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(54) A METHOD FOR CREATING COMMODITY ASSETS FROM UNREFINED COMMODITY RESERVES UTILIZING BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGY

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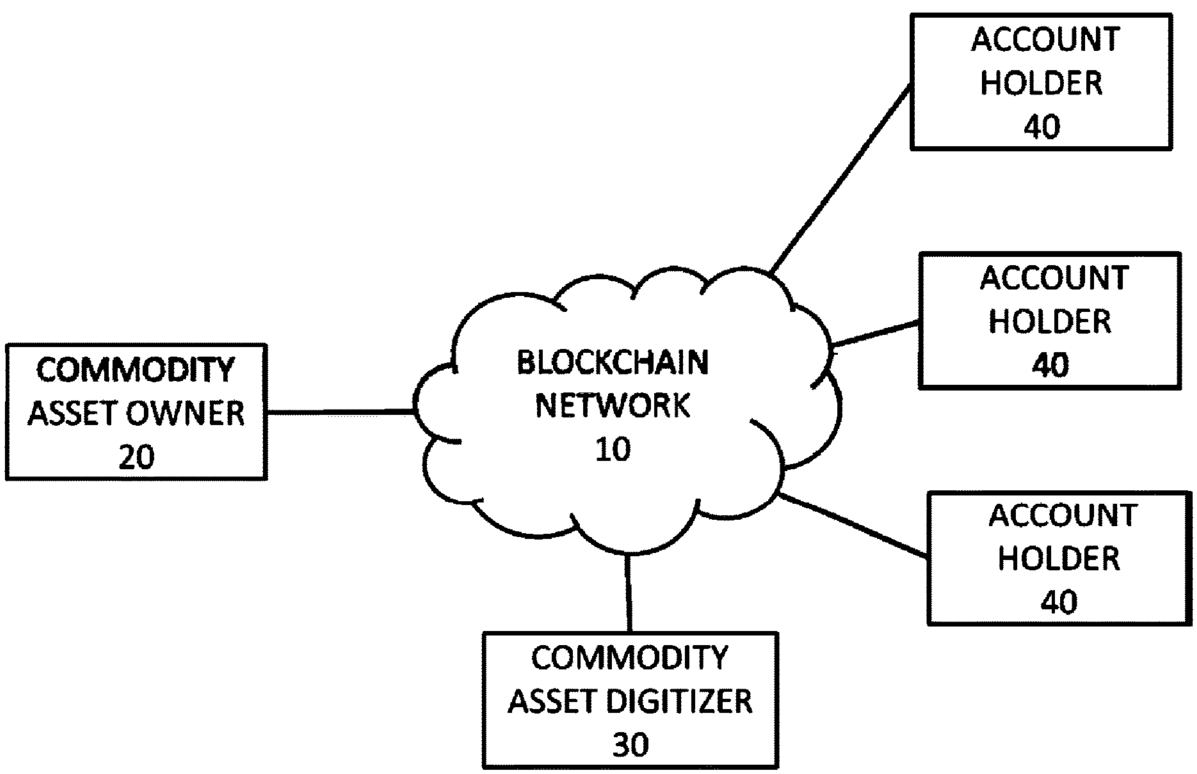
(57) **ABSTRACT**

A method for creating an asset-backed distributed ledger token representing a smart contract, the token being backed by a pledge of an illiquid form of a precursor or means of production of a commodity asset, comprising receiving a pledge of unrefined or pre-commodity asset, digitizing the unrefined commodity asset into fractional representations of the commodity asset using smart contracts on a distributed ledger network, and allowing account holders access to the perform transactions on the distributed ledger network to trade the fractional representations under the terms of the smart contract.



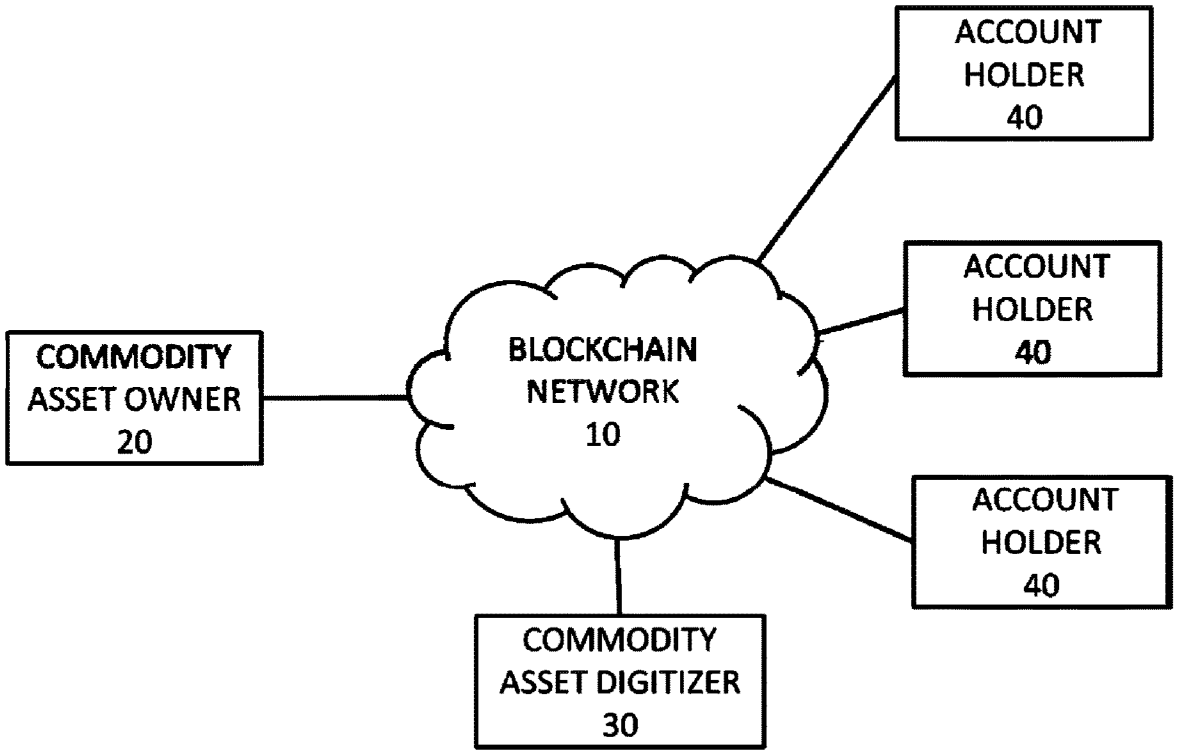

ACCOUNT HOLDER 40
ACCOUNT HOLDER 40
ACCOUNT HOLDER 40
COMMODITY ASSET OWNER 20
BLOCKCHAIN NETWORK 10
COMMODITY ASSET DIGITIZER 30

Fig. 1

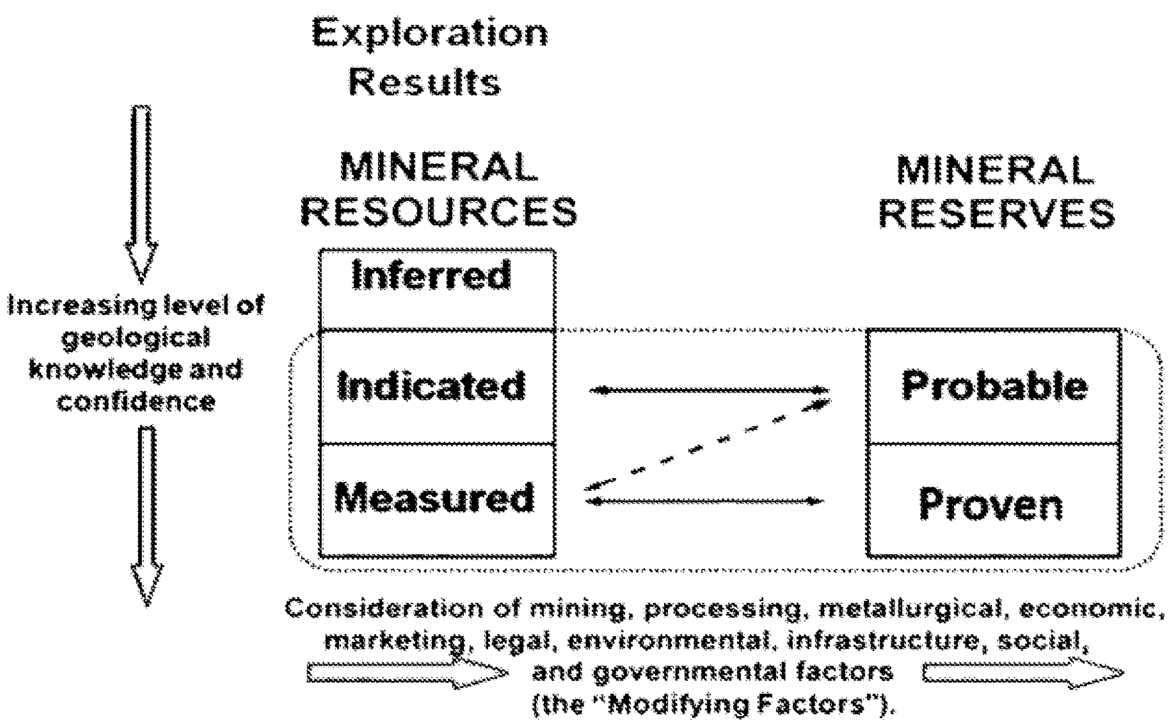

Exploration Results
MINERAL RESOURCES
MINERAL RESERVES
Inferred
Indicated
Measured
Probable
Proven
Increasing level of geological knowledge and confidence
Consideration of mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the "Modifying Factors").

