UNIT 7.3

BLOCKCHAIN APPLICATIONS

CRYPTO TOKENS

Lecturer: Ph.D Lê Quang Huy

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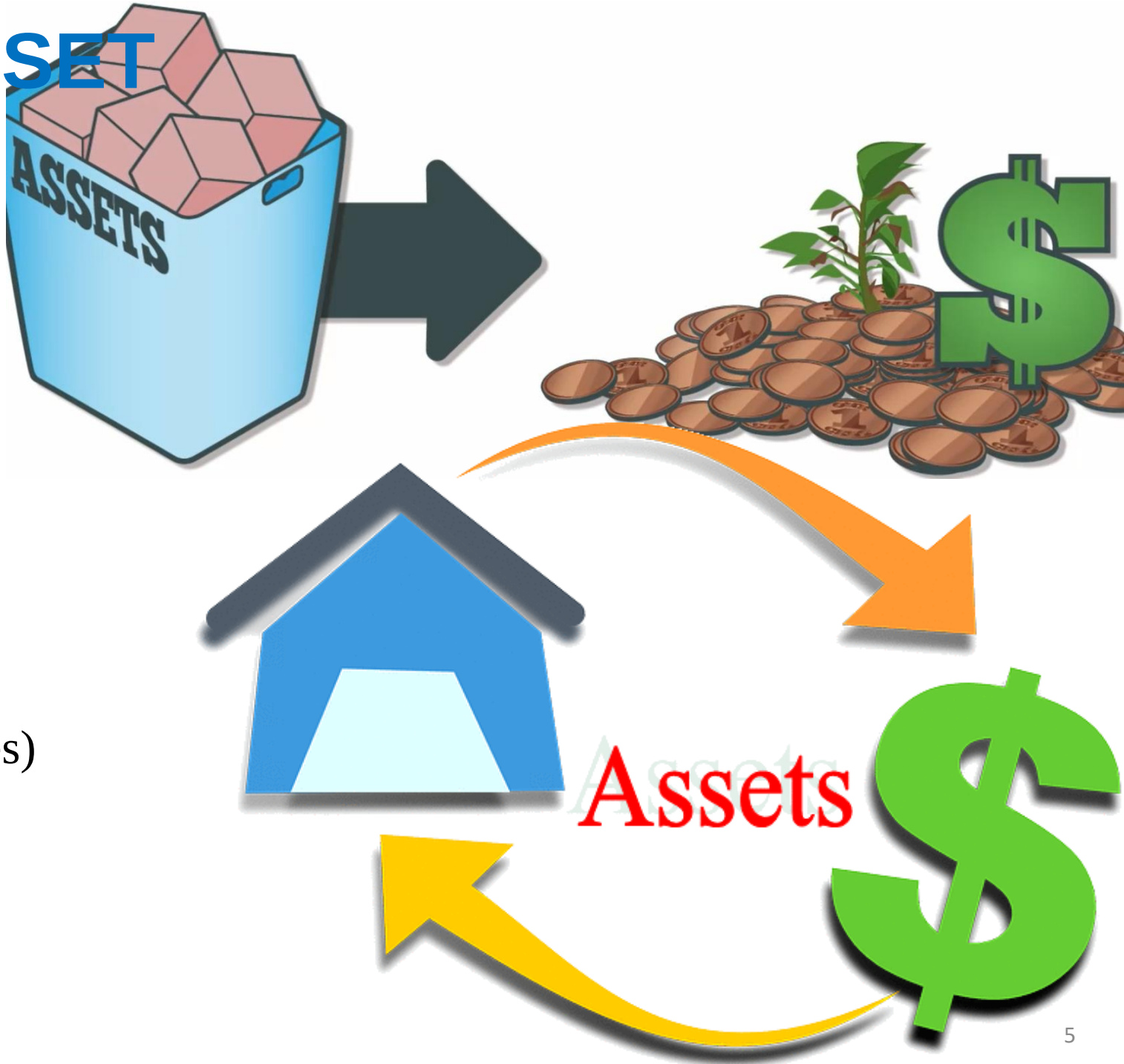
2.1. WHAT IS ASSET

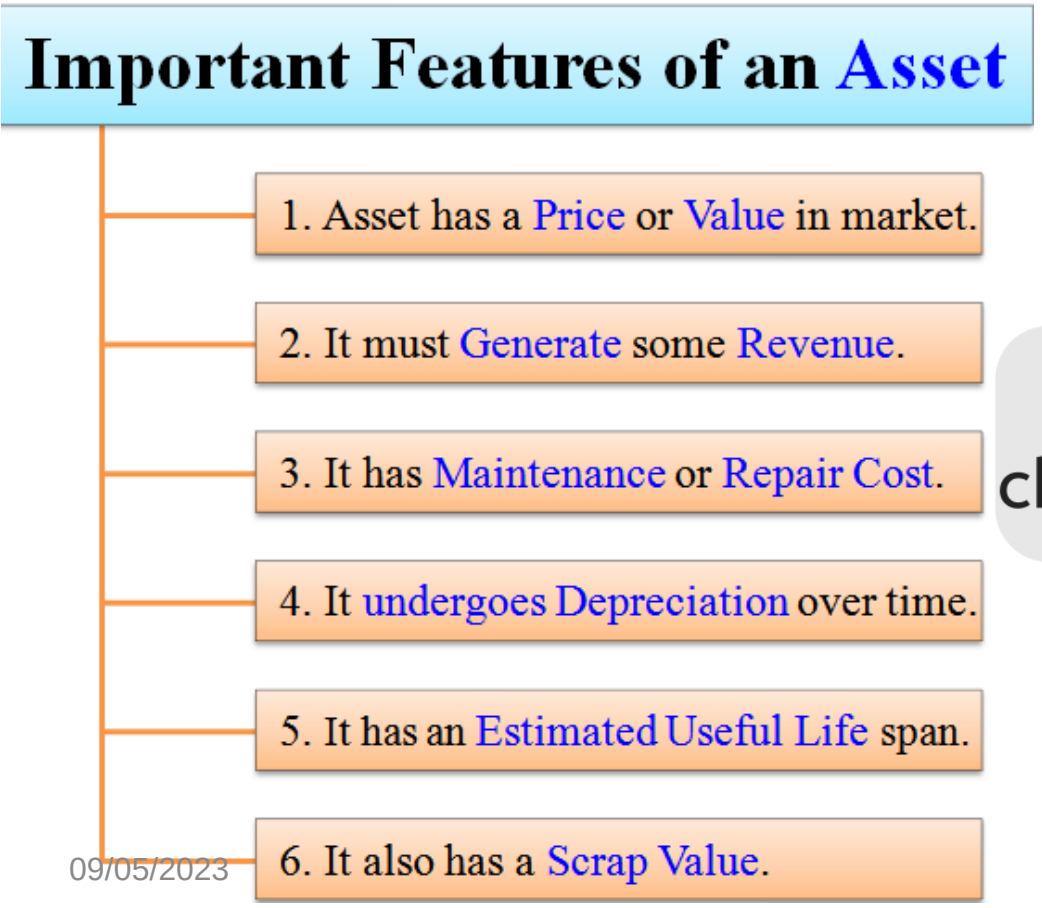
Asset is a things:

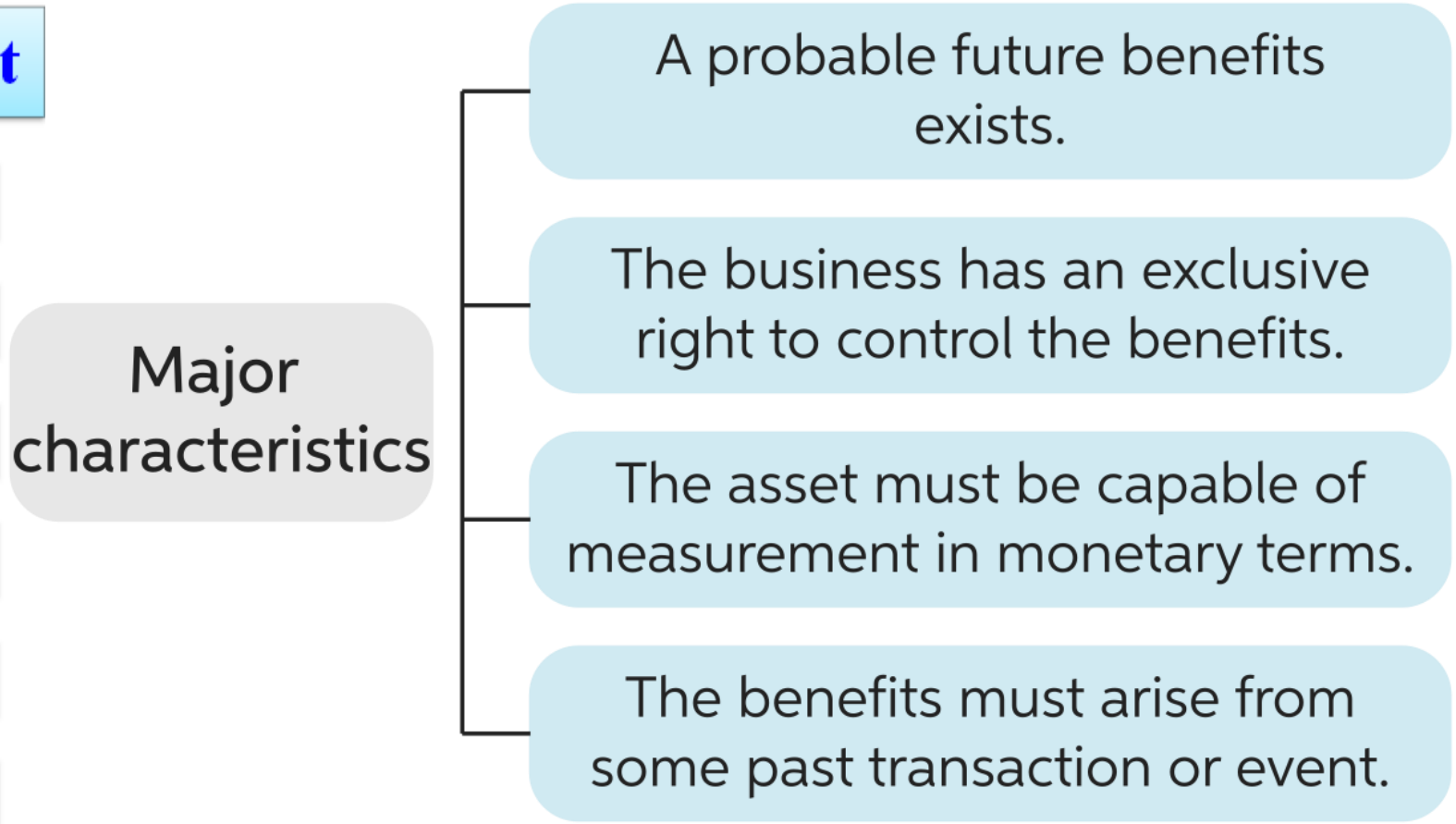
- Have value
- Can be transformed (convert) into monetary (cash) value.
- Form:
  - Tangible (physical resources)
  - Intangible (nonphysical resources)



2.2. CHARACTERISTICS OF ASSETS

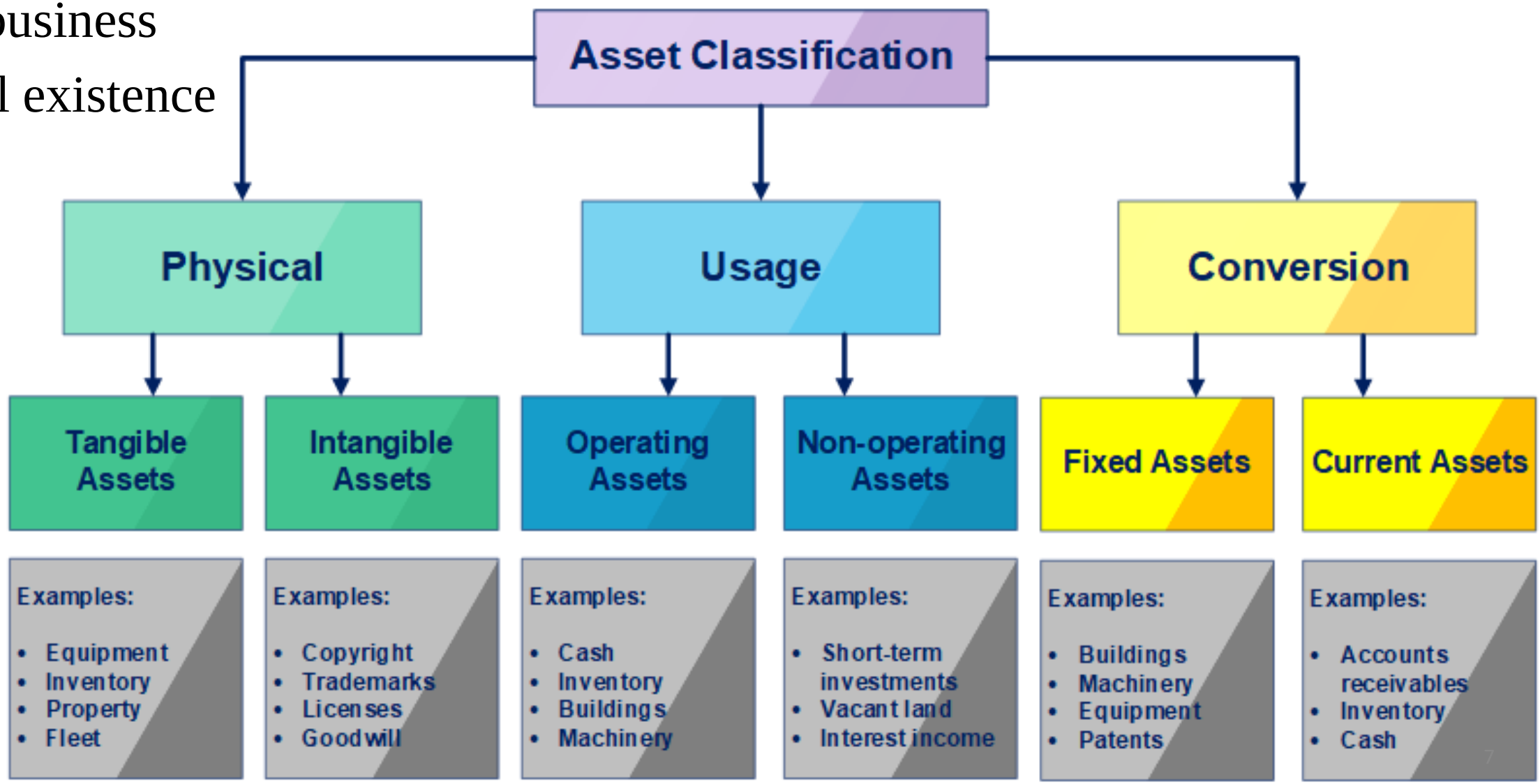
- Ownership: ownership or control of the asset.
- Economic value: provide economic value.
- Resource: can generate future economic value.





