Tokenizing Real World Assets

• A Massive Opportunity
• Why we are missing it
• And, how to grab it
Definitions

Tokens

Tokens are Digital Bearer Assets on a blockchain or a DLT.

Virtual Tokens

Tokens that do not have any real world representations. Often created by blockchain protocols.

Asset-backed Tokens

Tokens that are ownership titles to real-world assets.

Tokenization

Process of maintaining custody of a real world asset and representing it as a digital bearer asset.
Virtual Tokens are Easy

Creating virtual tokens that are not pegged to any real world assets is well understood.

Two Requirements

• Secure Double-Spend prevention.
• No centralized control over transaction processing.

Nakamoto consensus algorithm successfully addressed the above two requirements.
Large Interest in Tokenizing Real World Assets

**Real World Assets**

- Equities
- Bonds
- Real Estate
- Commodities
- Retail Currencies (paper money)
- Wholesale Currencies (inter-bank money)

**Perceived Benefits of Tokenization**

- Efficiency gains via automation – make reconciliation obsolete
- Efficiency gains via disintermediation
- Instant global settlements
- Reduced liquidity requirements
What’s in it for Token Issuers?

Excellent Monetization Opportunity

• Custodians of Real World assets can tokenize them and make them transactable.

• Token issuers can earn revenue via charging fees for creation and destruction of tokens. They can also introduce transaction fees.

• Examples: Pax Gold [1], Cache Gold [2]
Attempts at Tokenization: Equities

Exchanges Experimenting with Tokenization of Equities

- Warsaw Stock Exchange
- Australian Stock Exchange
- Deutsche Boerse
- Indian National Stock Exchange
- Japan Exchange Group
- Korea Exchange
- London Stock Exchange
- Luxembourg Stock Exchange
- Moscow Exchange
- Nasdaq
- Santiago de Chile Exchange
- Nasdaq
- SIX
- TMX Group

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Imagine instantly transferring Equity Tokens from one exchange to another.
Attempts at Tokenization: Bonds

Bonds Issued on Ethereum

• In 2017, Nivaura issued an Ether-denominated Bond using the UK FCA regulatory sandbox [1].
• In 2019, Societe Generale issued a bond on Ethereum [2].

Bonds Issued on DLT

• In 2018, the World Bank created the first legally binding bond on DLT [3].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Imagine instantly transferring Bond Tokens from one bank to another.
Attempts at Tokenization: Real Estate

Real Estate Tokens issued on Ethereum

- In 2018, Propellr and Fluidity launched the tokenization of USD30m Manhattan property on Ethereum [1].

- In 2019, Equisafe investment platform tokenized a luxury property on Ethereum [2].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements.
Attempts at Tokenization: Commodities

Several Gold-backed crypto-currencies exist

- Paxos Gold (PAXG)
- Perth Mint Gold Token (PMGT)
- Digix Global (DGX)
- Tether Gold (XAUT)
- Meld Gold by Algorand

Oil backed crypto-currency

- In 2017, Venezuela announced Petro, a crypto-currency backed by its oil reserves [1].

Perceived benefits include instant settlements for payments and trading activities.
Attempts at Tokenization: Retail Currencies

Fiat-backed stablecoins

• Total market-cap of stablecoins is approximately $35B \[1\].

• Some regulators demand that stablecoins may only be issued by licensed entities and only be traded within regulated exchanges, e.g., Singapore based xSGD \[2\].

Retail CBDC

• China is testing its retail CBDC in Suzhou. Phone-to-phone offline, in-person payments \[3\]. No blockchains involved.

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Reduced liquidity requirements.
Attempts at Tokenization: Inter-bank Money

Inter-bank Stablecoins

- JP Morgan Coin for inter-bank settlements [1].

Wholesale CBDC

- Various Central Bank initiated projects around the world. Project Ubin [2], Project Jasper [3], eKrona [4], etc.