Fig. 3

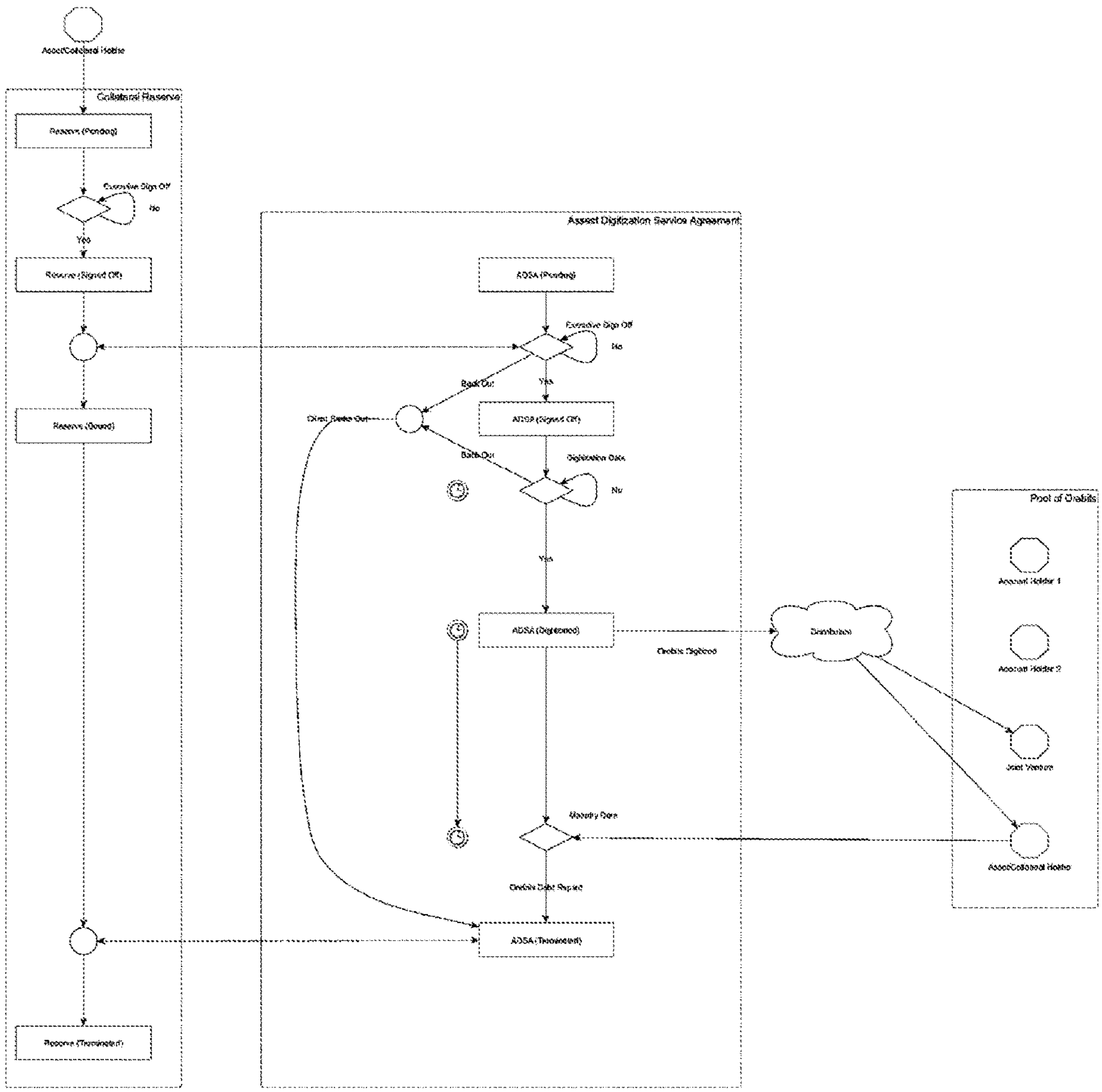

Collateral Reserve
Reserve (Signed Off)
No
Yes
Assest Digitization Service Agreement
ADSA (Pending)
Back Out
ADSA (Digitized)
ADSA (Terminated)
Distribution
Pool of Orebits
Joint Venture

Fig. 2

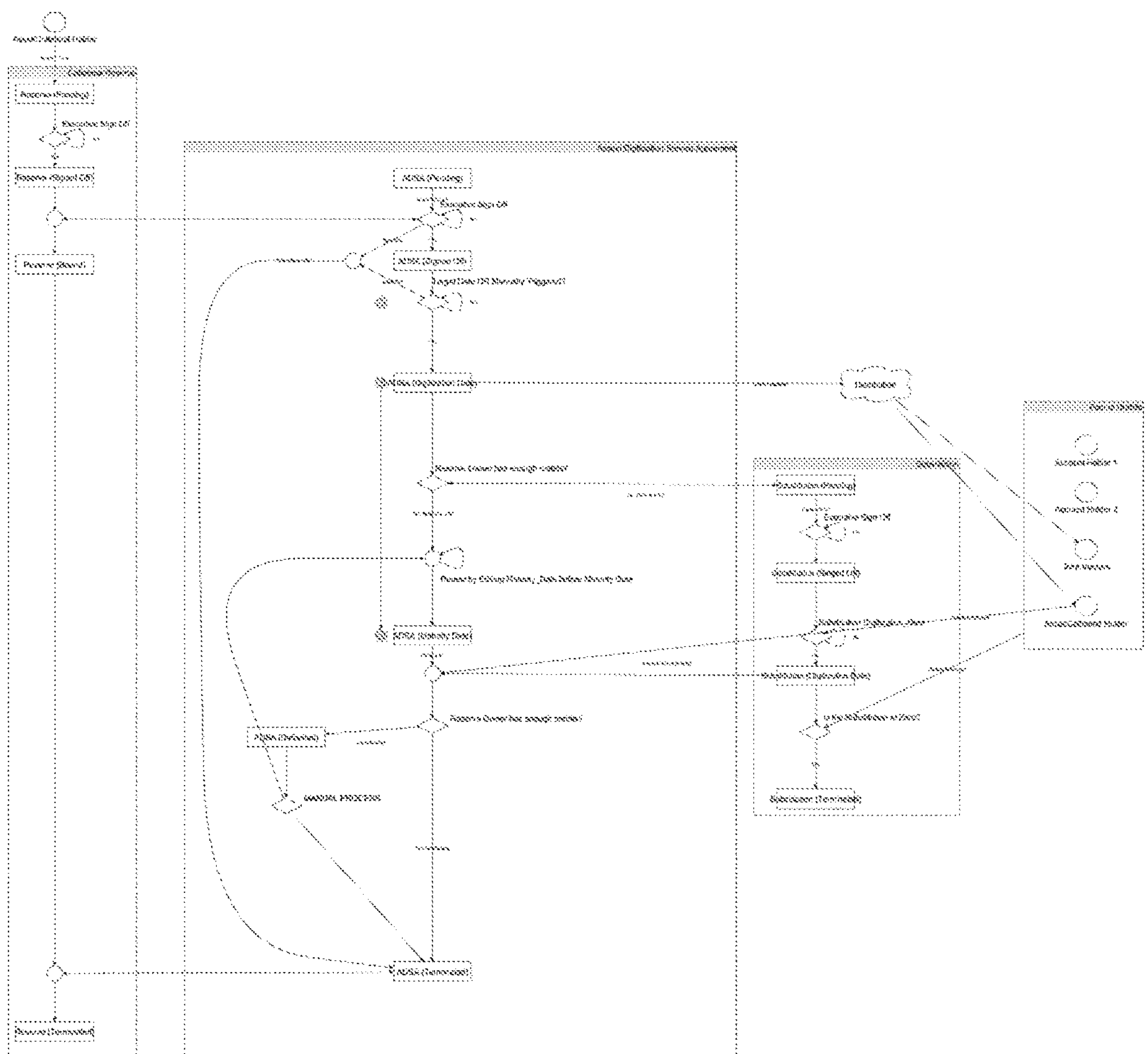


Fig. 4

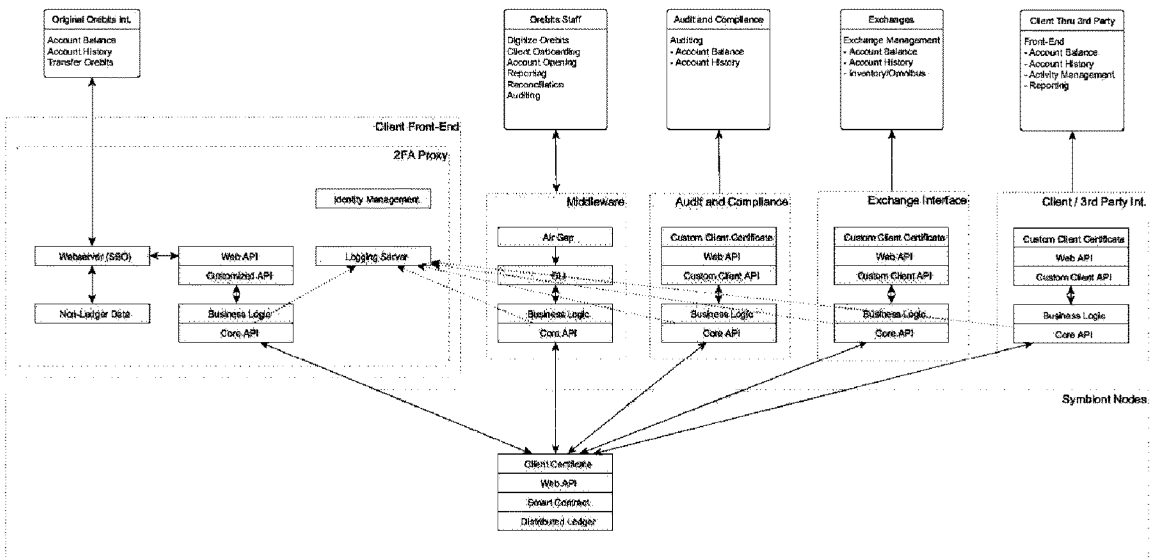

Original Orebits Int.
Account Balance
Account History
Transfer Orebits
Orebits Staff
Digitize Orebits
Client Onboarding
Account Opening
Reporting
Reconciliation
Auditing
Audit and Compliance
Auditing
- Account Balance
- Account History
Exchanges
Exchange Management
- Account Balance
- Account History
- Inventory/Omnibus
Client Thru 3rd Party
Front-End
- Account Balance
- Account History
- Activity Management
- Reporting
Client Front-End
2FA Proxy
Identity Management
Webserver (SSO)
Web API
Customized API
Logging Server
Non-Ledger Data
Business Logic
Core API
Middleware
Air Gap
Business Logic
Core API
Audit and Compliance
Custom Client Certificate
Web API
Custom Client API
Business Logic
Core API
Exchange Interface
Custom Client Certificate
Web API
Custom Client API
Business Logic
Core API
Client / 3rd Party Int.
Custom Client Certificate
Web API
Custom Client API
Business Logic
Core API
Symbiont Nodes
Client Certificate
Web API
Smart Contract
Distributed Ledger