2.3. CLASSIFICATION OF ASSET

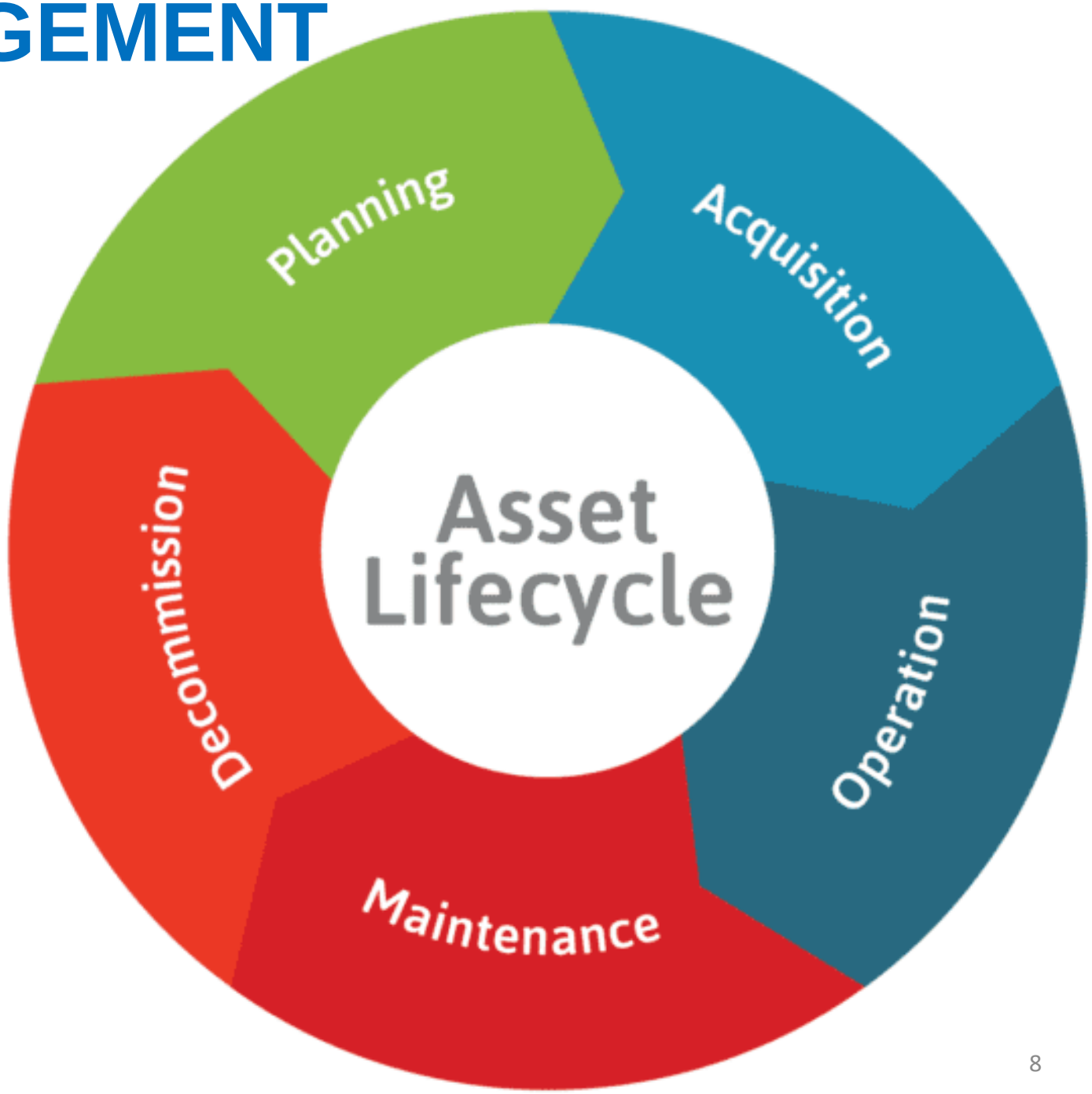
- Convertibility to cash
- Use in business
- Physical existence



2.4. ASSET MANAGEMENT

Asset management:

- Process of maximizing asset value
- Entire lifecycle
- Most cost-effective manner



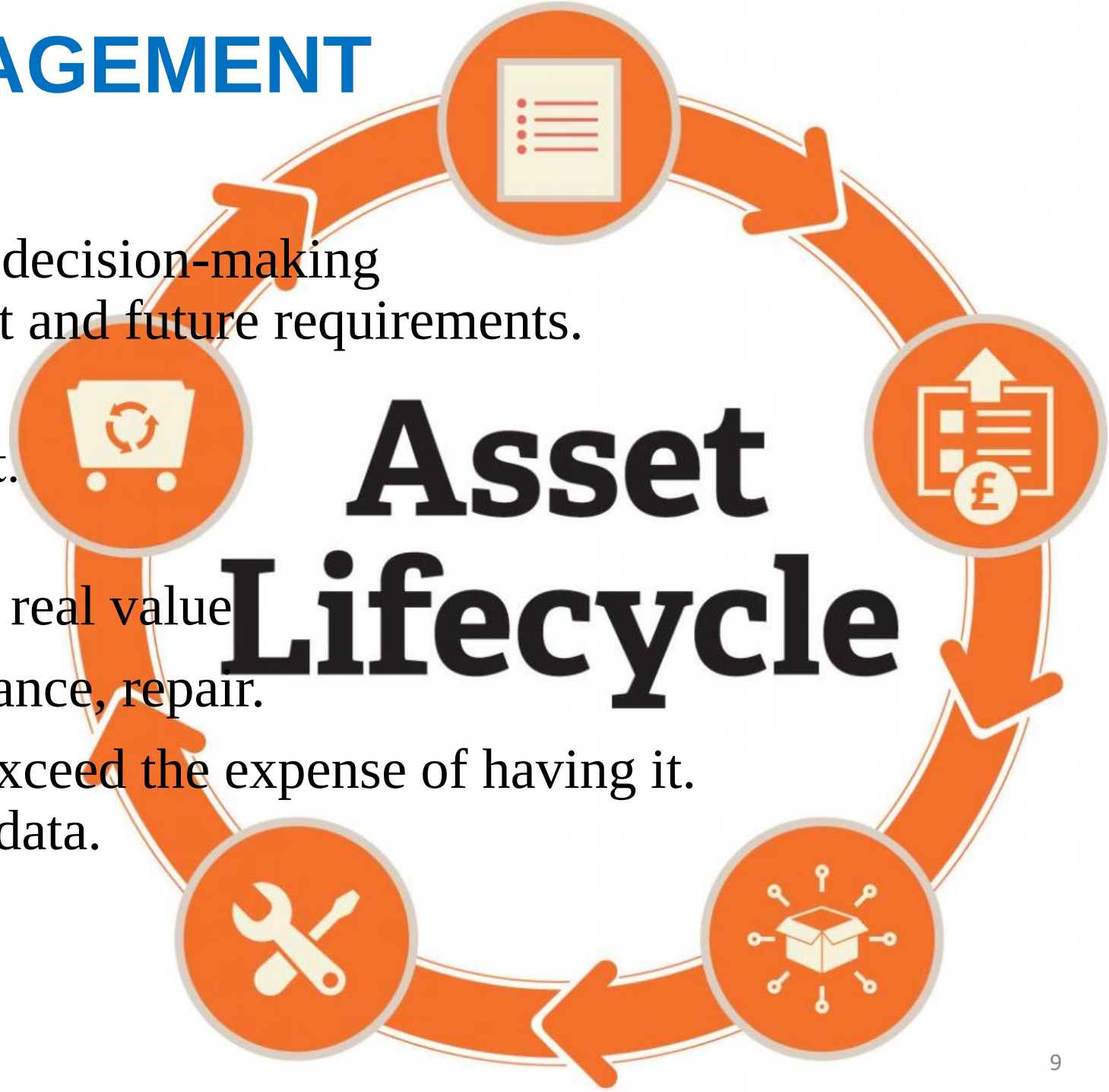
Necessary:

- Maximum value from assets (ROI)
- Minimise ‘life cost’ of assets.

2.4. ASSET MANAGEMENT

Management:

- Planning: gather information for decision-making assesses and evaluates for current and future requirements.
- Procurement/acquisition: lowest-priced, 'premium' product. begins to be used.
- Operation: being used delivering real value
- Maintenance: monitore, maintenance, repair.
- Disposal: costs of maintenance exceed the expense of having it. dismantling, wiping of sensitive data.



3. TOKENS

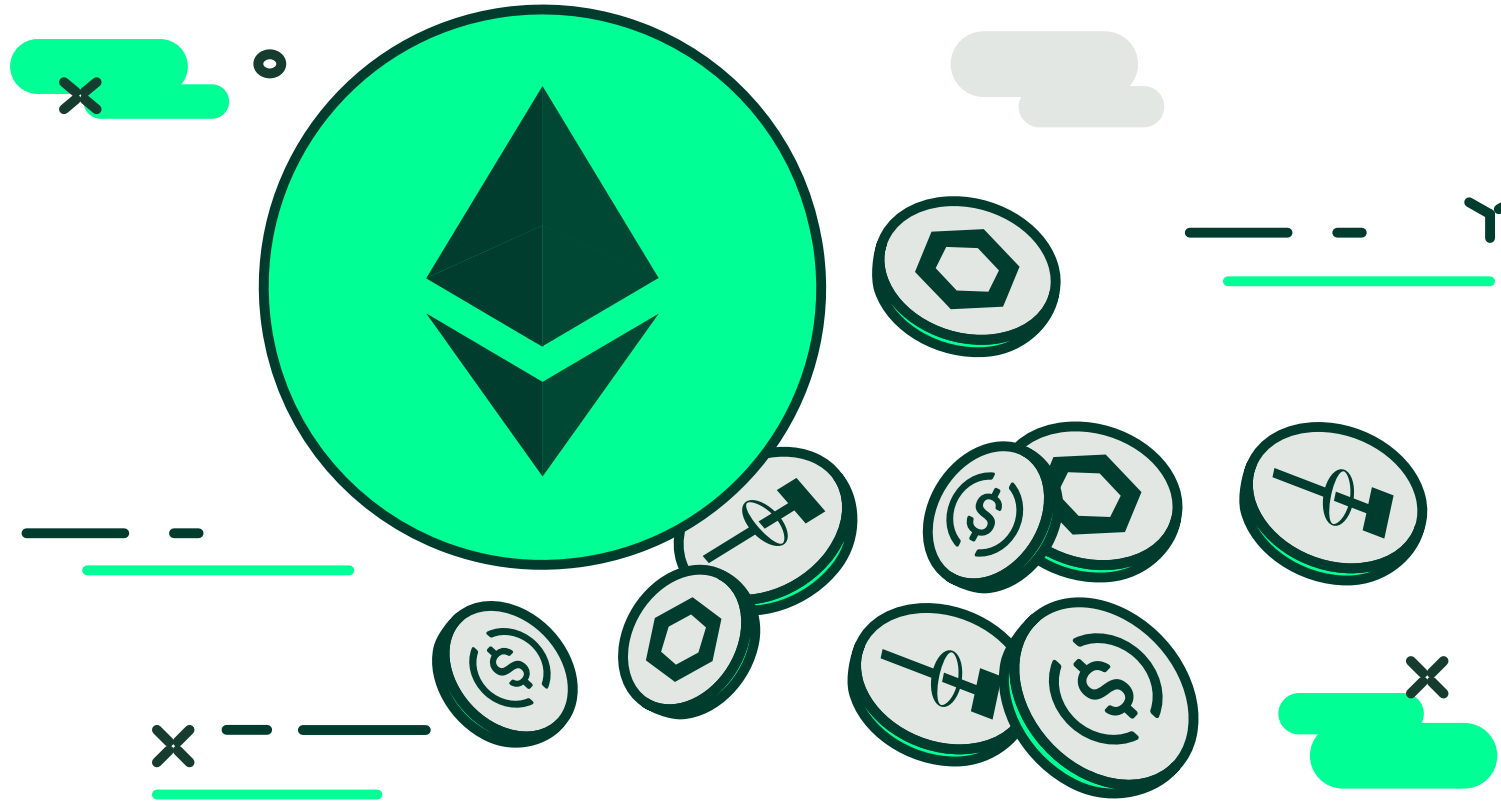
3.1. TOKEN DEFINITION

3.2. TOKEN TAXONOMY

3.3. TOKEN ACTIVITIES

3.4. TOKENIZATION

3.5. DIGITAL ASSET



3.1. TOKEN DEFINITION

Arts, entertainment, and media: game, music group, animated television series…

Computing:

- Token: object (software or hardware) represents the right to perform operations:
- Session token, Security token or hardware token, Bearer token, Access token, Tokenization (data security), Invitation token, Token Ring, …
- Lexical token, a word or other atomic parse element.

