asset is withdrawn from the platform. Withdrawal of an asset requires the formal termination of the contracts that enable it to be tokenized. Once terminated, the asset must be reloaded if it is to be tokenized again, which requires all ownership and rights verifications and audits to be performed.

In many cases, as long as changes in ownership and rights are done through the platform, no additional audits are required to transfer ownership. However, in some cases, such as real estate, assets have methods for attaching rights outside of the Sweetbridge platform. When this is the case, audits must be done periodically, or whenever ownership changes, to validate that new rights have not been granted externally. These audits need to be done to assure rights, such as a lien, have not been placed on the asset. The Sweetbridge platform supports the ability to create both automated and manual workflows for doing these audits.

Fungible assets

Fungible assets are assets that have no distinct identity between instances. Almost all commodities are examples of fungible assets. Assets such as wheat, rice, produce, meat, platinum, diamonds, or oil don't have distinct identities. Some of these don't even have an instance because they can be subdivided down to some elemental level such as oil, gold, or electricity. Other fungible assets may have an instance such as a grain of rice, a carrot, head of lettuce but are tracked as collections instead of specific items such as a bushel of rice or a carton of lettuce.

Fungible assets are measured using a unit of measure or count such as an ounce of gold or a barrel of oil. Many fungible assets have a standard unit of measure that is used to describe

quantity. This is typically the unit used in tokenization. Other fungible assets have multiple standards used depending on location, use case, etc. The Sweetbridge platform supports the ability to create conversions for various tokens when they represent the same type of fungible asset. This allows tokens that use one unit of measure to be converted into tokens using another unit of measure.

Much like putting gold into a coin with a serial number changes a fungible asset into a distinct asset. The Sweetbridge platform allows tokenization to be used to create tokenized distinct assets out of fungible assets by placing them in tokenized containers. Each container must have a unique identity, the quantity of the fungible asset, and can optionally support provenance information.

Fungible assets from sets of distinct assets

One of the advantages of tokenization is the ability to turn sets of distinct assets into fungible assets. This can be done by defining a set of common characteristics around distinct assets and creating a pool of these assets that then become fungible. Any asset that matches the common characteristics can be a member of the pool. This is very important for assets that are treated as fungible but have distinct identity such as a particular make and model of iPhone. These assets are frequently treated as fungible even though they have unique identifiers such as a serial number.

When held in quantity, such as in inventory, they are frequently fungible with each other — one has just as much value as the next in the same set. The Sweetbridge platform takes this into account and supports the creation of distinct asset pools that allow the identity of the assets in the pool to switch to the set as a whole. This is critical for tracking identity through warehouses and boxes which contain multiple instances but have distinct identity on the container. Once the item is sold to a specific entity, the identity switches back to the individual asset. As in the above iPhone example, when the phone is sold to a specific individual the serial number becomes more important because it is the identity on the iPhone that a specific individual owns.

Asset and goods provenance

Fungible assets may not have identity but they may have provenance. Provenance is the source, place of origin, or ownership history for something. This may affect its value. Knowing its provenance may make something more marketable, such as knowing that the farm that grew the lettuce used organic processes or is located locally. This is because many things that are treated by markets as fungible may have characteristics that are not fungible to consumers. Therefore, knowing the provenance of an item may increase its value to the ultimate consumer.

The Sweetbridge platform is designed to allow fungible assets to be treated as existing in or belonging to a subset or domain within the asset type. This allows fungible assets to support provenance information by some aggregation such as lot, unit, shipment, container, etc. Adding provenance allows organizations to use sensors, identifiers on containers, and validation processes to prove claims about fungible assets that will increase their value. This can be audited to verify these claims, or identify counterfeits and ensure proper handling.

A tokenized fungible asset with provenance can be converted to the same type of tokenized fungible asset without provenance, but the reverse is not true. To do the reverse, the provenance of the asset must be proven as if the asset was being tokenized originally.

The Sweetbridge platform supports several control systems auditors can use to verify provenance claims. The core design uses multiple independent methods of verifying a claim to gain confidence in the claim. If all of the methods used produce the same results, then the likelihood that there is an error or fraud is low. If one method disagrees with another, it does not mean a problem exists, but it means that a problem could exist. If the methods disagree once in a million cases, a problem is unlikely. If they disagree once in ten cases, a problem is highly likely and can be investigated.

The Sweetbridge platform allows the establishment of materiality thresholds. This allows industries, governments, corporate compliance, and financial auditors to set materiality for more invasive audits of provenance information.

Temporal and perishable goods

Consumable goods such as perishable food items or pharmaceuticals are examples of temporal goods. Temporal goods are assets that are only good for a period of time and frequently must be kept in specific conditions to maintain their value.

Most temporal goods are examples of fungible assets. To tokenize these goods or assets they must be containerized with a unique lot, container, etc., to turn the asset into a distinct asset. These assets either cease to have value or cease to be useable on a specific date. Making them distinct assets with identity also allows them to have verifications on conditions reported by those that handle, store, or transport these assets.

Condition validation may occur through sensors such as IOT devices or through certifications backed by financial warranty. The method used is up to the tokenization party using the Sweetbridge platform. The platform simply supports the structures, workflows, and verification processes needed to validate and prove claims.

Summary of assets

It is impossible to imagine all of the effects or the opportunities created through the tokenization of assets. The amount of friction reduced and the standardization that can be created will likely have far reaching effects. However, the tokenization of rights on assets, goods, and services may ultimately dwarf all other benefits by a significant margin. This tokenization of rights is only possible when the assets themselves have first been tokenized.

The Sweetbridge platform is a system that builds on itself, in which each addition adds greater and greater value to all participants in the system. Synchronized Accounting enables the trust necessary to ensure trusted tokenization of assets. Trusted tokenization of assets enables the

ability to go a step further and tokenize the rights on assets. Where this add-on effect ends is yet to be discovered, but the ramifications of just tokenization of assets and rights are sure to be significant enough to create new markets and opportunities, which will be particularly beneficial to early adopters.