Fig. 5

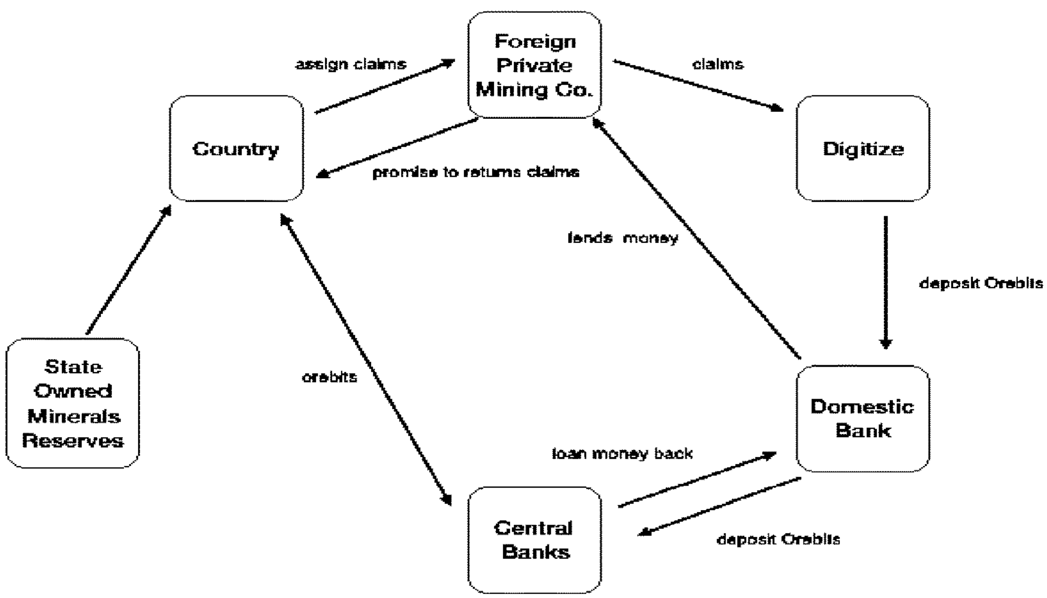

Foreign Private Mining Co.
assign claims
claims
Country
Digitize
promise to returns claims
lends money
deposit Orebits
State Owned Minerals Reserves
orebits
Domestic Bank
loan money back
Central Banks
deposit Orebits

Fig. 6

A METHOD FOR CREATING COMMODITY ASSETS FROM UNREFINED COMMODITY RESERVES UTILIZING BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGY

FIELD OF THE INVENTION

[0001] The present invention relates to the field of securitized transactions and smart contracts, and encompasses systems and methods for conducting transactions.

BACKGROUND OF THE INVENTION

[0002] Each reference cited herein is expressly incorporated herein by reference in its entirety, for all purposes.

[0003] In the current marketplace, a commodity asset owner can go to a lender and securitize the commodity assets thereby gaining liquidity. The problem with this current model is that it requires a liquid commodity, and when securitized, the commodity may be restricted from beneficial use. Further, the value of the commodity may be deeply discounted, and ongoing interest charges are accrued.

[0004] Frolov et al., U.S. Pat. No. 9,747,586, discloses a system and method for issuance of electronic currency substantiated by a reserve of assets. The reserve is a commodity or asset that is actively traded.

[0005] Miner, US 20150332256, discloses a system and method for converting cryptocurrency to virtual assets whose value is substantiated by reserve of assets. The reserve is, for example, book entries for fiat currencies, which are actively traded.

[0006] Doney, US 20170213289, expressly incorporated herein by reference in its entirety, describes creation of collateralized portfolios, as a collection of income-producing assets, generated through transactions that exchange estimated asset value for liquid instruments in the portfolio. Transaction elasticity is provided by liquid instruments (reserve funds and portfolio-owned shares) held in reserve in the portfolio's reservoir which provides a market smoothing function to adapt to changes in asset demand and risk. Each portfolio's reservoir is collectively owned by the shareholders; continuously replenishing itself with income generated by assets in the portfolio. Shares can be represented by digital tokens, traded as digital currency such as cryptocurrency, and monetized with the convenience of cash through a network of exchanges and payment gateways.

[0007] Vieira et al., US20180047111, expressly incorporated herein by reference in its entirety, describes enhanced organizational transparency using a linked activity chain in a ledger, employing a block chain.

[0008] So-called "Smart Contracts" are legal obligations tied to a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of the contracts. Smart contracts allow the performance of credible transactions without third parties. These transactions are trackable and may be irreversible. See, en.wikipedia.org/wiki/Smart_contract. The phrase "smart contracts" was coined by computer scientist Nick Szabo in 1996. See, "Nick Szabo—Smart Contracts: Building Blocks for Digital Markets". www.fon.hum.uva.nl, Extropy #16; Szabo, Nick (1997 Sep. 1). "Formalizing and Securing Relationships on Public Networks". First Monday. 2 (9); Tapscott, Don; Tapscott, Alex (May 2016). The Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World. pp. 72, 83, 101, 127. ISBN 978-0670069972. A smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises. Recent implementations of smart contracts are based on blockchains, though this is not an intrinsic requirement. Building on this base, some recent interpretations of "smart contract" are mostly used more specifically in the sense of general purpose computation that takes place on a blockchain or distributed ledger. In this interpretation, used for example by the Ethereum Foundation or IBM, a smart contract is not necessarily related to the classical concept of a contract, but can be any kind of computer program. See, Buterin, Vitalik. "Ethereum Whitepaper", Github; Cachin, Christian. "Architecture of the Hyperledger Blockchain Fabric", ibm.com.

[0009] Byzantine fault tolerant algorithms allowed digital security through decentralization to form smart contracts. Additionally, the programming languages with various degrees of Turing-completeness as a built-in feature of some blockchains make the creation of custom sophisticated logic possible. See, "Smart contracts: Turing completeness & reality"; "Dumb Contracts and Smart Scripts—We Use Cash". weuse.cash.

[0010] Notable examples of implementation of smart contracts are Decentralized cryptocurrency protocols are smart contracts with decentralized security, encryption, and limited trusted parties that fit Szabo's definition of a digital agreement with observability, verifiability, privity, and enforceability. See, "How Do Ethereum Smart Contracts Work?—CoinDesk". CoinDesk. Retrieved 2017 Oct. 27; "Bitcoin as a Smart Contract Platform". Richard Gendal Brown. 2015 Mar. 30; "Blockchain: Forget Bitcoin, here comes the real thing". Idealog. 2016 Mar. 29; "What are Smart Contracts" (PDF). chainfrog. Aug. 3, 2017. Bitcoin also provides a Turing-incomplete Script language that allows the creation of custom smart contracts on top of Bitcoin like multisignature accounts, payment channels, escrows, time locks, atomic cross-chain trading, oracles, or multi-party lottery with no operator. Rosa, Davide De. "The Bitcoin Script language (pt. 1)". davidederosa.com; bitcoinbook: Mastering Bitcoin 2nd Edition—Programming the Open Blockchain—Chapter 7, Mastering Bitcoin, 2017 May 30; "Smart contracts and bitcoin", medium.com/@maraoz/smart-contracts-and-bitcoin-a5d61011d9b1; "Contract—Bitcoin Wiki". en.bitcoin.it; "What is a Bitcoin Merklized Abstract Syntax Tree (MAST)?". Bitcoin Tech Talk. 2017 Oct. 12; "Smart Contracts on Bitcoin Blockchain" (PDF). Sep. 4, 2015; Andrychowicz, Marcin; Dziembowski, Stefan; Malinowski, Daniel; Mazurek, Lukasz (2013). "Secure Multiparty Computations on Bitcoin"; Atzei, Nicola; Bartoletti, Massimo; Cimoli, Tiziana; Lande, Stefano; Zunino, Roberto (2018), "SoK: unraveling Bitcoin smart contracts" (PDF), 7th Int. Conf. on Principles of Security and Trust (POST), European Joint Conferences on Theory and Practice of Software. Ethereum implements a nearly Turing-complete language on its blockchain, a prominent smart contract framework. Atzei, Nicola; Bartoletti, Massimo; Cimoli, Tiziana (2017), "A survey of attacks on Ethereum smart contracts" (PDF), 6th Int. Conf. on Principles of Security and Trust (POST), European Joint Conferences on Theory and Practice of Software; "Vitalik Buterin on Tweeter (verified) ". 18 Apr. 2017. RootStock (RSK) is a smart contract platform that is connected to the Bitcoin blockchain through sidechain technology. RSK is compatible with smart contracts created for Ethereum.

[0011] "RSK—Rootstock Open-Source Smart Contract Bitcoin Technology?"; "Digrate Express rating report on Project Rootstock"; Thomas Bocek (15 Sep. 2017). Digital Marketplaces Unleashed. Springer-Verlag GmbH. p. 169-184. ISBN 978-3-662-49274-1; "A Solution for the Problems of Translation and Transparency in Smart Contracts"; "Trust in Smart Contracts is a Process, As Well"; "Scripting smart contracts for distributed ledger technology". See also, "Namecoin". Cointelegraph. 23 May 2015. Automated Transactions; "Ripple discontinues smart contract platform Codius". Bitcoin Magazine. Jun. 24, 2015; "Automated Transactions Specification"; "Qora and Burst Now Able to Make Cross-Chain Transactions". May 22, 2015.

[0012] Smart contract infrastructure can be implemented by replicated asset registries and contract execution using cryptographic hash chains and Byzantine fault tolerant replication. See, Nick Szabo (2005). "Secure Property Titles with Owner Authority"; Jörg F. Wittenberger (2002). "Askemos a distributed settlement"; "Proceedings of Int. Conf. on Advances in Infrastructure for e-Business, e-Education, e-Science, and e-Medicine on the Internet"; Martin Möbius (2009). "Erstellung eines Archivierungskonzepts für die Speicherung rückverfolgbarer Datenbestände im Askemos-System"; Tom-Steve Watzke (2010). "Entwicklung einer Datenbankschnittstelle als Grundlage für Shop-Systeme unter dem Betriebssystem Askemos".