Economics

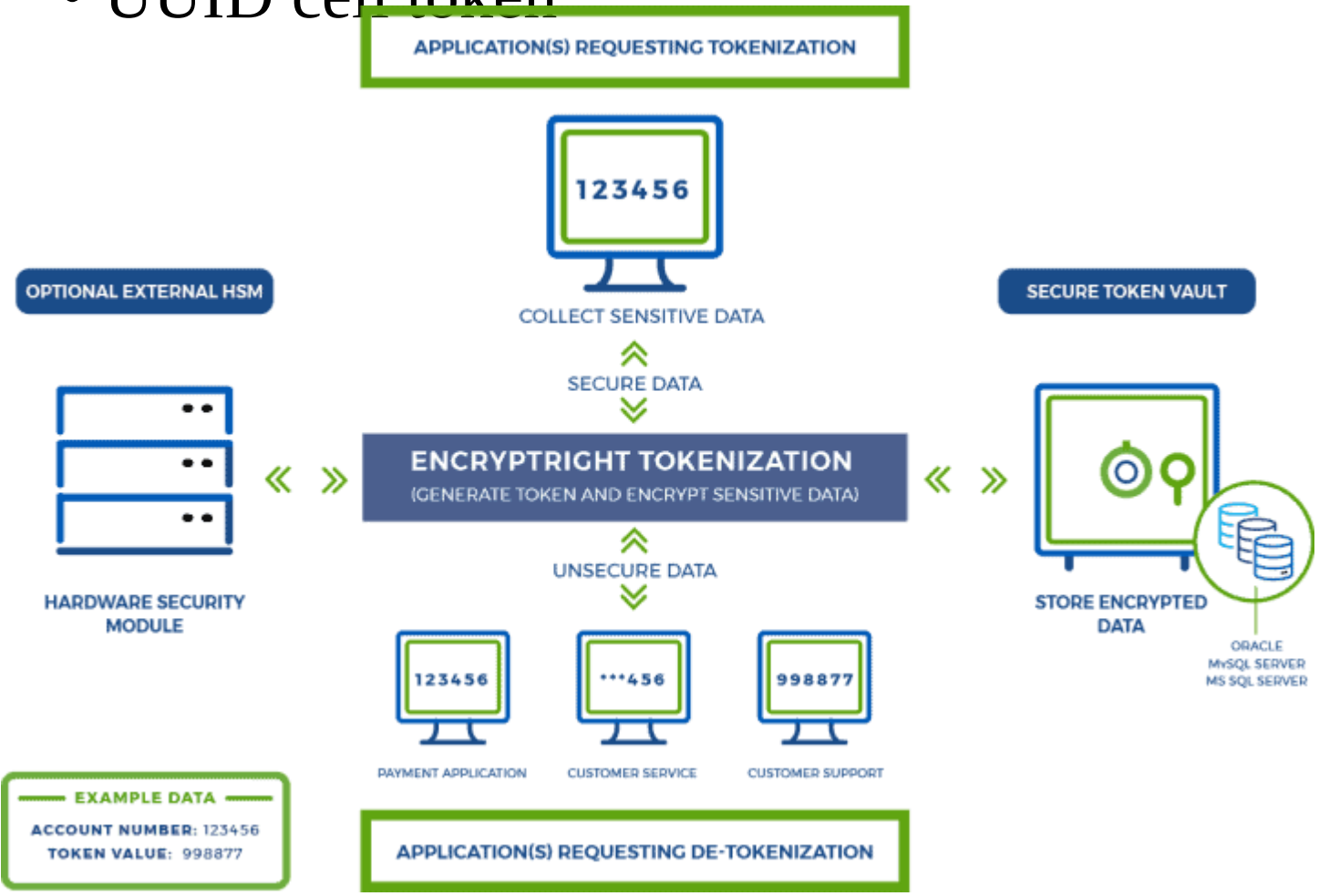
- Token (voucher, gift card)
- Token coin: Casino token, Knight token
- Token money, currency

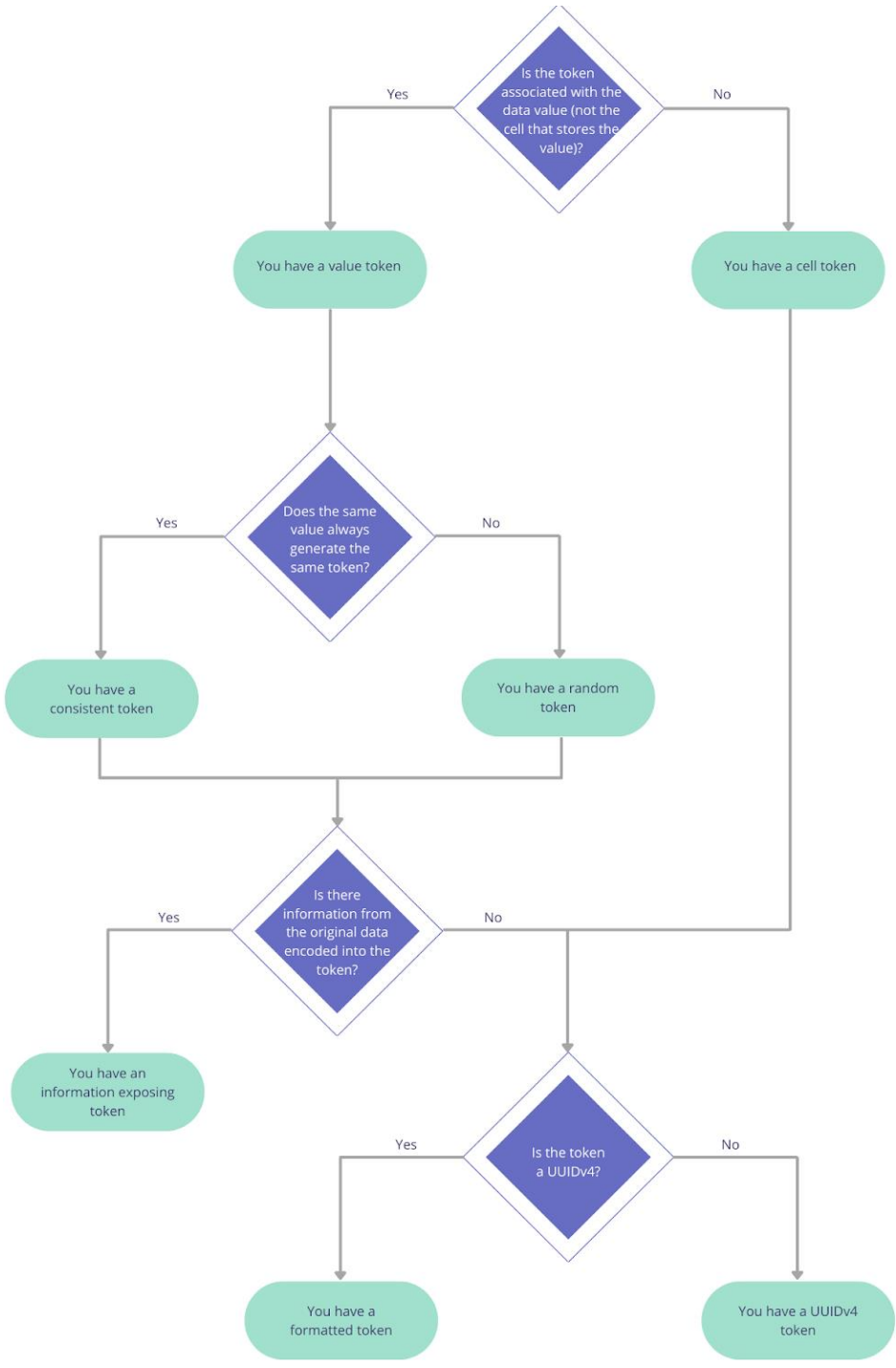
Other uses

- Token (cryptocurrency), Token (railway signalling),
- Token Racing, Tokenism ,
- Type-token distinction (computer programming)
- Wedding token

3.2. TOKEN TAXONOMY

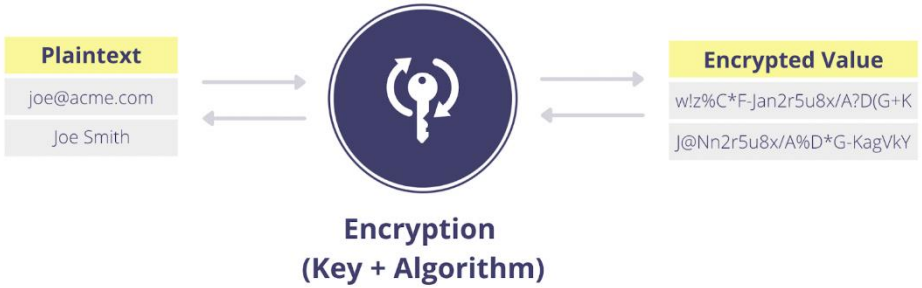
- Consistent format-preserving token
- Random format preserving token
- UUID cell token





3.3. TOKEN ACTIVITIES

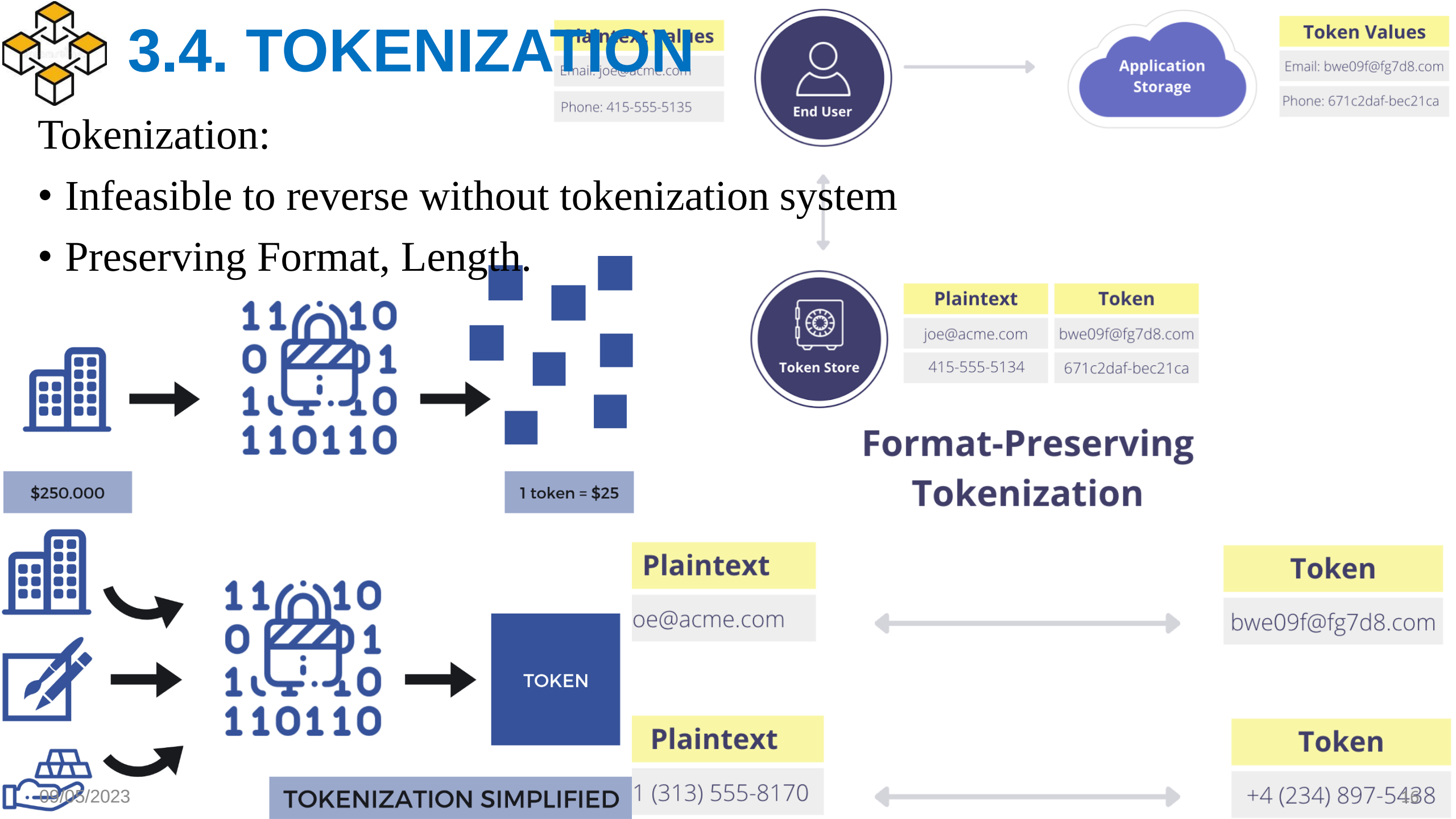
- Tokenization (data security):
  - Substituting (mapping) a sensitive (original) data element with a non-sensitive equivalent (token)
  - That has no intrinsic/exploitable meaning or value. (safeguard sensitive data).
- De-tokenization:
  - Token is a reference (identifier) maps back to sensitive data through a tokenization system



3.4. TOKENIZATION

Tokenization:

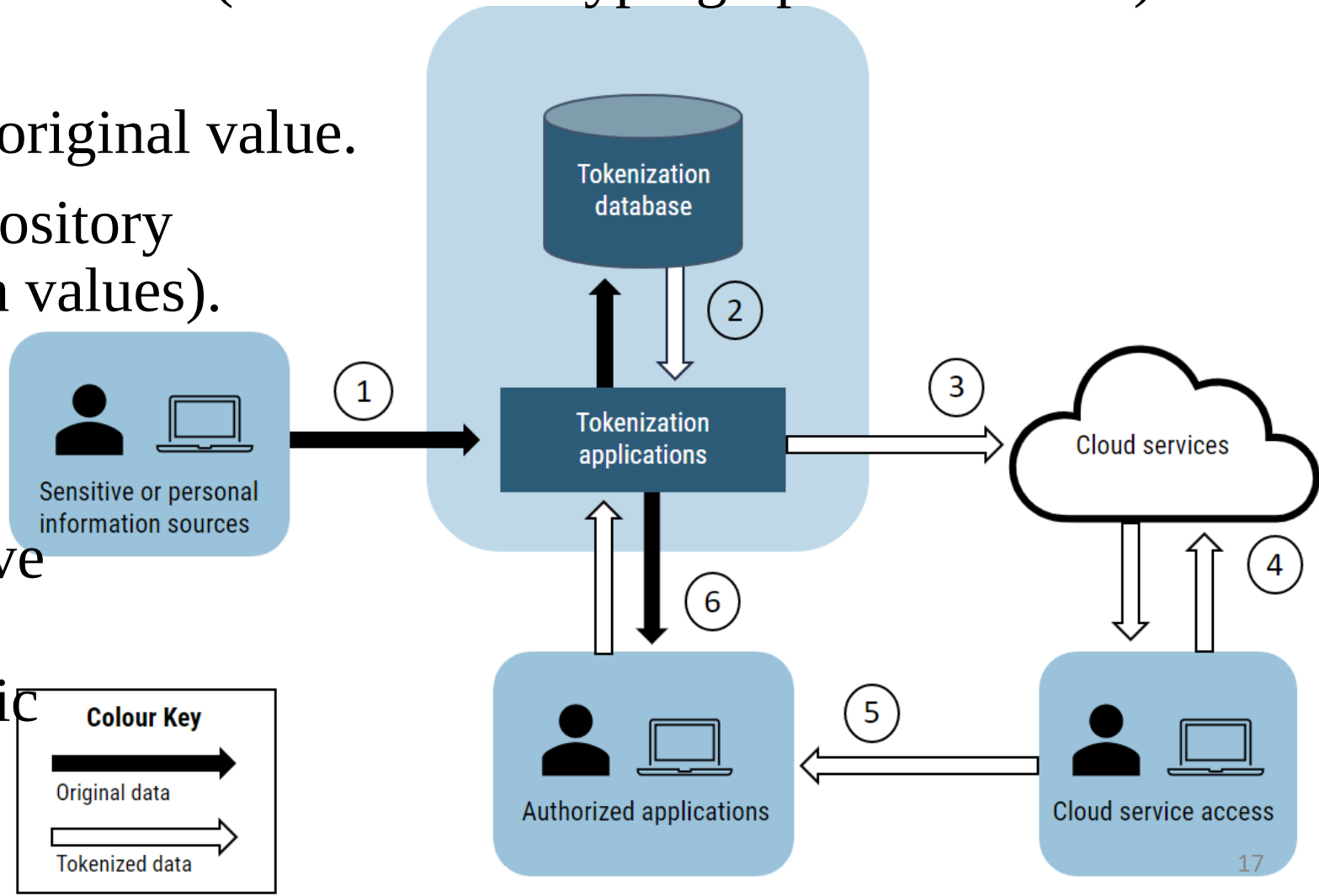
- Infeasible to reverse without tokenization system
- Preserving Format, Length.



3.4. TOKENIZATION

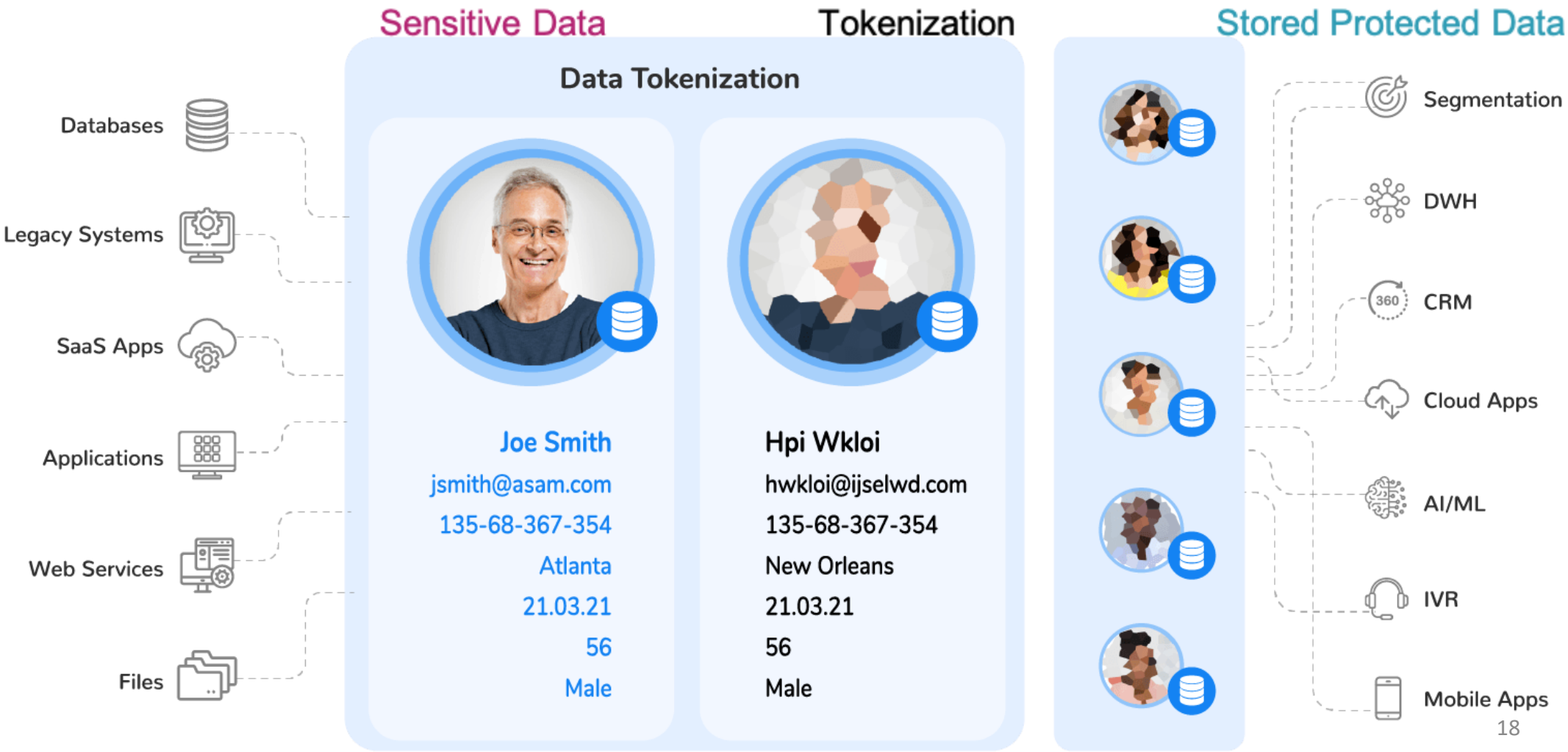
Tokenization systems components:

- Token Generation: producing a token (irreversible cryptographic functions).
- Token Mapping: assigning the created token value to its original value.
- Token Data Store: central repository (original values, related token values).
- Encrypted Data Storage: Token Data Store and sensitive data in transit.
- Management of Cryptographic Keys: for Token Data Stores.



3.4. TOKENIZA

Tokenization applications:



3.5. DIGITAL ASSETS

Digital asset: is asset

- Exists in digital form
- Comes with a distinct usage right.

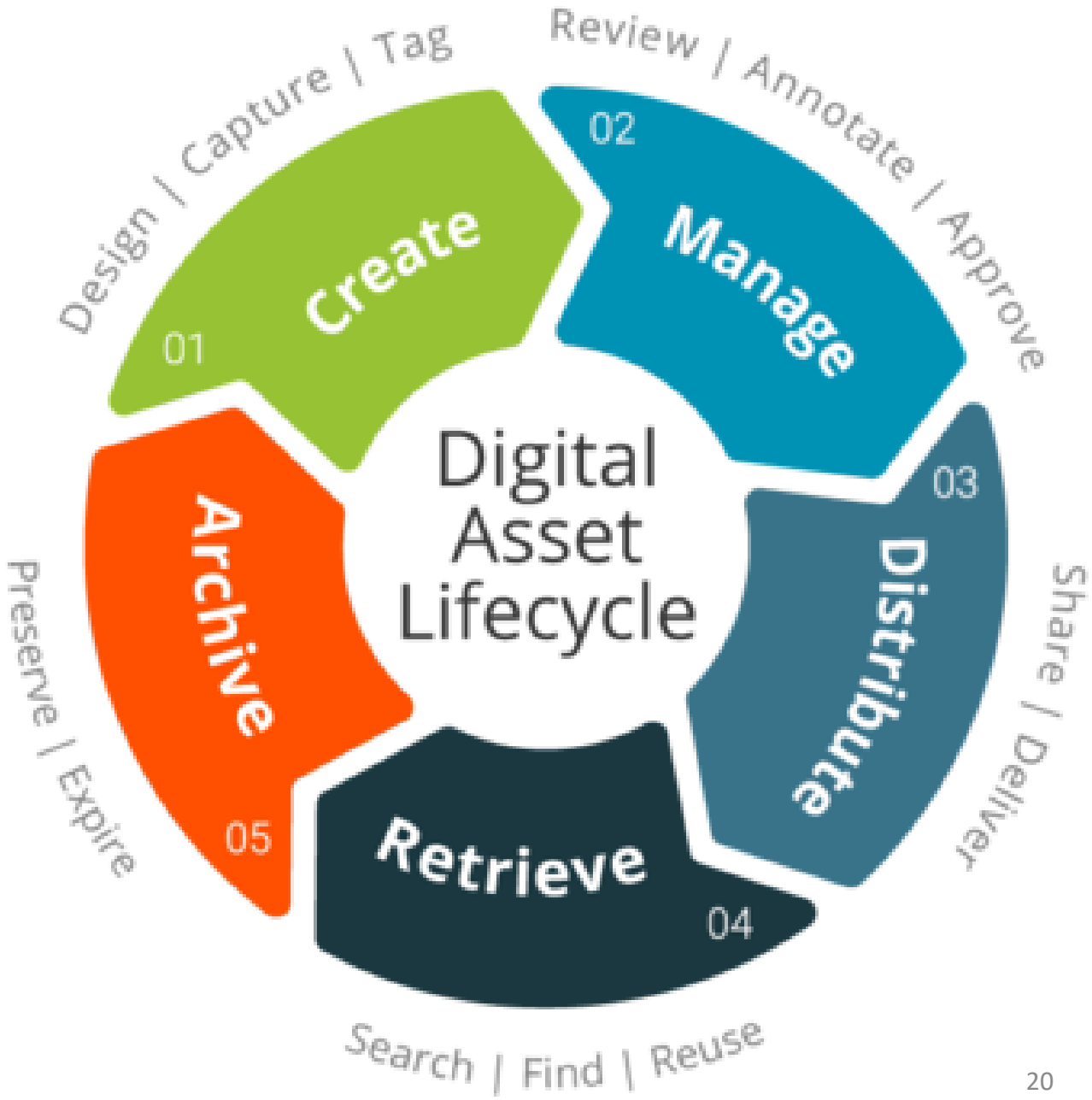
Token:

- Tool for representation digital assets

3.6. DIGITAL ASSET MANAGEMENT

Digital asset management:

- organizing digital capital
- quickly and efficiently retrieval



4. CRYPTO TOKENS

4.1. CRYPTO TOKEN

4.2. CRYPTO ASSETS

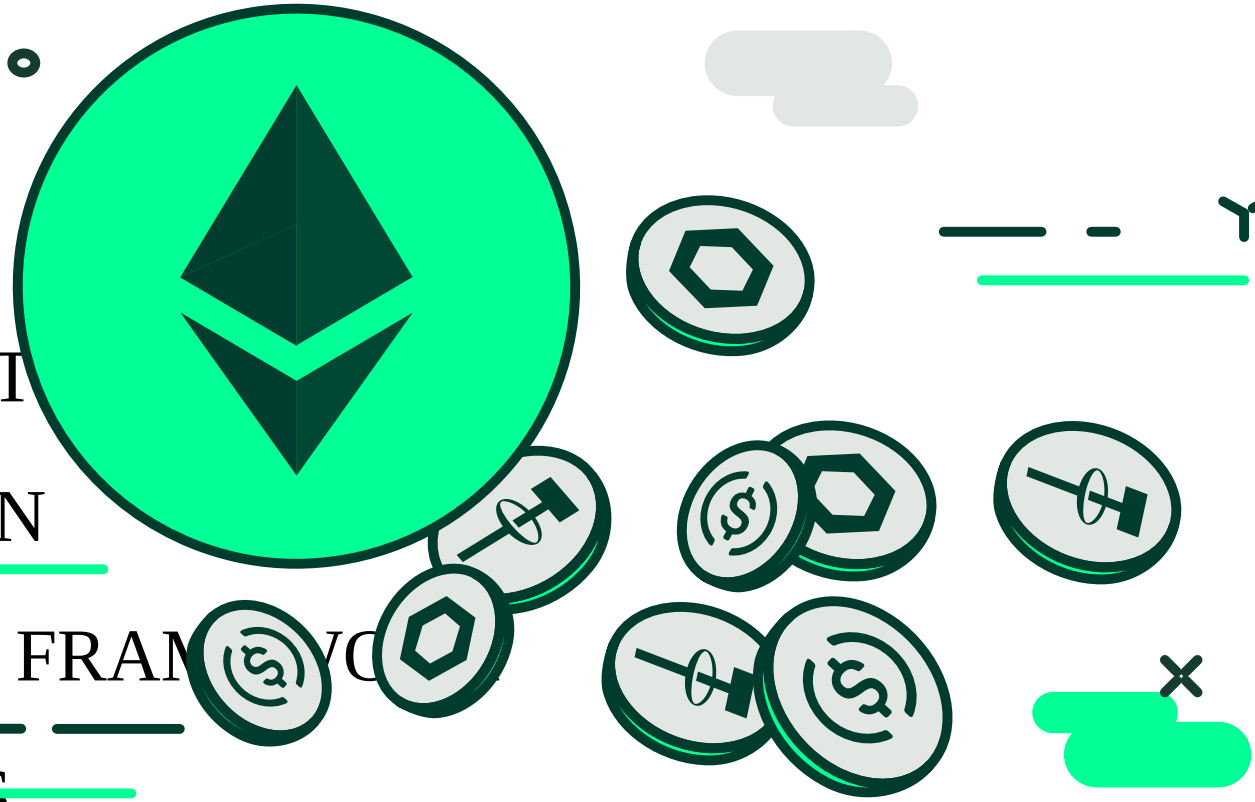
4.3. CRYPTO TOKEN CLASSIFICAT

4.4. BLOCKCHAIN TOKENIZATION

4.5. CRYPTO TOKEN TAXONOMY FRA VO

4.6. CRYPTO TOKEN STANDARDS

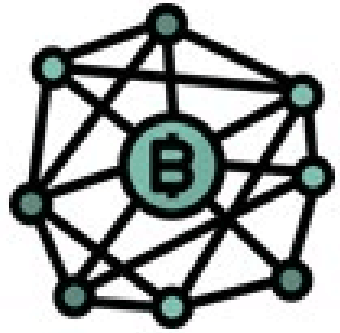
4.7. CRYPTO TOKEN APPLICATIONS



4.1. CRYPTO TOKEN

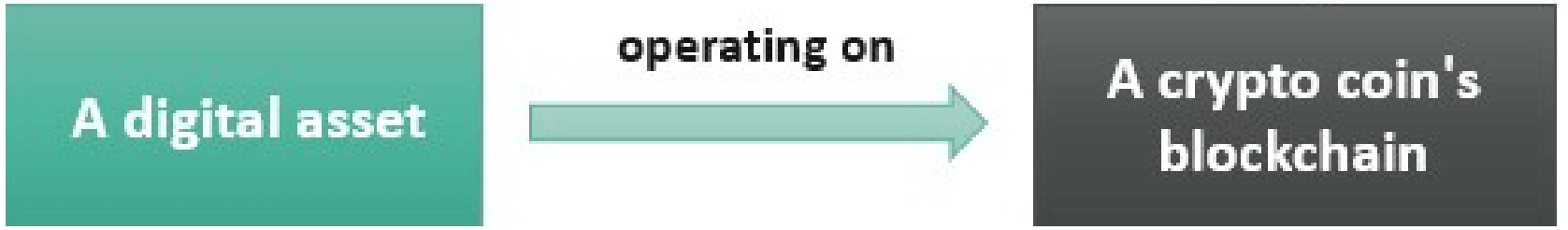
Crypto Tokens (blockchain token):

- Cryptographic string of characters (letters), digital tokens
- Represents scarce assets.
- Operate by smartcontract



Features:

- Fixed/transparent supply
- Avoid tokens inflation



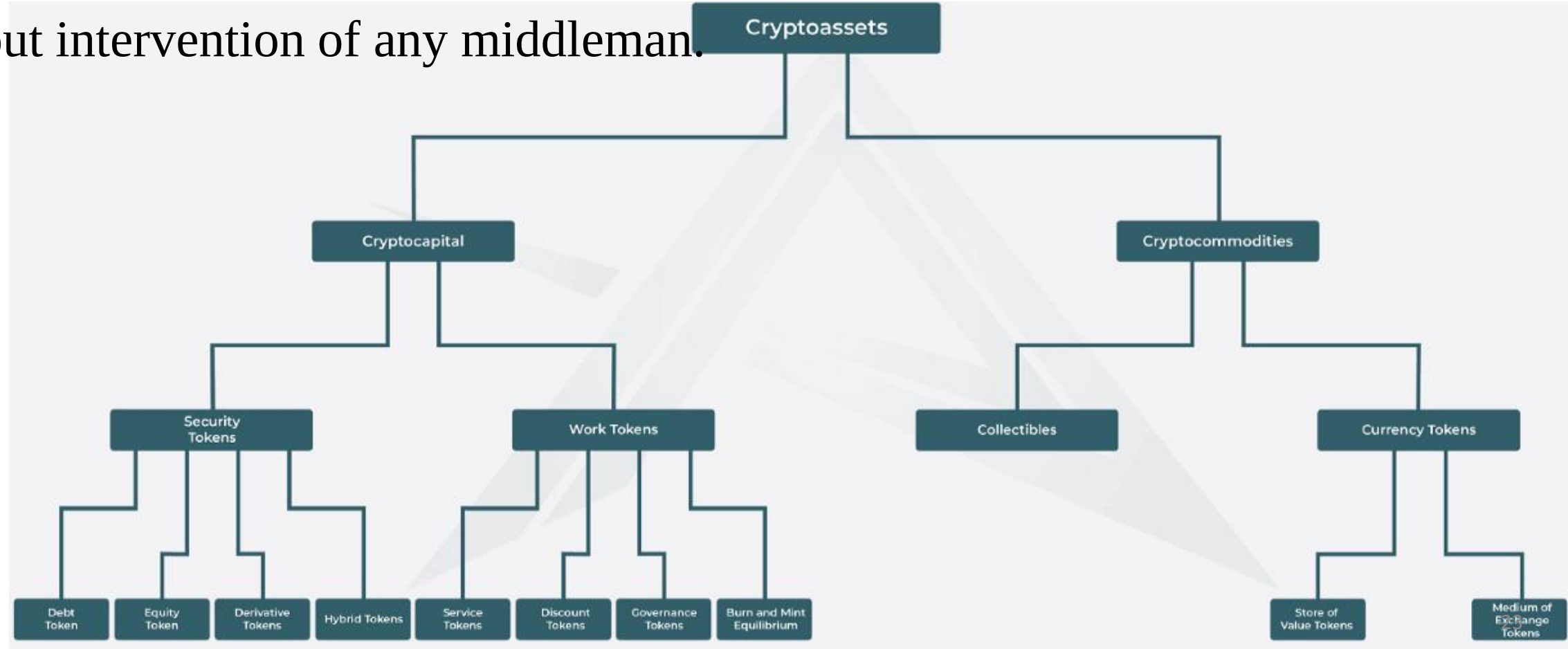
- Developed on top of a blockchain protocol
- Through smart contracts

CryptoCurrency vs Crypto Tokens

4.2. CRYPTO ASSETS

Crypto Asset: is a digital asset which

- Utilizes cryptography, peer-to-peer networking, public ledger.
- Regulate creation of new units, verify and secure transactions.
- Without intervention of any middleman.



4.3. CRYPTO TOKEN CLASSIFICATION

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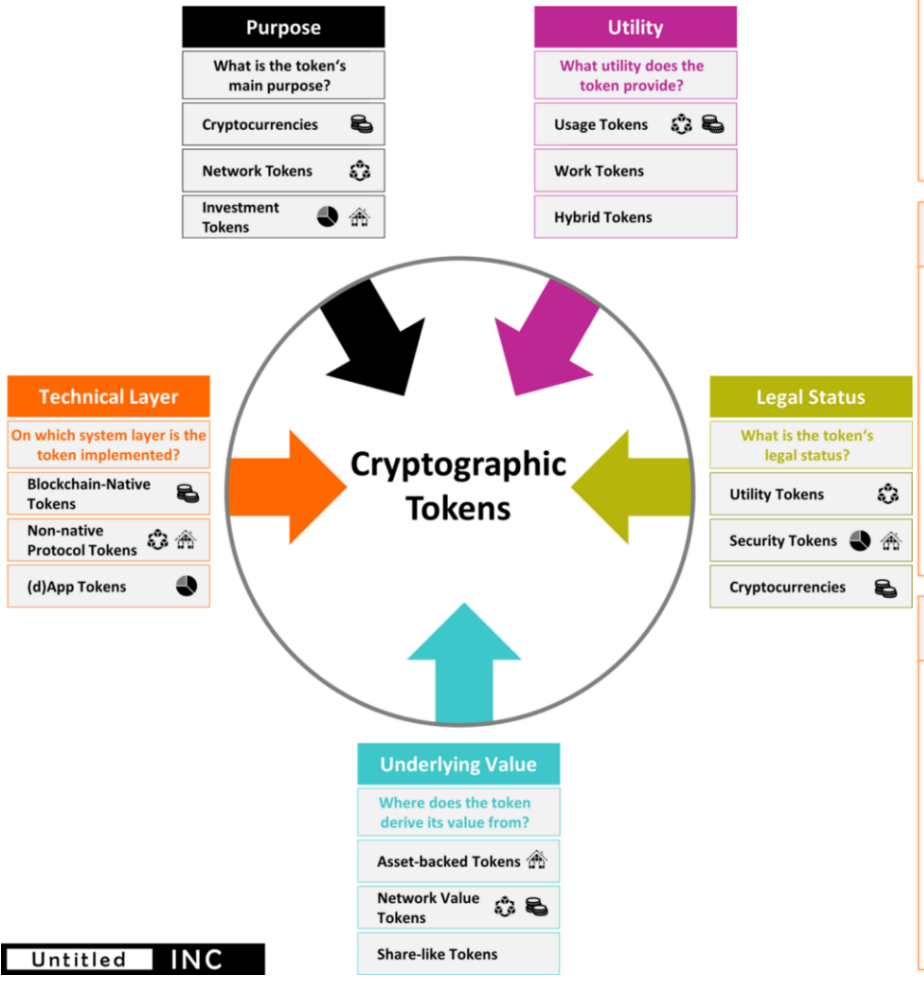


MAIN TOKEN TYPES PER DIMENSION

Technical Layer

Blockchain-Native Tokens

Description: A token that is implemented on the protocol-level of a blockchain

Characteristics:
- Critical to operate the blockchain
- Integral component of the blockchain's consensus mechanism
- Part of the blockchain's incentive mechanism for block validators/other nodes

Examples: BTC (Bitcoin, Bitcoin); ETH (Ether, Etherum), STEEM (Steem, Steem)

Non-native Protocol Tokens

Description: A token that is implemented in a cryptoeconomic protocol on top of a blockchain

Characteristics:
- Integral component of the protocol's consensus mechanism
- Part of the protocol's incentive mechanism for nodes
- Tracked on an underlying blockchain to which it is not integral (e.g. ERC20 Tokens on Ethereum)

Examples: REP (Decentralized Oracle Protocol, Augur)

(d)App Tokens

Description: A token that is implemented on the application-level on top of a blockchain (and potentially protocol)

Characteristics:
- Integrated within the application
- Part of the app's incentive mechanism for nodes and/or users
- Tracked on an underlying blockchain to which it is not integral (e.g. ERC20 Tokens on Ethereum)

Examples: WIZ (Wisdom, Gnosis), SAFE (Safecoin, SAFE Network)

Purpose

Cryptocurrencies

Description: A token that is intended to be a "pure" cryptocurrency

Characteristics:
- Intended as a global medium of exchange
- Functions as a store of value

Examples: BTC (Bitcoin), ZEC (Zcash), KIN (Kin, Kik)

Network Tokens

Description: A token that is primarily intended to be used within a specific system (e.g. network, application)

Characteristics:
- Token has functionality within the issuers system
- Not intended as a general cryptocurrency

Examples: GNO (Gnosis), STX (Stacks, Blockstack)

Investment Tokens

Description: A token that is primarily intended as a way to passively invest in the issuing entity or underlying asset

Characteristics:
- Promises owners a share of asset value or in (future) success of the issuing entity
- No or little significant functionality

Examples: Neufund Equity Tokens (Neufund), DGX (Digix Gold, DigixDAO)

Underlying Value

Asset-backed Tokens

Description: A token that functions as a claim on an underlying asset

Characteristics:
- Allows trading via IOUs without actually having to move the underlying asset
- The issuer is responsible to hold the underlying asset
- Introduces counterparty risk

Examples: USDT (Tether USD, Tether), GOLD (GOLD, GoldMint), Ripple IOUs (Ripple)

Network Value Tokens

Description: A token that is tied to the value and development of a network

Characteristics:
- Tied to the value generated and exchanged on the network (e.g. transaction fee volume)
- Closely intertwined with key interactions of network participants

Examples: ETH (Ether, Ethereum) STEEM (Steem)

Share-like Tokens

Description: A token with share-like properties

Characteristics:
- The issuer promises token owners a share in the success of the issuing entity (e.g. dividends, profit-shares)
- May or may not come with voting-rights
- Mostly on no/weak legal basis

Examples: DGD (DigixDAO), LKK (Lykke)

Likely to be classified as a security token

Utility

Usage Tokens

Description: A token that provides access to a digital service, similar to a paid API key

Characteristics:
- Grants holders access to exclusive functionality of the service

Examples: BTC (Bitcoin), STX (Stacks, Blockstack)

Work Tokens

Description: A token that provides the right to contribute to a system

Characteristics:
- Owning Tokens is the precondition for contributing to the system
- Contributions are either incentivized with a rewards system or holders get utility from the system/decentralized organization

Examples: REP (Reputation, Augur), MKR (Maker, Maker DAO)

Hybrid Tokens

Description: A token featuring traits of both usage and work tokens

Characteristics:
- Grants access to system functionalities
- Allows owners to contribute to the system

Examples: ETH (Ether, Ethereum, after Casper), DASH (Dash)

Legal Status*

Utility Tokens

Description: A token offering owners clearly defined utility within a network or (decentralized) application

Characteristics:
- Closely tied to the functionality of the issuing network or application
- Internal network/app currency but not necessarily attempting to be a currency
- Grants owners the right to actively contribute to the system vs. passive investor role
- Avoids security-like features

Examples: GNO (Gnosis), STEEM (Steem)

Security Tokens

Description: A token that behaves like a security

Characteristics:
- Showcases security-like features, e.g. voting on decisions regarding the issuing entity, dividends, or profit shares
- Holders are regarded as owners
- Little or insufficient utility

Examples: SPiCE (SPiCE VC), Bitwala (tba)

Cryptocurrencies

Description: A token that is a pure cryptocurrency

Characteristics:
- Acts as a store of value and medium of exchange
- Not emitted by a central authority against which owners have claims

In Germany (according to BaFin):
- currently not regarded as lawful, functional currency
- not regulated by e-money laws

Examples: BTC (Bitcoin), ZEC (Zcash), LTC (Litecoin)

4.3. CRYPTO TOKEN CLASSIFICATION

- Payment token: function as currency, serve as a medium of exchange, store of value, and unit of account.
- Utility token: digital access to a application/service on blockchain.
- Asset Tokens: refer to assets, are backed by real-world assets, (tokenized), gold, silver, debt, commodity, real-estate
- Security token: function similarly to traditional securities, represent the fractional ownership of any real-time asset.

