

# Lecture 4

—

ERC20 Tokens and Tokenomics

Fungibility

# What are Fungible Tokens?

## Fungible

Exists an exact identical unit

1 Euro coin is not unique, many other 1 Euro coins

We care about **how much**.

## Non-Fungible

No other unit is the same

A house is different from its neighbour

We care about **what feature**.

# Notable Token ERCs

## **ERC20**

Standard fungible token  
Extremely widespread  
Simple functionality

## **ERC777**

ERC20 improvement  
Backwards compatible  
Some efficiency improvement in transactions  
Supply control and authorization functionalities

## **ERC721**

Standard non-fungible token  
(NFT)  
Extremely widespread  
Most gaming, music, art  
solutions built with this standard

## **ERC1155**

Mult Token Standard  
Non fungible, semi-fungible,  
fungible  
Gas and storage efficiency  
More exchange capabilities

ERC20

# The ERC20 Standard

<https://eips.ethereum.org/EIPS/eip-20>

**function** name() **public** view returns (string)

**function** symbol() **public** view returns (string)

**function** decimals() **public** view returns (uint8)

**function** totalSupply() **public** view returns (uint256)

**function** balanceOf(address \_owner) **public** view returns (uint256 balance)

**function** transfer(address \_to, uint256 \_value) **public** returns (bool success)

**function** transferFrom(address \_from, address \_to, uint256 \_value) **public** returns (bool success)

**function** approve(address \_spender, uint256 \_value) **public** returns (bool success)

**function** allowance(address \_owner, address \_spender) **public** view returns (uint256 remaining)

event Transfer(address indexed \_from, address indexed \_to, uint256 \_value)

event Approval(address indexed \_owner, address indexed \_spender, uint256 \_value)

# The 5 minute challenge



Simple Token in 5 Minutes

<http://thetokenfactory.com/#/factory>

<https://wizard.openzeppelin.com/>



Products ▾

For Business

Resources ▾



## How to Create Your Own ERC-20 Token in 10 Minutes

Create ERC-20 Token

Create Ethereum Token

Create Your Own ERC-20 Token

ERC-20 token

# ERC20 Implementation

```
https://github.com/OpenZeppelin/openzeppelin-contracts/  
blob/master/contracts/token/ERC20/ERC20.sol
```

**Understand what other people put in their code!!**

```
https://ethernaut.openzeppelin.com/level/0x80934B  
E6B8B872B364b470Ca30EaAd8AEAC4f63F
```



# Stablecoins

## Stability Mechanisms

# Stablecoins

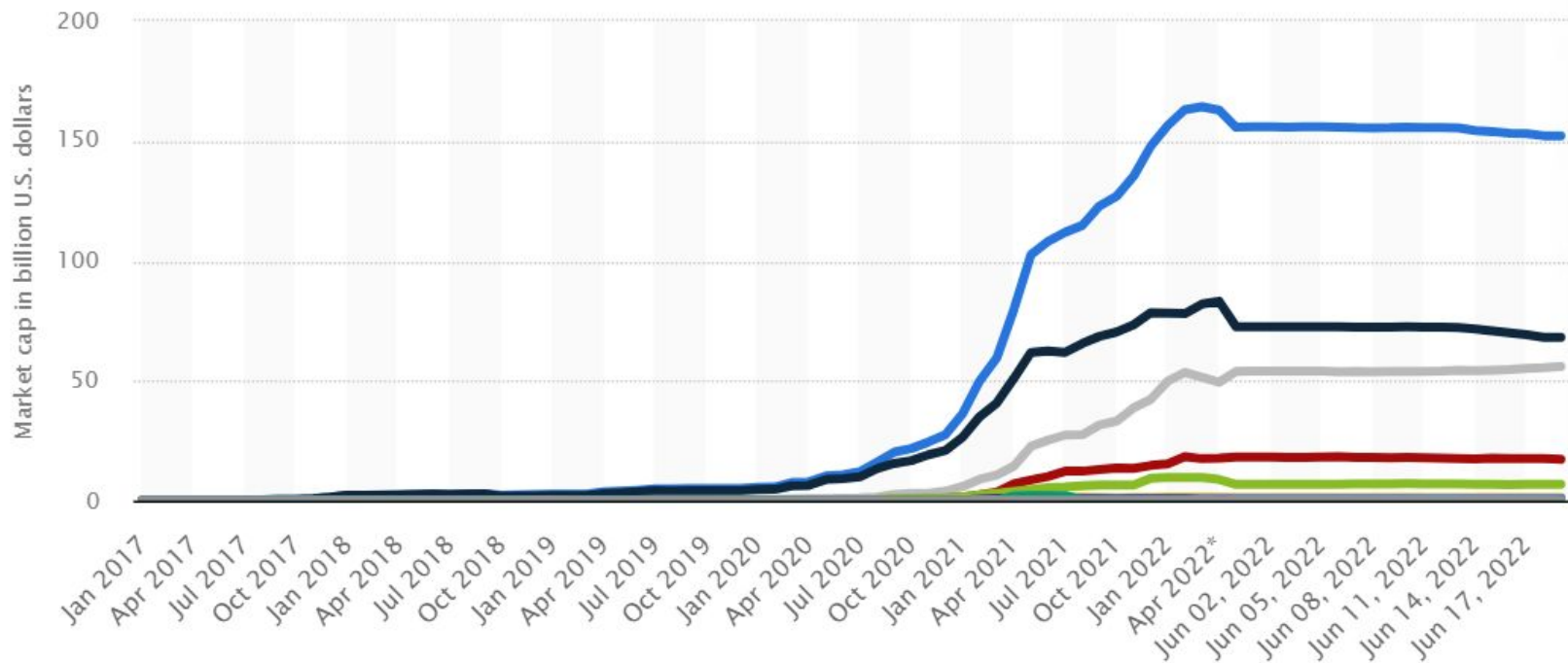
Have a relatively stable value because they are pegged to a target currency.