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[0014] Smart contracts have advantages over equivalent conventional financial instruments, including minimizing counterparty risk, reducing settlement times, and increased transparency. UBS proposed "smart bonds" that use the bitcoin blockchain in which payment streams could hypothetically be fully automated, creating a self-paying instrument. See, "Blockchain Technology: Preparing for Change", Accenture; Ross, Rory (2015 Sep. 12). "Smart Money: Blockchains Are the Future of the Internet", Newsweek; Wigan, David (2015 Jun. 11). "Bitcoin technology will disrupt derivatives, says banker", IFR Asia. See also,

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[0064] Liquidity, the ability to efficiently convert asset value to cash on demand, is a key characteristic of optimal markets. Likewise, high transaction costs, inability to liquidate an asset on demand, and discounting of an asset in order to facilitate a transaction represent market inefficiencies. Many investment opportunities, such as emerging technologies or real estate projects in the developing markets, offer significant earning potential but suffer from a lack of liquidity. Despite the potential for return, earning potential for these asset classes may remain dormant. Asset liquidity may be limited to due to lack of information, individual asset risk, uncertain market conditions, large transaction sizes, and irregular or infrequent payouts.

[0065] A particular class of assets involve resources capable of generating or producing commodities at a predictable cost (i.e., assets for which there exists a robust market with high efficiency), but which themselves have limited liquidity because of the cost, time, and risk of bringing the asset to commodity status. These assets are thus ultimately valuable, but suffer significant discounts beyond the predicted cost of commoditization. For example, mineral deposits which produce commodity minerals fluctuate based on the value of the mineral, but suffer discounts far in excess of the cost of extraction. Further, because the value is intrinsic to the deposit, the use of the asset for securitization depends on the extractability of the resource, and not its actual extraction, permitting leverage of the capital investment independent of the mineral business. Indeed, because the market for commodity minerals may fluctuate or suffer cyclic pricing, it may be inefficient to extract mineral deposits under all circumstances, yet liquidity of the underlying real estate or leases is a significant risk on owning or lending based on these deposits.

[0066] Currently, a company which owns a source or means for production of a commodity may borrow at interest from a lender secured by the assets, or sells equity which intrinsically shares in the profits of production, or offers some hybrid security. While an equity holder may have liquidity in selling the shares, the value of the shares is heavily weighted toward the profits made from operations, and negatively impacted by the size of the capital investment involved. Meanwhile, a debt lender (e.g., bondholder) typically has more limited liquidity, and even if the security interest is sufficient to ensure eventual payment, the default risk for the borrower remains a critical factor in liquidity

SUMMARY OF THE INVENTION

[0067] The present technology provides various solutions addressing these issues. It converts an illiquid asset which represents demonstrable and recognized wealth, into a liquid resource, typically without requiring the illiquid asset itself to be monetized. A contingent interest in real property rights (e.g., a security interest) permits, upon conclusion of a smart contract, a counterparty to the asset owner, to force either compliance with the terms of the smart contract, e.g., repayment of the tokens, or have available legal remedies available under the contingent interest. In a preferred embodiment, the smart contract requires return of the same number of tokens as were issued to the asset owner, in order to release the contingent interest. This permits a distributed ledger to be a complete an accurate accounting means for the tokens, from creation to extinction by completion of the cycle. Of course, more complex terms are possible, such as a fractional or surplus return ratio. In a preferred embodiment, a substitution is possible, which serves to secure release of the contingent interest, absent return of all tokens, for example in case of unavailability or pricing disparity.

[0068] In general, a borrower seeks to monetize a capital investment in a productive resource that has a predictable cost of production of a commodity, and other predictable (and/or insurable) risks. A buyer, lender, or issuer seeks to securitize the investment by creating a salable and tradable token, guaranteed by the value of the security (security interest), and subject to a "smart contract" which limits unpredictable human-factor risks, so that the value of the loan can be immediately off-loaded into public markets. Finally, public markets acquire the tokens, which have advantages over cash, in terms of transferability, security, and in some cases (i.e., unstable political regimes), asset backing. The tokens are ultimately backed by a security interest in the productive means, and may have a discount in excess of the cost of extraction or production, at least at issuance. The tokens, once issued, have a fundamental value, tied to the security interest and smart contract that governs it. Therefore, in contrast to a fiat currency, the tokens are less correlated in value with political instability, inflation, devaluation, foreign trade balance, and the like. On the other hand, the token would typically have a value positively correlated with the value of the underlying security asset, and the commodity to which it pertains.

[0069] The tokens may be tied to a single smart contract, or issued backed by a portfolio of secured assets. A typical smart contract will have a predefined term, such as 10 years. At the end of the term, the borrower must acquire the tokens at market price, or provide a permitted alternate. In a preferred embodiment, the smart contract authorizes a right of substitution, wherein the borrower may release the security interest by depositing with a reliable repository, a predetermined amount of the commodity, and at termination, the holder(s) of tokens can offer their tokens to the original source, presumably at or near the underlying commodity value, as of the expiration of the contract. In another scenario, the token holders receive the commodity itself, and not its value, though in most cases, the commodity is represented by a liquid right in a defined currency. The fixed expiration date permits deposit of commodities futures contracts as the substituted assets, rather than the commodities themselves, which further reduces the economic inefficiency of the securitization.

[0070] The preferred implementation permits a renewal of the smart contract, such that an actual transfer of the commodity is not required. Thus, the smart contract can be renewed, with underwriting performed in anticipation of renewal to verify that the secured assets have appropriate value, etc.

[0071] Users of the tokens may therefore anticipate variations in demand over time. However, while the security for the particular tokens may differ, the smart contract is designed and intended to provide sufficient margin between the security interest and likely range of values such that they are fungible, and various tokens for the same commodity would assume the same market value.

[0072] In some cases, the tokens will rise to a value above a right of substitution value or security interest value. In this case, there may be differences between tokens, but in that case, there would be an incentive for bowers to substitute the security as the commodity or a contract right for the commodity, and thus achieve fungibility in that manner. When the value of the token rises above the securitization, the result is somewhat similar to the pricing of non-securitized cryptocurrencies, i.e., the pricing is dependent on scarcity of the tokens and a demand established by usefulness or speculation. However, in contrast to current unsecuritized cryptocurrencies, the securitized tokens have a right, at smart contract termination, to liquidation at the exchange price for the commodity. Further, if the tokens are fully substituted (a likely occurrence if the token value exceeds the commodity exchange value), the smart contract may go into automatic renewal (with a right of token redemption), and thus expiration risk for token-holders abated. Therefore, the tokens have a minimum value expressed in a commodity exchange rate at or after smart contract expiration, and no maximum value.

[0073] The scarcity of the tokens is guaranteed by the limited nature of commodity production or creation facilities, and the securitization discount.

[0074] To the extent that commodities market risks are deemed unacceptable or undesired, the tokens may be backed by various types of portfolios that mitigate desired risks. Likewise, risks may be concentrated if desired. For example, instead of securitizing tokens based on a mineral mine or the like, the borrower may simply deposit futures contracts in exchange for tokens, which are then sold to raise cash. If the borrower owns a productive resource for the subject commodity, the future contract may be written based on production and fulfillment by the borrower. However, this is not required, and the borrower may engage in side transactions to fulfill its eventual obligations, so long as the security interest meets the smart contract and underwriting criteria.

[0075] Blockchain technology provides various known advantages. For example, entries made on the blockchain are permanent, immutable, and independently verifiable. Therefore, the use of blockchains is particularly valuable for verifying ownership of a token, recording transfers of tokens, and auditing transactions. The present technology does not require, and a preferred embodiment does not include, anonymity, and therefore parties to a transaction may be authenticated using biometrics, multifactor authentication, or various means. This avoids the need to rely on passwords or cryptographic credentials alone, as with some cryptocurrencies. Thus, a human service may be employed to verify participants in transactions. On the other hand, anonymous transaction capability is also possible.

[0076] The use of tokens provides advantages with respect to currencies, commodity trades, barter, contract obligations, and other payment methods. Currencies can require conversions, which incur costly and risk. Commodity trades may require delivery of significant quantities of material, storage (with required physical security), transactional costs, pricing fluctuations, etc. Barter has similar issues with commodities, but also incurs liquidity risk. (If an exchange is with respect to a liquid asset, it is either a security or a commodity, if it is neither, it would be considered a barter). Contract rights, such as futures, incur the risks of the underlying security or commodity, but also a greater pricing fluctuation risk to contract termination, and likely higher transactional costs.

[0077] The token according to the present technology has some characteristics of a derivative of a forward contract, with the advantage that, while the value of the token is secured by the value of the resource capable of delivering the commodity (with certain investment in delivering the commodity less than a differential between the value borrowed and the present value of the resource), and there is no actual requirement to develop the resource to deliver the commodity, maintaining efficient options for the borrower. The derivative, however, has characteristics of a virtual cryptocurrency, with asset backing, which can reduce volatility. While there is technically no limit on demand-based increases in the value of the tokens, and thus opportunity for speculation, according to a preferred embodiment, the borrower has a right of substitution, and therefore the risk of specific demand by a borrower seeking to recover the tokens and retire the debt, and therefore an opportunity for a hold-out, is limited. Further, the technology does not particularly seek to limit the amount of asset-backed tokens generated, and therefore scarcity of the class of tokens is not a driving principle for valuation. Therefore, the motivations for pricing volatility are limited, resulting in a cryptocurrency or crytoasset token whose basis for valuation is the asset backing and usefulness in or in conjunction with commerce.

[0078] Typically, the tokens are fully fungible, and are issued in undistinguished form and as part of an indistinguishable pool. With respect to particular issuances, it is possible that a certain resource will turn out to be overvalued or fraudulent, and as a result, the tokens issued based on that resource lack asset backing. Since we presume that there are other tokens available in the same class that are properly asset backed, this would tend to negatively impact the valuation of those particular tokens. Of course, steps are taken during underwriting to avoid this possibility, but it is also possible to acquire insurance on the assets to assure the value of their securitization. When tokens are separately tracked, as compared to a normal token, a token under which the borrower has defaulted, and a surety is invoked may be worth more than other tokens, leading to higher "special" demand for riskier tokens. On the other hand, if the token value is above redemption, the special tokens will be worth less. Therefore, a speculation opportunity is provided in this case.