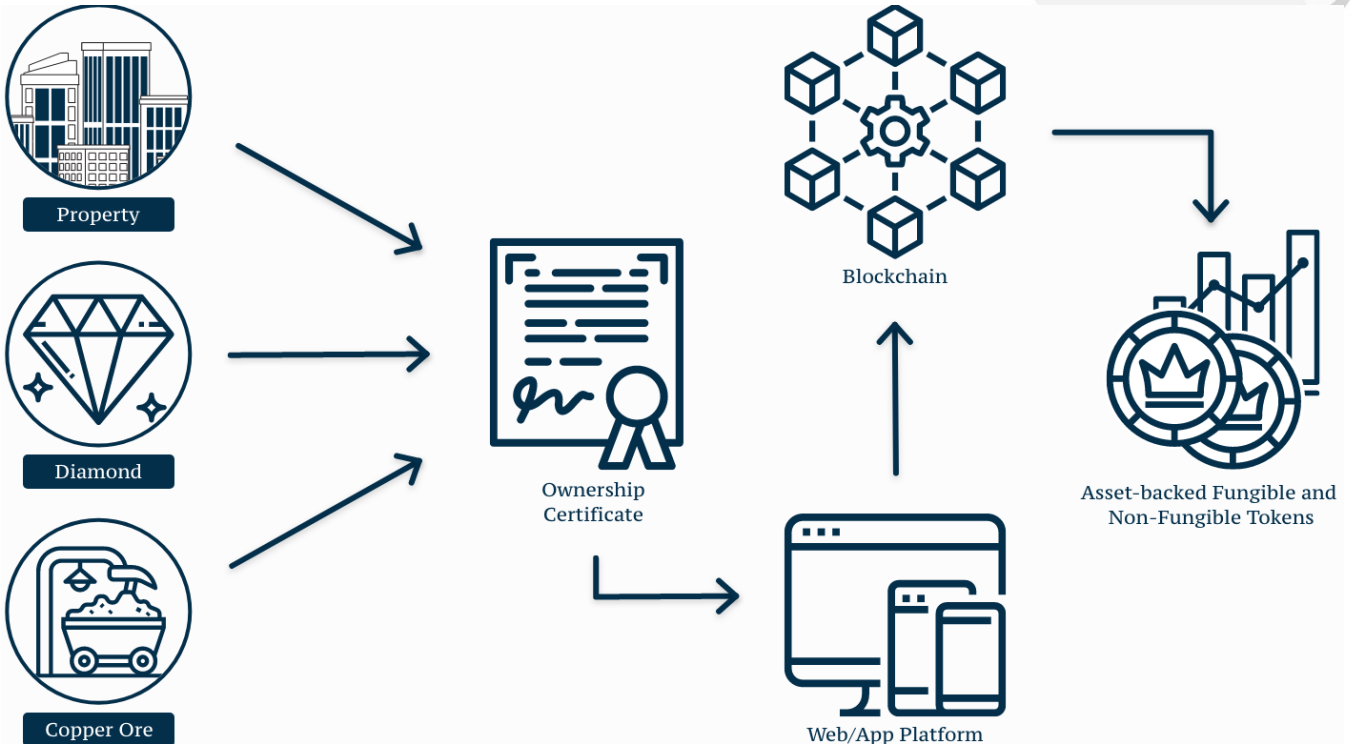
4.3. CRYPTO TOKEN CLASSIFICATION

Class					
Payment Token	Utility Token			Investment Token	
Role/Purpose					
Right	Value Exchange	Toll	Function	Currency	Earnings
Representation					
Digital	Physical	Virtual	Legal		
Supply					
Fixed	Schedule-based				
Incentive System					
Enter Platform	Use Platform	Stay Long-Term			
Fungibility					
Fungible	Non-Fungible				

4.4. BLOCKCHAIN TOKENIZATION

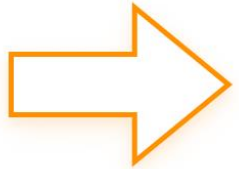
Blockchain Tokenization:

- For security token.



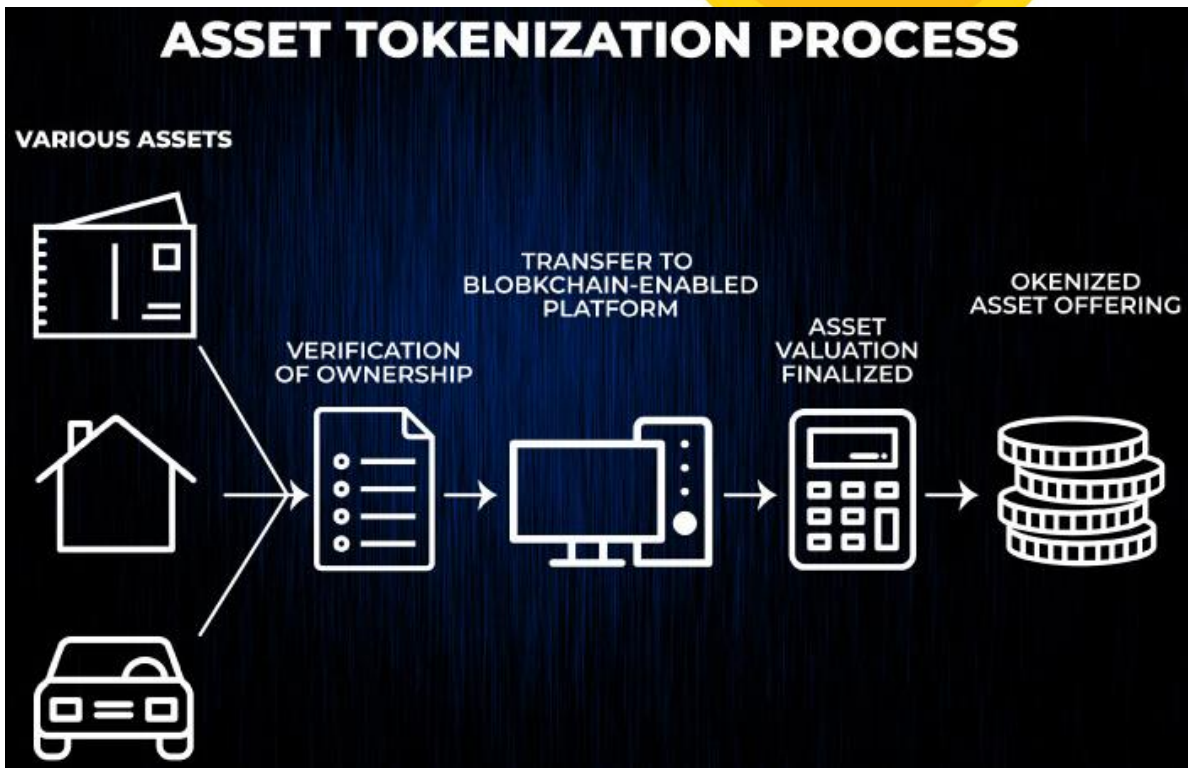
Real World

A paper contract representing a claim on, or right to, some good, service, or asset in the real world...



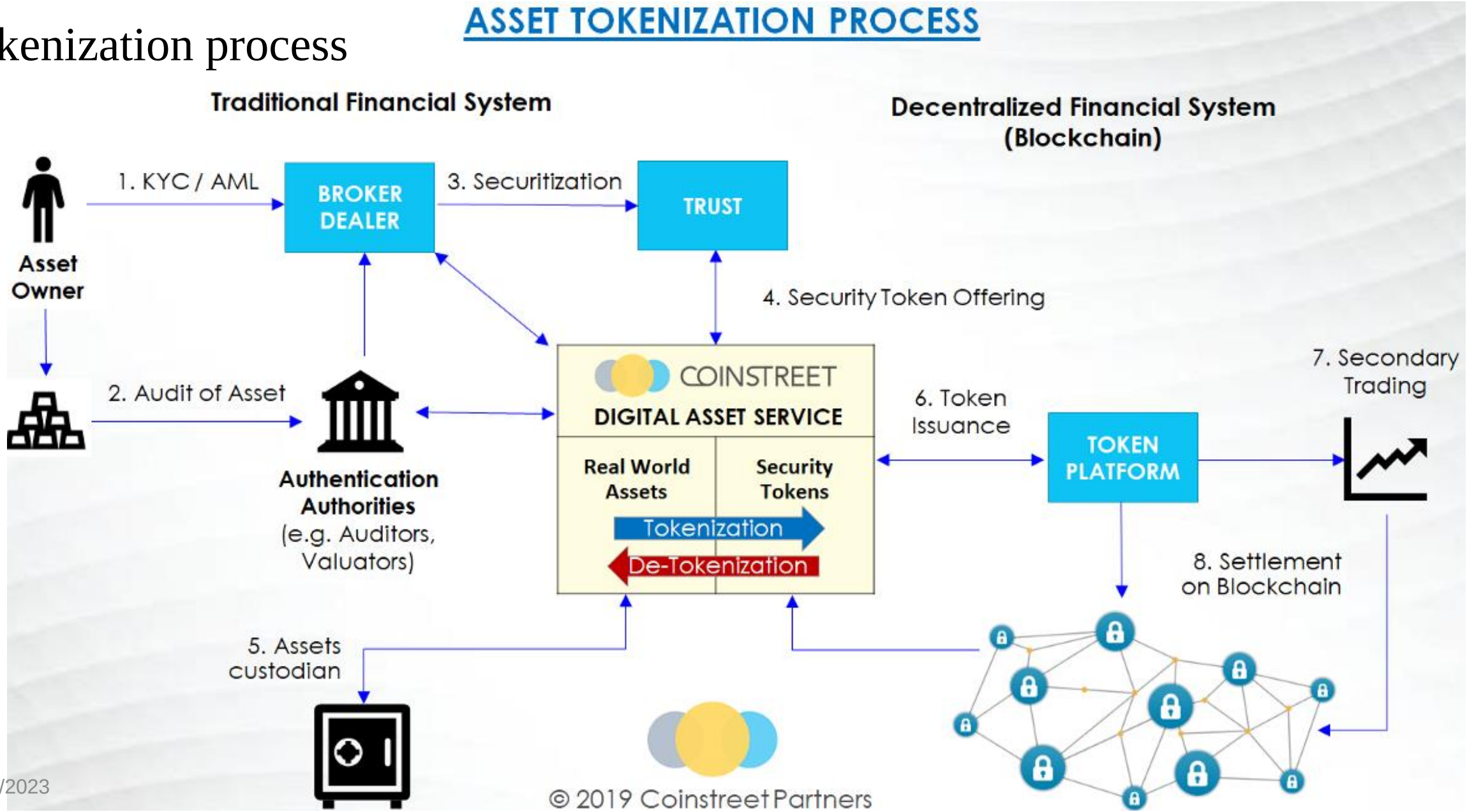
Blockchain World

... is converted into a digital contract in the form of a token within a blockchain network