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Reduced liquidity requirements.
Observations

**Strong Interest in Tokenization**

Across all asset-classes.

**Retail Use-cases are Flourishing**

Regulatory over-sight on person-to-person transactions is minimal in several jurisdictions.

**Institutional Use-cases are Stymied (not for lack of trying)**

There are strong confidentiality and compliance requirements for institutional use-cases.
Observations

Tokens

- Virtual > $1T
- Asset Backed
  - Retail ~$40B
  - Institutional
    - Huge Potential
    - Low Adoption
      - Our target
The Institutional Opportunity

- Bonds ($128T) [1]
- Real Estate ($10T) [2]
- Equities ($95T) [3]
- Commodities ($20T) [4]

Currencies (~$100T)

In comparison, present day tokenized world, which primarily comprises of virtual tokens, is valued at $1T.
Institutional Asset-backed Tokens are Hard

Not two, but four requirements

**Two Requirements**

- Secure Double-Spend prevention
- No centralized control over transaction processing

**Two New Requirements**

- Confidentiality – Parties not involved in a transaction should not be aware of it.
- Compliance – Adherence to data residency, data hygiene and financial reporting guidelines.

New requirements necessitate a new design. Blockchain inspired approaches will fail.
Current Attempts are Blockchain Inspired

Let's look at four examples.

**Ethereum**
Public Blockchain with Smart Contract functionality.

**ConsenSys Quorum**
Permissioned version of Ethereum.

**IBM Hyperledger Fabric**
IBM's permissioned Blockchain.

**R3 Corda**
Distributed Ledger Technology (DLT).

None of these designs jointly satisfy the four requirements.
Ethereum
Public Blockchain with Smart Contract functionality.

- Bonds and Real estate tokens have been issued on Ethereum. These seem to be experimental exercises.
- Adoption is lacking.
- **Problem:** Ethereum is too public. Institutions do not want to compromise confidentiality of their transactions.
ConsenSys Quorum

Permissioned version of Ethereum. Also has a confidential transactions mode.

- Payload of confidential transactions is sent to parties involved in transaction. Payload hash is sent to all members to aid ordering via consensus.

- **Problem:** Payload hash does not contain enough information to ensure double-spend prevention when only two parties are involved in a tx. Confidential digital asset transfers are impossible.

JP Morgan, the creator of Quorum, recently sold it to ConsenSys [1]. We believe Quorum is not being used in JPM Coin.
IBM Hyperledger Fabric

Philosophy: Blockchains are replicated databases.

- **Problem:** If ordering service is operated by a centralized entity, decentralization requirement is not satisfied.

- **Problem:** If ordering service is operated by a decentralized set of peers then confidentiality and compliance requirements are not satisfied.

Cross-org replication of data, even encrypted data accrues tremendous liabilities on enterprises.
- The notary service is essentially a transaction ordering service.

- **Problem:** The notary service is centralized. Decentralization requirement is not satisfied.
Half Epsilon’s Approach

1. Ignore the Blockchain / DLT hype

2. Re-solve the double-spend prevention problem to satisfy the four requirements

This is very hard. But, we did it!
Product: One Time Spend Machine

OTSM – A Special Purpose FIPS 140-2 Level 3 HSM

OTSM prevents a digital asset from being spent multiple times.

OTSM enables direct institution-to-institution transfers of Tokens. No blockchain / DLT. Satisfies the four requirements.

<table>
<thead>
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<th>OTSM</th>
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<tbody>
<tr>
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Bottom Line

Every solution to the double-spend prevention problem brings in massive change.

Think Digital Banking
Enabled by resilient databases.

Think Crypto-economics
Enabled by Nakamoto consensus.

Think One-tap Payments
Enabled by secure ICs in stored value cards and mobile phones.

Now, Think Institution-grade Tokenization of Real-world assets
Enabled by Half Epsilon OTSM.
Thank You!

If you liked this deck, share it!

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