[0079] If, upon termination of a smart contract, there is a default, and the security interest must be liquidated, it is possible that an investment is required to extract the resource to fulfill the contract. In that case, an administrator, trustee, receiver, or the like (as specified by the smart contract and underlying agreements) assumes control over the resource. Because of the margin between the debt amount and the value of the commodity that may be extracted from or produced by the resource, it is likely that the estate can be managed to fulfill its responsibility. Indeed, there may be cases where the token-holders are advantaged (at least theoretically) as compared to those holding tokens from non-defaulting debtors. Thus, a perverse incentive may occur where demand is high for the lowest "quality" tokens, due to an arbitrage opportunity at contract termination. For example, in a non-defaulting case, the debtor must acquire the previously issued tokens or deliver the substituted assets. Therefore, the market price for the tokens will be driven by the substitution paradigm, which is generally the same commodity as produced by the resource (though this is not a theoretical constraint). On the other hand, in the defaulting case, the debtor presumably lacks the liquid assets to reacquire the tokens at market price, and lacks the commodity to fulfill the substitution, leading to a possibility that the rational market price is above the substitution value, especially if the terms of default provide an advantage to the token-holder, such as an above-market interest rate for delayed payment. Further, because these defaulting tokens become "special", and the smart contract under which they are issued will not be renewed, the expiring tokens may be subject to increased demand, and thus higher prices.

[0080] This is not to say that the system is design to include perverse incentives which drive objectively antisocial behavior and seeming irrational results. Rather, the terms of the smart contract may be designed to correct for aberrant conditions, and to ensure that token holders are assured of the asset backing under all of the various conditions, leading to a lower risk discount and reduced correlation of risks between the tokens themselves and external market-specific conditions. Thus, the tokens become available for cross-border transactions, use in unstable economies, during fiat currency contractions, and especially in transactions loosely linked to the commodity which secures the tokens. While the tokens may be initially issued in a private transaction, such as a financing of an acquisition of a mine, or expansion of a mine, they would become available for general transactions as an alternate to cryptocurrencies, and due to their characteristics designed to limit speculation-driven volatility, and artificial scarcity (i.e., scarcity due only to the fact that the tokens have limited liquidity and availability), the tokens become a good fit for use in consumer and business-to-business transactions.

[0081] The key advantage of the tokens over cash derives from their origination in an asset securitization transaction, which is designed to be more efficient, and yield lower discounts of net asset value to liquidity achieved, than traditional bank lending, and perhaps equity issuance. Thus, the generation of the tokens according to the present technology alleviates an artificial scarcity of fiat currencies, under traditional loan paradigms, thus unlocking vast amounts of wealth. Once unlocked, the tokens continue to represent an advantage over fiat currency in that they are readily exchangeable for fiat currency on an exchange or in a transaction, and are also backed by hard assets, a feature missing from fiat currencies.

[0082] Typically, the present technology is implemented in a manner fully compliant with all banking and securities laws, and the use or advantages of the technology are not predicated on US tax avoidance, US currency transfer restriction evasion, etc. However, the exchange network is independent of the financial services oligopolies, such as The Clearing House (New York), credit card networks (Mastercard, Visa, Discover, American Express, etc.), etc., and therefore is free to compete by providing lower cost, better service(s), advantages, etc.

[0083] According to another embodiment, the token system is tied to commodity-specific investment or speculation. For example, if a user seeks to invest in diamonds, gold, platinum, etc., he or she may acquire tokens having such characteristics. Typically, these would be tokens that have a high proportion of substituted assets in the form of the respective commodity, whose pricing is highly correlated with the commodity, and whose smart contract assures that significant deviation between the token price and the redemption price with respect to the underlying commodity are well aligned. Indeed, in such a scenario, short or staggered terms of the smart contract may be desired, so that speculation on commodity pricing over time can be effectively managed. Further, in some cases, the token owner may be provided with a right of demand, for example, to acquire an amount of the underlying commodity in exchange for the token. This would have the effect of converging the token price with the demand value as the contract nears expiration, and also permits use of the tokens as a market hedge, while maintaining liquidity.

[0084] Another issue involves international currency and financing issues. For example, a non-US commodity miner seeks to finance production of gold outside the US. Typically, a security interest in real estate or a business is recorded in the jurisdiction in which the business is location, and is denominated in the currency of that jurisdiction. This imposes difficulties where a lender does not wish to incur currency risk for the particular jurisdiction, but is quite willing to incur the business risk inherent in the loan, if denominated in commodity value. Therefore, the present technology provides a means to secure the loan, which in theory does not violate currency export restrictions of the jurisdiction, since at contract termination, the commodity itself may be delivered. The loan, in the form of the tokens, then represents a derivative of the value of the commodity, at least when issued, and near expiration, especially in a non-renewable smart contract. For a renewable smart contract, the value of the tokens is largely limited unilaterally, in that if the tokens exceed the market value of the underlying commodity, there will be a large incentive for the borrower to substitute commodity for tokens, thus tying their values together. However, if the commodity value is less than the token value, the token will remain floating in value.

[0085] Because of the discount between the value of the secured assets and the amount of the security, the tokens have a fair market value over equity in the resource. Therefore, the tokens have another basis for valuation, and another possible value correlation. In the event that the company that manages the resource becomes illiquid and its business prospects dim, the tokens assume properties similar to that of a secured lender. The redemption at contract expiration, in this case, appears as a zero coupon bond. The option of renewal of the contract, if provided, may provide the token-holder with an ability to cash out, but in any case typically requires a new underwriting process that assures that the value of the security interest is discounted well below the amount outstanding.

[0086] Therefore, the particular rules and features of the smart contract will define future risks and rewards of the participants, and can vary over a broad range of parameters. For example, instead of emulating a zero coupon bond, the tokens may yield dividends or pay interest. If this is a direct payment, this incurs tracking and tax reporting that might result in difficulties. However, as built into a smart contract, the result may be a programmed increase in value of the tokens over time with respect to redemption value, right of substitution amount, or other time-dependent features which are predicted to drive the value of the tokens up over time toward the expiration.

[0087] The present technology therefore features an asset which is subject to a legally-enforceable security interest, to secure a debt, which may be denominated in currency or a value of a commodity. In exchange for a sum, a series of tokens are generated and issued. The tokens are subject to a contract which provides for a future redemption, at a value secured by the security interest. The contract itself may be a smart contract, which includes automatically implemented rules and features, which in some cases may be independent of sovereigns, and has aspects which are enforced independent of the parties and their agents. The tokens may be traded on an exchange which relies on a blockchain. The future redemption may provide different options, such as currency, commodities, renewal upon terms, or otherwise.

[0088] In a preferred embodiment, the security interest is in a gold mine, with a debt of less than 20% of the proven reserves of the claim, after a due diligence investigation of the value of the claim and its productive capability, such that extraction of gold sufficient to redeem the tokens is commercially feasible without exceeding the value of the secured assets. The term may be 10 years, with a right of substitution at par value at any time over the term. At expiration, the borrower must reclaim all of the tokens, or substitute security in the form of a pre-specified amount of gold. However, upon redemption of any token, the borrower may reissue the debt as a new token, subject to a new smart contract. A term of the smart contract permits a token-holder with an outstanding token to automatically exchange tokens for replacement tokens, thus leaving pending transactions and markets uninterrupted.

[0089] The issued tokens are available for various transactions, similar to other known cryptocurrencies, and are traded on exchanges with respect to different currencies, tokens, or commodities, or between individuals on a secure digital ledger, which may be a blockchain.

[0090] The right of redemption may permit substitution of other tokens, having distinct security, which meet system-wide criteria, and therefore the tokens become fungible. However, each debtor remains responsible at contract termination to fulfill its obligations, or the security interest may be foreclosed. When the process is aggregated for a number of borrowers, the management of redemption, substitution, and foreclosures becomes a normal business activity, and therefore can be managed accordingly. Further, the aggregation leads to greater liquidity, reduced search cost and individual risk speculation, and more orderly markets. Further, from the perspective of a token-holder, default risks are also aggregated, and therefore have lower volatility.

[0091] In some cases, the value of resource subject to the security interest is far in excess of the value of the debt, and respective tokens. One option is, rather than issuing all tokens having the same value, a set of tranches of tokens, which represent priority of liquidation in event of default. This has the effect of creating tokens with greater and lesser degrees of correlation with the underlying business involved in the secured resource. The tranches may also have other differences. Thus, it is possible to create derivatives which largely isolate different risks, and thus satisfy different investment objectives.

[0092] In some cases, the security is not in real estate, mines or leases per se, but may be with respect to in-process inventory. For example, mined, unrefined ore may be subject to the monetization transaction, with the redemption based on a fraction of the metal or mineral contained in the ore. Therefore, the technology may be used for short term business financing. As the ore is processed, if the tokens are not redeemed, the miner may replace the ore to maintain the pool or secured assets.

[0093] As discussed above, the smart contract may be insured. This permits an insurer, such as an insurance company, to assume various risks independent of the token values, and may therefore arbitrage the market value of the tokens with respect to the implied insurance risk. This therefore incentivizes the insurer to act as a market-maker with respect to the tokens under various circumstances, assuring liquidity and orderly markets for the tokens. Even if the smart contract does not require a captive sinking fund, an insurer may require this as a term of the contract. The use of insurance is one way to make different tokens fungible; if tokens having various underlying distinctions are insured to have the same risks (e.g., a common guaranty by the same insurance company), then the markets may treat these as being of the same type. This can be reinforced if the right of substitution includes alternate tokens (though this will generally sink the market value to the lowest valued token, which may be undesirable from an efficiency standpoint).

[0094] The blockchain employed is preferably the Symbiont system, which is a permission-based blockchain. See, symbiont.io/technology/.

[0095] By applying the power of a distributed ledger and smart contracts, the present invention can offer commodity asset owners a method to attain liquidity from their pre-commodity assets by digitizing those assets, and providing a new liquid asset representing a liquid derivative of the pre-commodity assets. These new liquid assets are derived from a fractional representation of the commodity assets. Commodity asset owners who desire liquidity can use this fractional representation (the new liquid asset) for alternative financing. This method will considerably speed up the process of gaining liquidity while allowing the asset owner to avoid ongoing financing charges.