4.4. BLOCKCHAIN TOKENIZATION

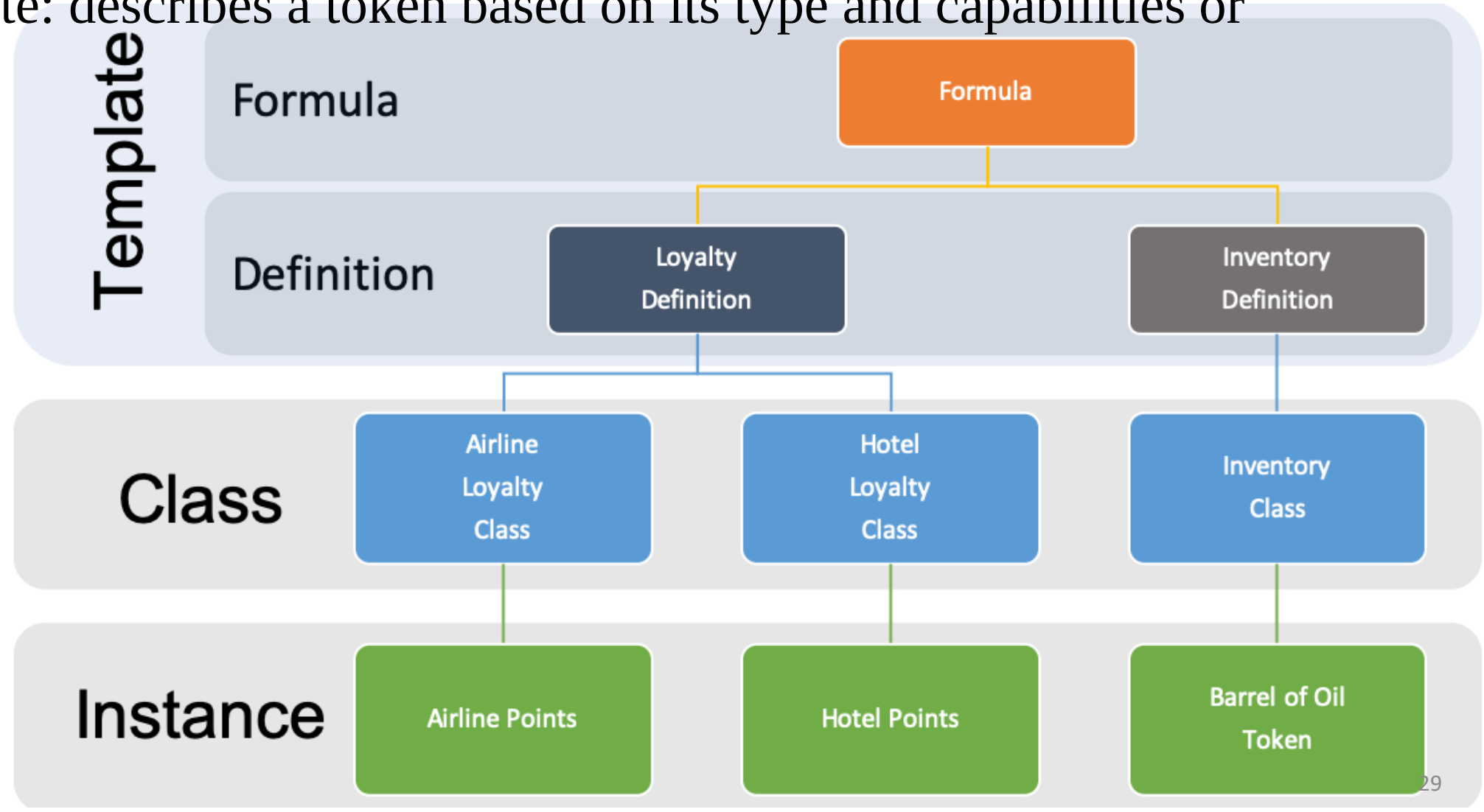
Tokenization process



4.5. CRYPTO TOKEN TAXONOMY FRAMEWORK

Token Taxonomy Framework model on tokens.

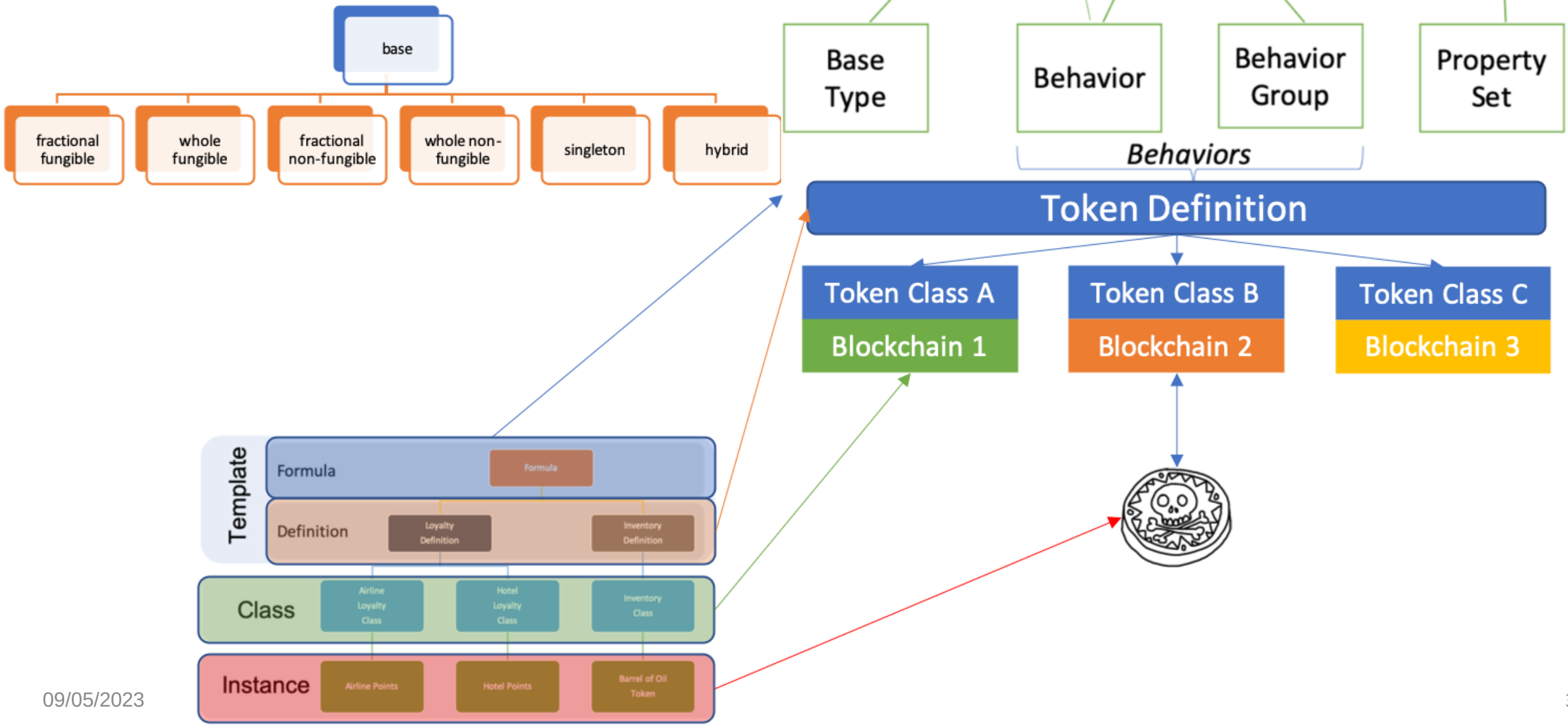
- Token Template: describes a token based on its type and capabilities or restrictions



4.5. CRYPTO TOKEN TAXONOMY FRAMEWORK

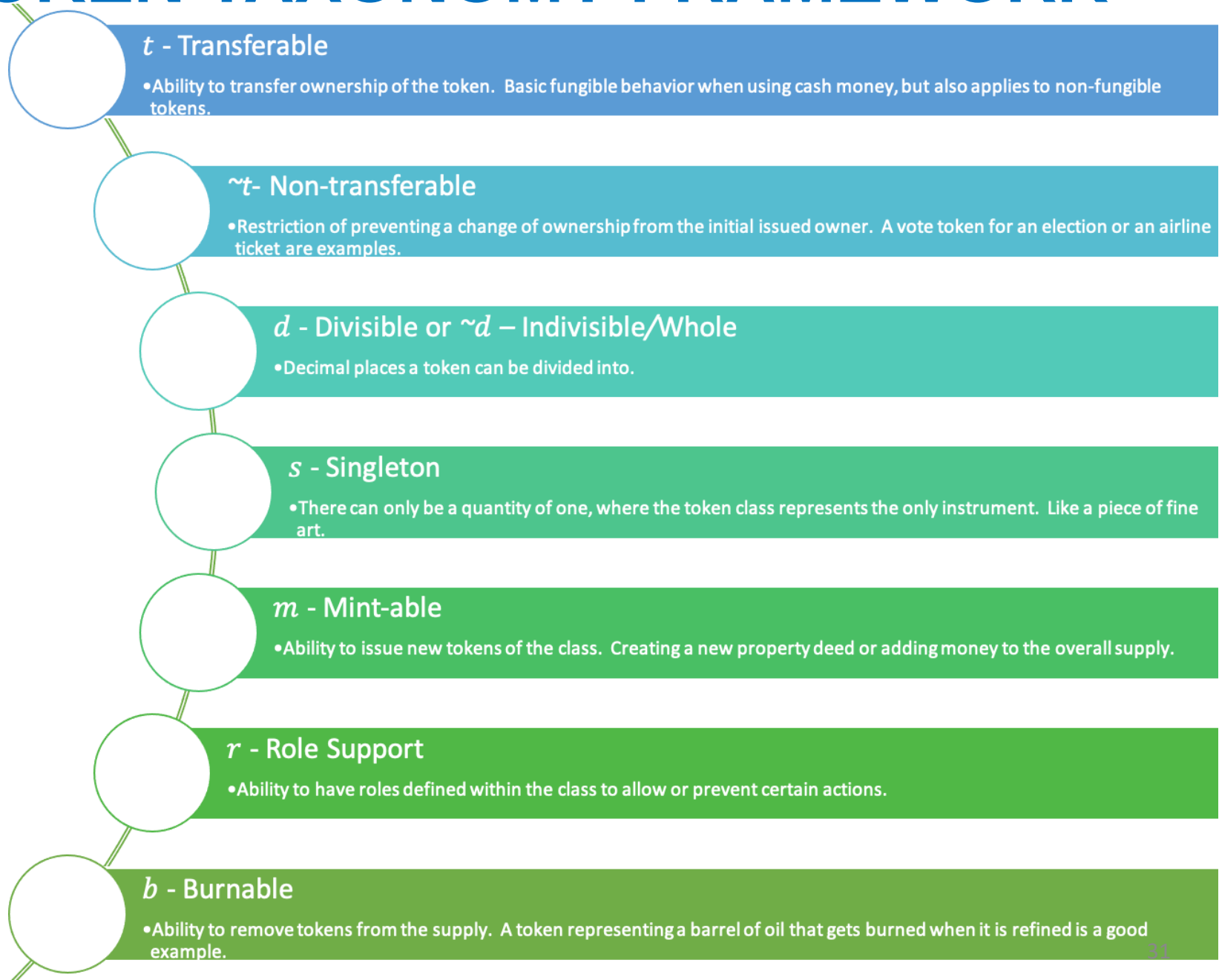
Template Formula.

$$[\tau_F\{\sim d, g, SC\} + \phi SKU]$$



4.5. CRYPTO TOKEN TAXONOMY FRAMEWORK

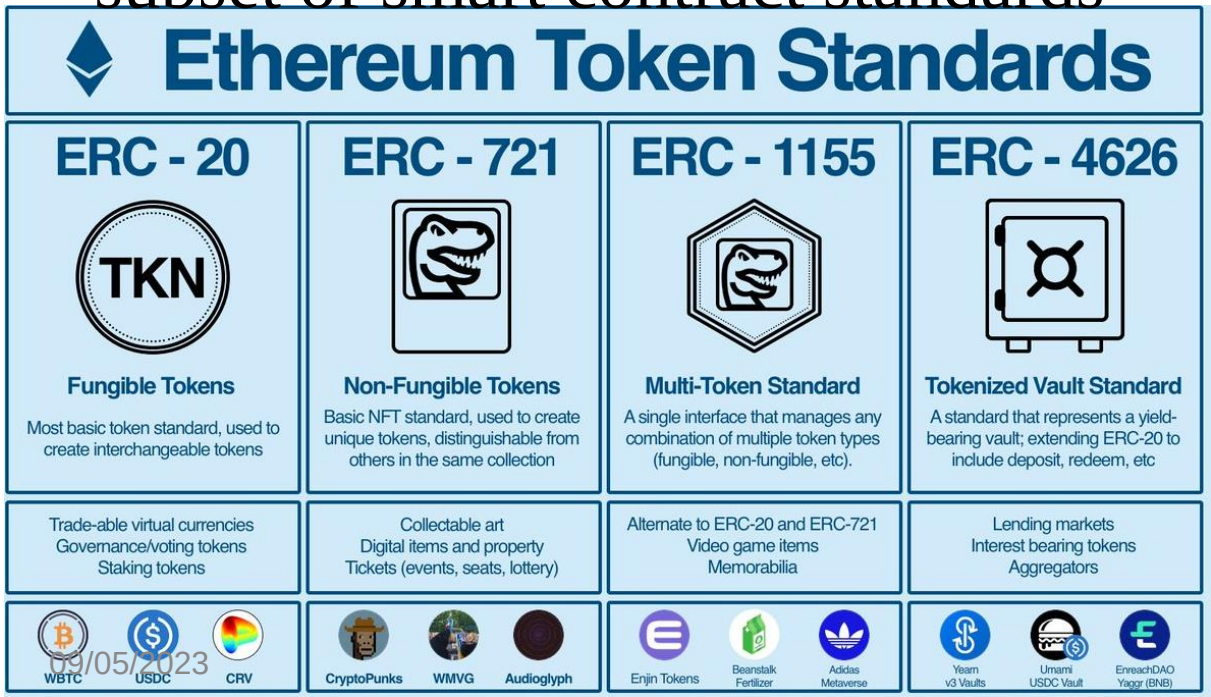
Crypto token activities:



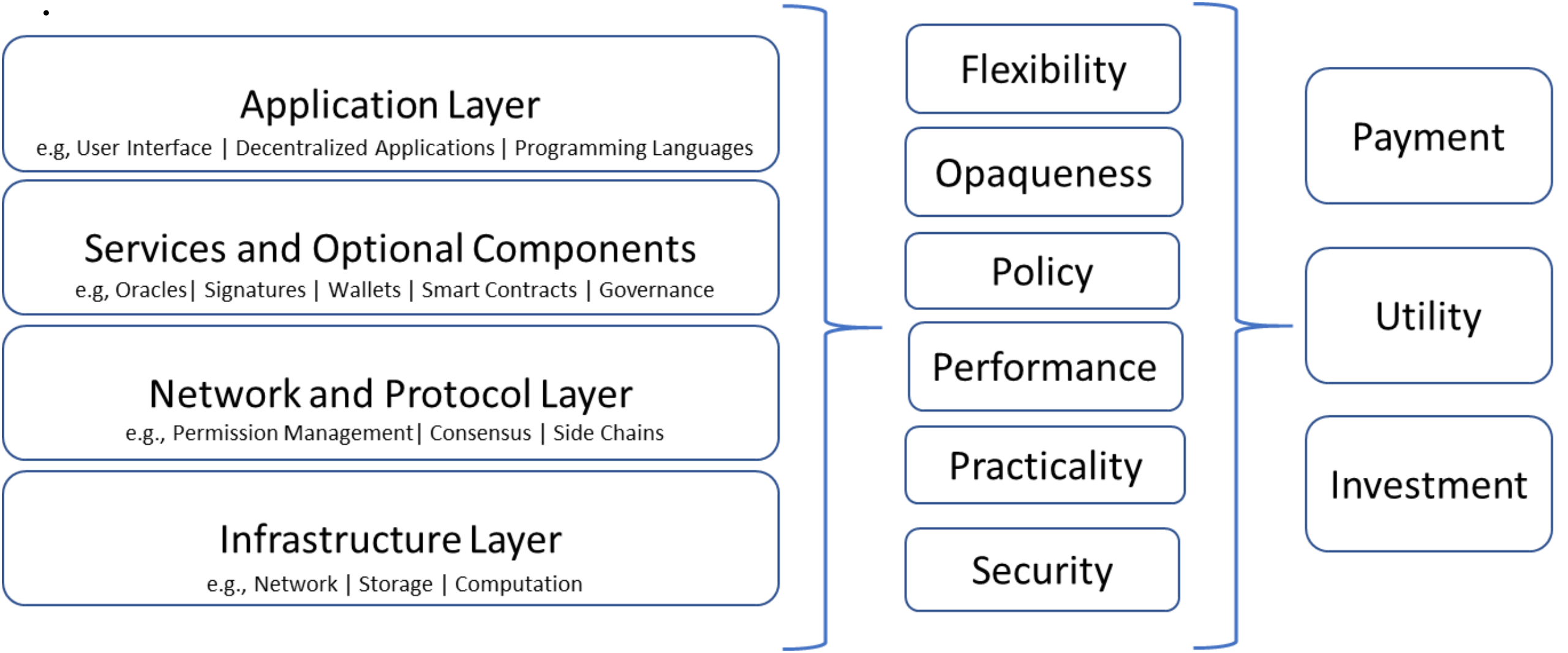
4.6. CRYPTO TOKEN STANDARDS

Token standards: set of rules, conditions, functions, events for crypto token works, smart contract follow.

- create, issue, deploy new tokens.
- on blockchains: utilize smart contracts
- subset of smart contract standards



4.6. CRYPTO TOKEN STANDARDS



Technology Stack

Properties

Token Types

4.7. CRYPTO TOKEN APPLICATIONS

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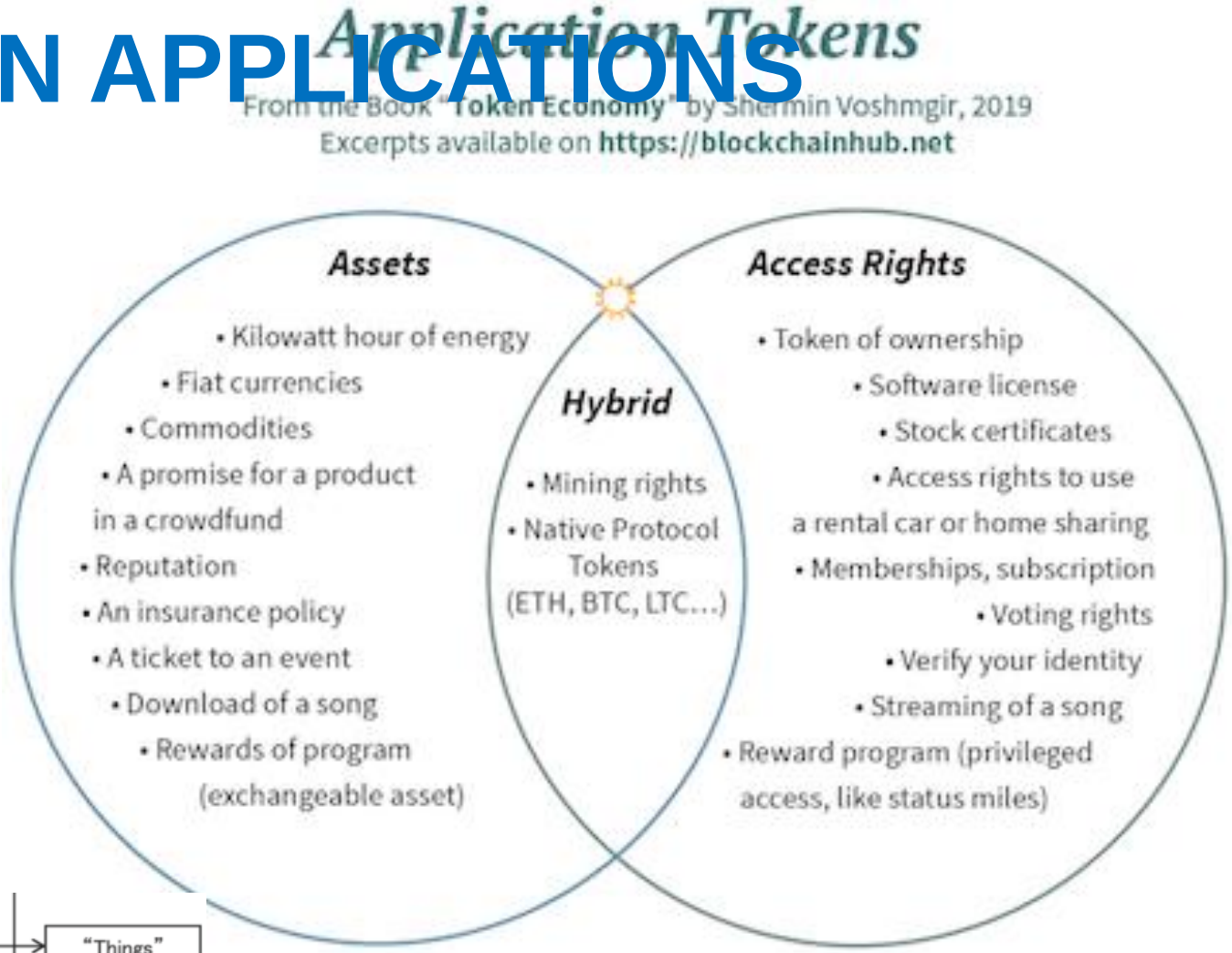
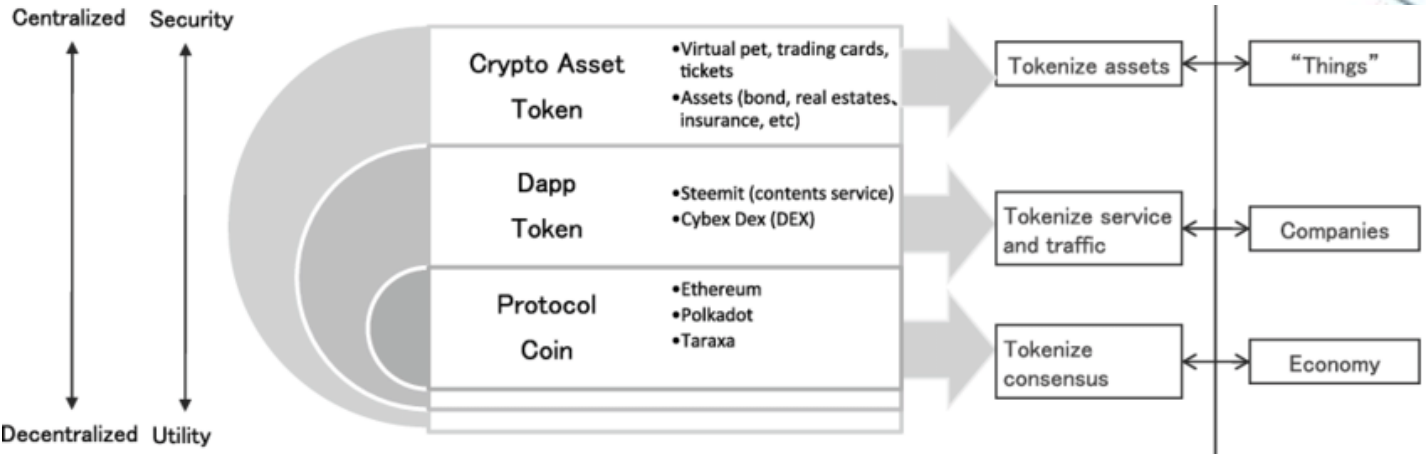
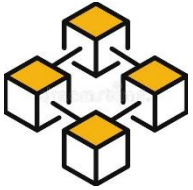




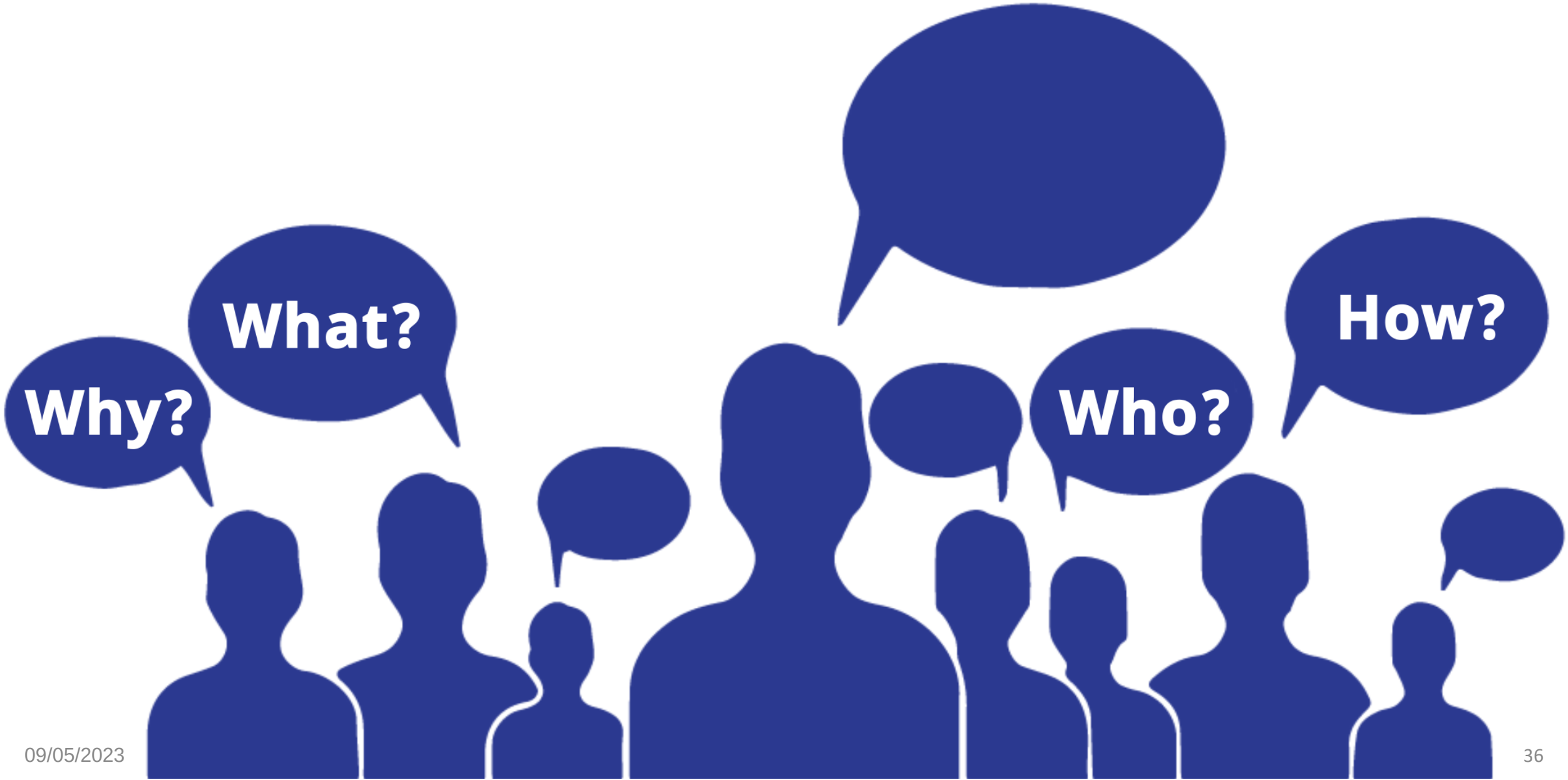
ation tokens can represent any asset or access rights or a combination of both.
an have simple or complex functions.



5. SUMMARY

- Asset:
  - Things have value, can be transformed into money.
  - Can generate future economic value
- Token:
  - Pointer reference something, represents digital assets.
  - Tokenization: Substituting a sensitive data element with a non-sensitive equivalent
- Crypto token (blockchain token):
  - Represents crypto assets, Operate by smartcontract
  - Standardized for operate on blockchain.

6. DISCUSSION



FINISH