[0096] The digitization of commodity assets allows for the entry of previously excluded asset classes inti the existing securitization marketplace. The problem was previously addressed through a traditional and less efficient securitization market. In the current marketplace, a pre-commodity asset owner can go to a lender and securitize the pre-commodity assets thereby gaining liquidity. The problem with the current model is that it is painfully long and expensive due to the deep discounting of the value of the pre-commodity assets as well as ongoing interest charges due to the business model to the lender.

[0097] The previously available solution was not fully satisfactory because it required ongoing finance charges as well as steeper discounting of the underlying assets. The known solutions require that there be a one to one relationship between the commodity asset holder and the lender. Because of this, the commodity asset holder is typically restricted in how to use the borrowed funds. The funds received were simply cash in the bank and not further available for securitization or other advanced financing techniques including the ability to sell to and/or repurchase from third parties.

[0098] These, and other objects and advantages of the present invention are achieved in accordance with the preset invention by the method according to the invention. In one preferred embodiment, the method is for creating precious metal backed token assets, secured by unrefined precious metal reserves, utilizing blockchain and/or distributed ledger technology. It is of course understood that other unrefined or pre-commodity reserves can be digitized in accordance with the present invention. Typically, if the assets achieve commodity status, there are existing markets that can be employed; however, such assets are not excluded by the present technology.

[0099] Similarly, non-commodity assets may also be securitized, with a slightly different security predicate. For example, an income-producing real estate investment trust can be monetized according to the present technology. In terms of substitution or replacement, the options include, for example, real estate interest substitution, heterogeneous asset or commodity type substitution, cash substitution, or other security.

[0100] In accordance with one preferred embodiment of the present invention, the digitization of illiquid pre-commodity assets creates a liquid asset, utilizing smart contracts and distributed ledger technology. The commodity asset holder is required to pledge the assets into a collateral pool for digitization and representation on the distributed ledger. Once recorded on the distributed ledger as inventory, the collateral will be used to digitize a fractional representation of the commodity assets.

[0101] Digitization occurs on the ledger via a smart contract. The smart contract contains all the necessary parameters needed to digitize including (but not limited to) the commodity asset description, the owner, the quantity, the location and the appropriate risk adjusted discount for the commodity asset and the title for the duration of the smart contract. The terms of digitization embedded in the smart contract allow for the allocation of the fractional representation of the commodity asset to the commodity asset owner. Also, embedded in the terms of the smart contract, is a maturity date which triggers the release of any pledged collateral back to the commodity asset owner while simultaneously requiring the return of the original fractional representation to the collateral pool. The commodity asset owner has control of the now liquid fractional representation created from the collateral. Of course, other encumbrances or side-deals may take place, represented in smart contracts or otherwise.

[0102] It is therefore an object to provide a token, representing an interest in a smart contract, the smart contract representing an agreement, secured by a security interest in the real property or a right in real property, to return the token within a predetermined period.

[0103] It is a further object to provide a method of defining a token, comprising: defining a smart contract, representing an agreement, secured by a security interest real property or a right in real property, to return the token within a predetermined period; pledging the real property or a right in real property to secure the security interest in the smart contract; and issuing the token. The method may further comprise returning the token, and releasing the real property or a right in real property from the security interest. The smart contract may be implemented in conjunction with a distribute ledger. The method may further comprise exercising a contingent property interest, e.g., the security interest, in the real property or a right in real property, after the predetermined period if the token is not returned.

[0104] The token may represent a fractional interest in the real property or a right in real property.

[0105] The smart contract may be implemented in conjunction with a distribute ledger.

[0106] The predetermined period may be tolled if a substitute asset is tendered.

[0107] The real property or a right in real property may comprise a mine having proven available reserves of the substitute asset. The substitute asset may be gold. The proven available reserves may be a predetermined multiple of the substitute asset.

[0108] The token may be generated as a transaction of a cryptographically-authenticated, distributed ledger comprising a database held and updated independently by each of a plurality of distributed elements, forming a consensus determination of transaction validity.

[0109] The agreement, secured by a security interest in the real property or the right in real property, may be terminated if the token is returned within the predetermined period, else a contingent property interest, e.g., the security interest, in the real property or a right in real property, may be exercised.

[0110] It is a further object to provide a method for creating a liquid token representation from an illiquid asset comprising: receiving a pledge of an illiquid asset; and digitizing the illiquid asset into fractional representations using a smart contract on a distributed ledger network, the fractional representations being secured by the pledge of the illiquid asset as collateral. The method may further comprise trading a fractional representation on an exchange, recorded in a distributed ledger network. The smart contract may comprise an illiquid asset description, an illiquid asset owner, a quantity, and at least one redemption rule. The at least one redemption rule may comprise a maturity date which triggers a release of the pledged illiquid asset as collateral back to the illiquid asset owner in exchange for return of all of the original fractional representations. The illiquid asset may comprises ore of a precious metal. The precious metal may be gold.

[0111] It is a still further object to provide a distributed ledger comprising terms of at least one smart contract representing an agreement which imposes a security interest in real property rights, comprising a term which authorizes creation of a token subject to the security interest, and subsequently deactivates the token and releases the security interest upon fulfillment of the smart contract terms.

[0112] It is another object to provide a computational node of a distributed communication network, configured to execute a portion of a distributed ledger comprising at least one smart contract representing an agreement which imposes a security interest in real property rights, comprising a contract term which authorizes creation of a token subject to the security interest, and subsequently deactivates the token and releases the security interest upon fulfillment of the smart contract terms.

[0113] The smart contract may comprise at least one term which imposes a predetermined period during which the terms must be fulfilled. The smart contract may comprise at least one term which provides a right to substitution to toll a foreclosure of the security interest. The distributed ledger may be provided in combination with computational nodes of a distributed communication network, configured to authenticate transactions involving the token, and automatically execute the terms of the smart contract, without centralized control.

[0114] These and other features of the present invention will become apparent from the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0115] FIG. **1** is a block diagram of the distributed ledger (blockchain) Network used by a method according to the present invention;

[0116] FIG. **2** is a flowchart of a first embodiment of the method according to the present invention;

[0117] FIG. **3** shows a flow diagram of underlying asset verification and valuation;

[0118] FIG. **4** is a flowchart of a second embodiment of the method according to the present invention;

[0119] FIG. **5** is a flowchart of a proposed information flow according to the second embodiment of the invention; and

[0120] FIG. **6** is a state diagram of a sovereign-backed securitization model according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Example 1

[0121] FIG. **1** shows a block diagram of the network utilized in accordance with the method of the present invention. At the heart of the system is a distributed ledger (e.g., transaction chain or blockchain) network **10** preferably implemented on the Internet and providing a distributed ledger, which is immutable. The network may use public key/private key cryptography to insure identification integrity and other algorithms to insure trust before a block of at least one transaction is added to the distributed ledger. The network can be implemented on any platforms that permit the running of smart contracts, such as the Hyperledger blockchain, Symbiont.io or the Ethereum blockchain.

[0122] Connected to the network **10** is a commodity asset owner **20** who is interested in pledging illiquid assets, such as unrefined gold that is still in the ground, to 3 create a liquid asset. Also connected to the network **10** is a digitizer party **30** who agrees to take the pledge of the illiquid assets subject to terms enforced in smart contracts running on the network **10**, and digitize the asset into fractional representation that can be sold to account holders **40**. For example, if the commodity asset was unrefined gold for which the owner can demonstrate that there is a proven gold reserve, the digitizer will provide 1 fractional representation (e.g., an Orebit.au) token for a defined amount of Reserves of gold. The assets will be pledged for 10 years, after which the asset owner must replace the entire reserve that was fractionalized.

[0123] The token can be sold to account holders on the network and each transaction is recorded immutably in a block on the distributed ledger to establish unquestionable ownership rights. The smart contracts, which are computer programs designed to operate on the distributed ledger network and carry out the terms of the method, automate the process and eliminate the need for human intervention in many steps.

[0124] FIG. **2** is a flowchart of one embodiment of the method according to the invention. According to the method of FIG. **2**:

[0125] A reserve is created by the asset holder. A first Smart Contract creates the inventory of the total amount of reserves being placed in the pool by the asset holder for digitization.

[0126] The diamond indicates that an executive must sign off on the reserve once it is created before it can go to the 'Signed Off' state. If there is no sign off, the system waits for the proper approval.

[0127] If the reserve has been approved (signed off), it is now ready to be digitized by the digitizer party using a smart contract process.

[0128] In order for the digitization to occur, the digitizer runs a second smart contract which is called an 'ADSA' (Asset Digitization Service Agreement) which is shown in a flow diagram in the second column. This contract knows the haircut (discount) and also is where the digitizer party puts in the maturity date, the digitization date and when digitized, creates the tokens. This is also where the digitizer associates the ADSA to a reserve and the number of tokens created for a particular reserve can be seen.

[0129] The created ADSA now waits for executive sign off similar to the reserve to create an object.

[0130] Once the digitization date is reached the reserve is bound, the ADSA is marked digitized and the tokens are created. FIG. 2 illustrates that until the digitization date comes and digitization occurs, the asset holder can still back out. However, if the digitization occurs, there is no backing out.

[0131] The ADSA now distributes the tokens created to the asset holder, and also deducts relevant on-ledger fees which are paid to both the network operator and the digitizer party.

[0132] The 10-year period now begins and after the maturity date, everything underneath happens at termination, i.e., the debt is repaid, the tokens are destroyed (e.g., redeemed and/or retired), the ADSA is terminated and the Reserve is terminated as long as there are no associated ADSA's.

[0133] Specifically, on termination the ADSA will look at the asset holder's account and sweep the tokens (exactly the number that was digitized) back for inactivation so that the lien can be lifted off the reserve. The inactivation, redemption, or retirement of a token is a transaction on the distributed ledger that labels the tokens with an updated status, to alert future buyers of that status, which would normally render them valueless, and thus block future transactions. (Note that, according to existing non-asset backed cryptocurrencies, the lack of asset backing does not preclude use, so technically, the transition from asset-backed to non-asset backed does not require that no party attribute value to the redeemed tokens.)

[0134] If for some reason the number of tokens in the asset holder's account are less than the original amount created the process goes into a default scenario. In event of a default, the legal process of foreclosure on the secured assets proceeds, and this provides security for the token-holders. Since the amount of feasible asset recovery exceeds the redemption value of the tokens, it is most probable that all token holders will be made whole, and indeed, the default process may make outstanding tokens more valuable than those that are redeemed in the normal course.

[0135] As a result of the method of the present invention, fungible liquidity is obtainable from commodity assets in various states of extraction or non-extraction and refinement. The method can create liquidity from pre-refined, combined and disparate commodity assets for each of those disparate commodity assets.

Example 2

System Architecture

[0136] It is a challenge for typical investors to get exposure to unrefined assets while, at the same time, owners of such assets often struggle to access liquidity. Asset digitization can provide investors with exposure to illiquid assets in a form that can be easily registered, traded and transferred. It also provides owners of illiquid physical assets with an opportunity to access new sources of liquidity. A distributed ledger technology platform is ideal for asset digitization because it provides an immutable record of the origination and provenance of digitized assets as well as a tamper-proof repository for all documentation supporting a given origination.

[0137] Tokens created according to the present paradigm are fundamentally different from most blockchain or distributed ledger offerings. Two core differences are that they are a cryptoasset, and not a cryptocurrency loosely backed by a hard asset, and directly represent the hard asset which is available as security for the set of transactions. The tokens are not decoupled from central management or rules of law. The platform is de-centralized from a resiliency and technological perspective but it is centrally managed by a service company. Unlike cryptocurrencies, such as Bitcoin or Ethereum, which are not centrally governed, it does not make sense to decouple a hard asset, which is subject to rules and regulations nor would you want to. Therefore, the divergence on this issue is both fundamental and philosophical. Since the linkage to a hard asset affords contingent property rights, the ability to operate with and within law is important. The same rules and regulations that protect the hard asset, i.e., preventing someone from usurping ownership of mineral rights, will protect any investment in the tokens, or the underlying smart contract. The tokens are subject to rule of law, and can and will be transferred in accordance with court rulings.

[0138] The hard asset backing the tokens may be, for example, proven reserves of unrefined gold. Primarily this will be in the form of in situ gold deposits but could include gold assets in interim stages of the refining process including head ore, concentrate, miner bars, and dore. The tokens represent a single mineral or commodity, and tokens tied to different security types will generally not be fungible among asset types. However, it is possible to define diversified pools, which consistently represent a plurality of asset types in predetermined ratios. Each token is fungible so a token from one source is equivalent and interchangeable to a corresponding token from another source without the need to trace its provenance. However, the provenance of each and every token is traceable within the pool and documented. The history of every transaction is stored in an immutable and tamper-proof ledger along with all supporting documentation.

[0139] Previously there was no platform for lending against unrefined proven reserves of gold. With this model, a secure auditable platform enables these transactions.

[0140] To validate the mineral deposits of any reserve or claim, one can use the "Canadian Institute of Mining" (CIM), National Instrument 43-101 (NI 43-101) guidelines for reporting. The NI 43-101, although Canadian based, is commonly used throughout North America, and even internationally. Although it is common to North America, the CIM/NI 43-101 reporting guidelines adhere to the "Committee for Mineral Reserves International Reporting Standards" (CRIRSCO). In the future, other CRIRSCO member guidelines may be used, including but not limited to the Australian "Joint Ore Reserves Committee" (JORC) reports. Each NI 43-101 report is conducted by an independent "qualified person(s)". At a minimum, the qualified person must be an experienced and accredited engineer or geoscientist with experience relevant to the subject matter of the mineral project (NI 43-101, 2011, p. 4). This report may be commissioned by the claim or reserve holder, but it is not carried out by the holder.

[0141] In order to understand the NI 43-101 report, the following definitions are required:

[0142] A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.

[0143] The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

[0144] Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.

[0145] The full report goes into greater detail on each Mineral Resource classification, however we are mainly concerned with minerals with the highest degree of confidence and those which can be converted into proven reserves. The following is a definition of a measured mineral resource:

[0146] A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve. (CIM Definitions, 2014)

[0147] Measured Mineral Resources offer the highest level of confidence such that there is sufficient sampling and testing to confirm grade or quality between points of observation. However, to be accepted by the present system, the analysis must also ensure the economic feasibility of the deposit. The presence of gold is insufficient if it is in such low concentration that extraction is not economical, or if there are legal or environmental restrictions. The NI 43-101 also takes this into account as well as defined by "Mineral Reserves":

[0148] A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified. The reference point at which Mineral Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. The public disclosure of a Mineral Reserve must be demonstrated by a Pre-Feasibility Study or Feasibility Study. (CIM Definitions, 2014)

[0149] It is important to understand that the Modifying Factors are not limited in scope to just the economics of the extraction process:

[0150] Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors. (CIM Definitions, 2014)

[0151] Once Modifying Factors are applied to the technical reports on the Mineral Resource Estimates a new category of Mineral Reserves are generated including Proven Mineral Reserves:

[0152] A Proven Mineral Reserve is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors. Application of the Proven Mineral Reserve category implies that the Qualified Person has the highest degree of confidence in the estimate with the consequent expectation in the minds of the readers of the report. The term should be restricted to that part of the deposit where production planning is taking place and for which any variation in the estimate would not significantly affect the potential economic viability of the deposit. Proven Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study. Within the CIM Definition standards the term Proved Mineral Reserve is an equivalent term to a Proven Mineral Reserve. (CIM Definitions, 2014)

[0153] FIG. **3** illustrates the relationship between the confidence of testing and samples versus Modifying factors.

[0154] Once a claim with an NI 43-101 has been reviewed and the Proven Reserves of gold have been validated, the value of the collateral, for all intents and purposes, is pegged at 1:5. For every 5 troy ounces of Proven Reserves of gold, exactly one token is issued. Ultimately, there is no definitive way to determine the value of the entire pledged claim, however, even by CRIRSCO reporting guidelines there is at least 5 times as much feasibly extractable gold. There are also Indicated Resources, there are also Inferred Resources and it is likely there are accompanying metals such as copper, molybdenum, silver and others that may or may not also have extractable value.

[0155] It is important to note that the pool is not purchasing the claims or the owner of the derived assets, it is only a pool for managing the title. The title to a claim is fully pledged to pool for the life of the loan and is to be returned to the claim holder once the loan has been repaid at Maturity. The asset represented in the form of a token are held by the account holder on initial digitization. The account holder may then use the platform to exchange tokens to another account holder. That account holder may then transfer tokens to another account holder, who may or may not be the original claim holder. The nature of the agreement, and the exchange of any non-token assets including but not limited to currency, stock or hard assets is between the two parties.

[0156] The services provided to run the pool include: the review and processing of Asset Digitization Service Agreement applications for perspective claim holders; the digitization of claims into smart certificates known as the token; the smart contracts to manage the lifecycle of the Asset Digitization Service Agreement; providing a secure platform to facilitate the trading of token; to provide an immutable and auditable history of transactions and documents including but not limited to claim titles. The services does not typically hold the derived value of assets; set the value of token; negotiate the terms of any loans or transactions; facilitate the transaction of assets other than token; or arbitrate agreements.

[0157] The business logic for the pool is codified within immutable Smart Contracts. The Smart Contracts ensure the agreed upon rules are correctly adhered to for the lifecycle of the ADSA. There are (2) primary Smart Contract types: ADSA: which represent the Asset Digitization Service Agreement; and Reserve: which represent the titled asset, typically a claim. The Smart Contracts allow for optional extensions. One such example is that presently only gold can be digitized. However, a claim is a defined section of land with Mineral Resources and is not limited to a particular mineral type. Therefore, other asset types may also be digitized, and those assets will be bound to the same Reserve object. If the digitization start and end periods of different asset types within a Reserve are not aligned, freeing up the title of a claim prematurely would cause ownership issues. Therefore, the Reserve is a separate object and is bound until the last ADSA is terminated.

[0158] The Reserve object or Smart Contract represents the titled claim and has the following attributes:

[0159] "approved_timestamp"; "approver_id"; "country"; "created_timestamp"; "creator_id"; "documents"; "geolocation"; "internal_reserve_id"; "last_modified_timestamp"; "last_modifier_id"; "owner_id"; "proven_reserves"; "ready"; "reserve_description"; "reserve_id"; "reserve_type"; "signed_date"; "state"; "status"; "terminated_timestamp"; "terminator_id".

[0160] The ADSA object or Smart Contract represents the fungible asset and has the following attributes: "approved_timestamp"; "approver_id"; "country"; "created_timestamp"; "creator_id"; "documents"; "internal_reserve_id"; "last_modified_timestamp"; "last_modifier_id"; "owner_id"; "proven_reserves"; "asset_type"; "tokens"; "quantity"; "ready"; "reserve_description"; "reserve_id"; "reserve_type"; "signed_date"; "state"; "status"; "terminated_timestamp"; "terminator_id".

[0161] The Substitution objects or Smart Contracts represent the Reserve and ADSA equivalent except for Refined Gold. The only difference is the reserve_type for Reserve is substitution and the resulting ADSA quantity is digitized at a 1:1 ratio instead of the standard 1:5.

[0162] The flow chart in FIG. **4** traces a simplified Reserve/ADSA lifecycle through the various states. The reserve status may be: Pending, Signed Off, Bound, Terminated ADSA status: Pending, Signed Off, Digitized, Terminated. According to FIG. **4**:

[0163] 1. Asset/Collateral Holder initiates a claim for review; Reserve (Pending).

[0164] 2. The Reserve title is clear; Reserve (Signed Off).

[0165] 3. The ADSA is submitted for review; ADSA (Pending).

[0166] 4. The ADSA passes review; ADSA (Signed Off).

[0167] 5. The Digitization date is set for the future; Reserve (Signed Off)/ADSA (Signed Off).

[0168] 6. The Digitization date arrives and token are digitized; Reserve (Bound)/ADSA (Digitized).

[0169] a. The claim title is fully pledged to the pool.

[0170] b. The token are deposited into the Asset/Collateral Holder's account.

[0171] c. The Asset/Collateral Holder may transfer token to other accounts.

[0172] 7. The Maturity date arrives and the original amount of digitized token are removed from the account; ADSA (Terminated)/Reserve (Terminated)

[0173] a. The claim title is returned.

[0174] b. The token are retired from the system.

[0175] It is possible to renew an ADSA past the original Maturity date, as defined by the Smart Contract. In order to terminate an ADSA, the Asset/Collateral Holder must acquire the original amount of tokens from the market to be retired. All of the tokens are accounted for on the system, but it is possible there may not be any for sale. To account for this anomaly an option exists for, and only for, ADSA owners who are approaching the maturity date, to pledge Refined Gold from a vault for the outstanding amount in a new Reserve. The original Reserve is terminated and the title to the claim is returned, however, there is a new obligation to recover sufficient tokens to release the pledged Refined Gold.

[0176] In the event there are insufficient tokens to cleanly terminate an ADSA on the Maturity date, the ADSA will default. Because the circumstances of each default are different and involve externalities, the Smart Contract principally flags the issue for remediation. However, to maintain the integrity of the platform, the only way to terminate an ADSA is to fully return the Digitized token.

[0177] There is no concept of a complete cycle. The smart contracts allow for any number of valid combinations. An Asset/Collateral Holder could Digitize an ADSA, renew, renew again, Digitize another ADSA, use the balance with the new claim to Terminate the original ADSA, default on the new ADSA, renew with penalties, pledge a substitution, Terminate the new ADSA, then repay the substitution at a later date, for example.

[0178] In its simplest form of the system uses distributed ledger technology (e.g., provided by Symbiont) to create a new digital asset class. While the term "blockchain" is the more widely recognized it is more technically correct to describe the platform of choice as a distributed ledger platform because transactions are appended one at a time rather than in "blocks". Indeed, in some cases, the technology may be implemented in blocks. Despite this minor distinction, the ledger retains the properties of traditional blockchains including replication, resiliency, immutability and enforced consistency. However, when implemented as a private ledger, many of challenges of the around privacy and performance of public distributed ledgers are inherently addressed.

[0179] The distributed ledger network may include trusted member nodes so the ledger is never publicly exposed. Alternate technologies employ cryptography that permit untrusted member nodes, which process the transactions in a verifiable and authenticated manner without access to the underlying data. Each member's data is encrypted and decrypted only by authorized members on the network. As a member, the pool leverages Smart Contracts which strictly enforce predetermined business rules. All activity is recorded on a tamper proof, append-only ledger along with times stamps and digital signatures. The pool preferably operates on a permissioned network negating the need for mining to enforce consensus. The distributed ledger preferably uses an implementation of a Byzantine Fault Tolerant algorithm (BFT-SMaRt, n.d.) that enforces consensus across the network. This approach provides resilience and performance orders of magnitude greater than mining, e.g., Bitcoin. All ledger data is encrypted and accessible only by authorized parties. When the pool queries the Smart Contracts, the encrypted data is read from the ledger, which only the pool member is able to decrypt. (In an alternate implementation, public verification is supported).

[0180] The news is full of stories where wallets have been compromised, cryptocurrency is stolen and there are few mechanisms to undo the damage. Private or permissioned based platforms mean everyone on the network or who has an account is a known entity who has passed a "Know Your Customer" (KYC) and AML. Compromising the system to benefit a particular account holder on a tamper-proof immutable ledger would be highly risky. In addition, since a service provider can administer the system, any transactions can be undone with complimentary transactions. This cannot be done in decentralized blockchains.

[0181] In addition to the data itself, the Smart Contract enforces business logic, which is also stored on the immutable ledger. Should a security hole, error or bug be identified in a Smart Contract, the distributed ledger platform may provide a straightforward mechanism for correcting it. Since all smart contract code is recorded as data on the immutable ledger, all parties have a record of both the error and the fix, and may employ legal recourse as necessary.

[0182] Along with financial data there it is possible to store various legal documentation data on the ledger as well. Examples include PDF documents, signed and scanned legal documents and stamped geological reports among others. Data, documents and business logic are all encapsulated on an immutable ledger for a completely secure and auditable solution.

[0183] The system is resilient and tolerant of failures. It can scale. Most importantly, it is a cryptographically-enforced, append only, immutable chain of all the history since inception. It is an ideal system for accountability and auditability. A permissioned distributed ledger adds no more attack vectors than the traditional stack while enabling full auditability in the event if they did happen. The present system may provide customized and modular APIs to securely interface with the platform. A proposed information flow diagram is provided in FIG. **5**.

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Example 3

Sovereign Financing

[0188] Financing a sovereign's deficit has become prominence for economic growth and stability, with the financial challenge, a sovereign is always in-need for a cash infusion. Recently, sovereignty auspices are not enough to get finance at a prime rate. When a government is looking to add liquidity to the economy on a non-inflationary basis, it needs to look to foreign investment and trade to accomplish this. Many governments have proven mineral reserves but to due to many reasons, these assets are not being utilized in any fashion. There is no mechanism to get the proven value of mineral reserves onto the central bank ledger to issue currency against these mineral reserves (e.g., gold) on a non-inflationary basis. The present technology permits a sovereign to finance and issue a debt obligation against a new asset class, such as a proven mineral reserve, which can be allocated in a way to provide leverage and a line of credit, without requiring extraction of the mineral, thus permitting preservation of the resource, with extraction only required in event of default.

Utilizing the Sovereign Government Proven Gold Mineral Reserve

[0189] The sovereign government, in this case, assigns the proven reserves to an international mining corporation as part of a public-private partnership. This is a common practice where mining rights and the reserve ownership is given out under different systems depending on the company and record keeping of the reserves through the government department assigned these duties but generically they are referred to as mining claims.

[0190] To mitigate the political risk and logistical risk of adding any new territory, the new government also provides a government guarantee as for the value of the proven reserves and to further guarantee they will allow the mine to operate and export the product without hindrance. The goal is to bring the risk in-line with the existing ledger assets so all respective securities stay fungible. The international mining corporation then takes this claim ownership and the sovereign guarantee information to a monetization entity, which "digitizes" the in-ground value through a smart contract. The international mining corporation then has the fungible digital assets they can be put into a trust and securitized within international financial markets with an audited value.

[0191] The international mining corporation can now pledge the digital assets in trust to a commercial bank (e.g., in the originating country). Utilizing normal bank protocols, the new asset can be pledged to the commercial bank, and the commercial bank can apply to the central bank for approval of the new crypto asset as well a pricing. The central bank can now create funds on a non-inflationary basis in the local economy including the finance activity to get the new mine into production. This scheme is represented in FIG. **6**.

[0192] Although the disclosure is described above in terms of various example embodiments and implementations, it should be understood that the various features, aspects and functionality described in one or more of the individual embodiments are not limited in their applicability to the particular embodiment with which they are described, but instead can be applied, alone or in various combinations, to one or more of the other embodiments of the disclosure, whether or not such embodiments are described and whether or not such features are presented as being a part of a described embodiment. Thus, the breadth and scope of the present disclosure should not be limited by any of the above-described example embodiments, and it will be understood by those skilled in the art that various changes and modifications to the previous descriptions may be made within the scope of the claims.

What is claimed is:

1. A token, representing an interest in a smart contract, the smart contract representing an agreement, secured by an undivided incomplete share of a security interest in real property or a right in real property, the smart contract requiring a return of the token within a predetermined time period, the predetermined time period being tollable selectively dependent on tendering of a substitute asset, and if the token is not returned within the tollable predetermined time period, permitting exercise of the security interest.

2. The token according to claim **1**, wherein the smart contract is implemented in conjunction with a distribute ledger.

3. (canceled)

4. The token according to claim **1**, wherein the real property or a right in real property comprises a mine having proven available reserves of the substitute asset.

5. The token according to claim **4**, wherein the substitute asset is gold.

6. The token according to claim **4**, wherein the proven available reserves are a predetermined multiple of the substitute asset.

7. (canceled)

8. The token according to claim **1**, wherein the token is generated as a transaction of a cryptographically-authenticated, distributed ledger comprising a database held and updated independently by each of a plurality of distributed elements, forming a consensus determination of transaction validity.

9. The token according to claim **1**, wherein the agreement, secured by the security interest in real property or a right in real property, is terminated if the token is returned within the predetermined period, else the security interest in the real property or a right in real property is exercised.

10. A method of defining a token, comprising:

defining a plurality of smart contracts, representing an agreement, secured by a portion of a security interest in real property or a right in real property, to return the token within a predetermined period tollable dependent on availability of a substitute asset, and if the token is not returned within the predetermined time period, permitting exercise of the security interest;

pledging the real property or a right in real property as the security interest to secure a plurality of the smart contracts; and

issuing the token.

11. The method according to claim **10**, further comprising returning the token within the tollable predetermined period of time, and releasing the real property or a right in real property from the security interest.

12. The method according to claim **10**, wherein the smart contract is implemented in conjunction with a distribute ledger.

13. (canceled)

14. The method according to claim **13**, wherein the real property or a right in real property comprises a mine having proven available reserves of the substitute asset.

15. The method according to claim **14**, wherein the substitute asset is valued according to a commodity exchange.

16. The method according to claim **14**, wherein the proven available reserves are a predetermined multiple of the substitute asset.

17. (canceled)

18. The method according to claim **10**, wherein the token is generated as a transaction of a cryptographically-authenticated, distributed ledger comprising a database held and updated independently by each of a plurality of distributed elements, forming a consensus determination of transaction validity.

19. The method according to claim **10**, further comprising exercising the security interest in the real property or a right in real property after expiration of the tollable predetermined period if the token is not returned and the substitute asset not tendered.

20. A method for creating a liquid token representation from an illiquid asset comprising:

receiving a pledge of an illiquid asset; and

digitizing the illiquid asset into fractional representations using a smart contract on a distributed ledger network implemented to require return of the token within a predetermined period tollable dependent on tender of a substitute asset within the predetermined period, the fractional representations being secured by undivided shares in the pledge of the illiquid asset as collateral.

21. The method according to claim **20**, further comprising trading a fractional representation on an exchange, recorded in a distributed ledger network.

22. The method according to claim **20**, wherein the smart contract comprises an illiquid asset description, an illiquid asset owner, a quantity, and at least one redemption rule.

23. The method according to claim **22**, wherein the at least one redemption rule comprises a maturity date which triggers a release of the pledged illiquid asset as collateral back to the illiquid asset owner in exchange for return of all of the original fractional representations.

24. The method according to claim **20**, wherein the illiquid asset comprises an unrefined precious metal.

25-32. (canceled)

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