This target is usually the USD.

Volatility is good for short term strategies but stables balance out for long term investment strategies.

Managing liquidity.

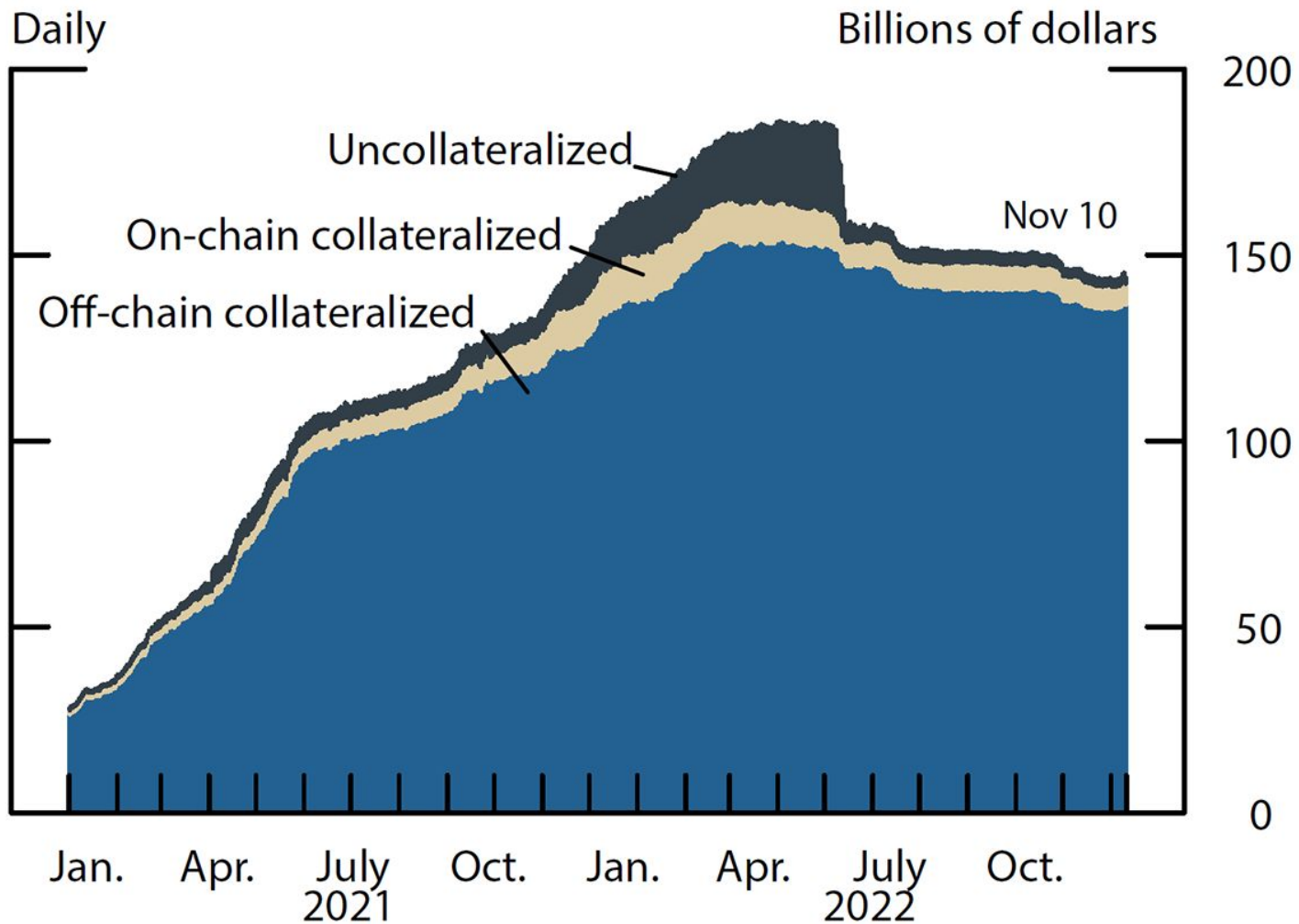
Serve as a medium of exchange between volatile currencies.



- Total (top 10 combined)
- Tether (USDT)
- USD Coin (USDC)
- Binance USD (BUSD)
- Dai (DAI)
- TrueUSD (TUSD)
- Pax Dollar (USDP)
- Neutrino USD (USDN)
- USDD (USDD)\*
- Fei USD (FEI)
- Gemini Dollar (GUSD)\*

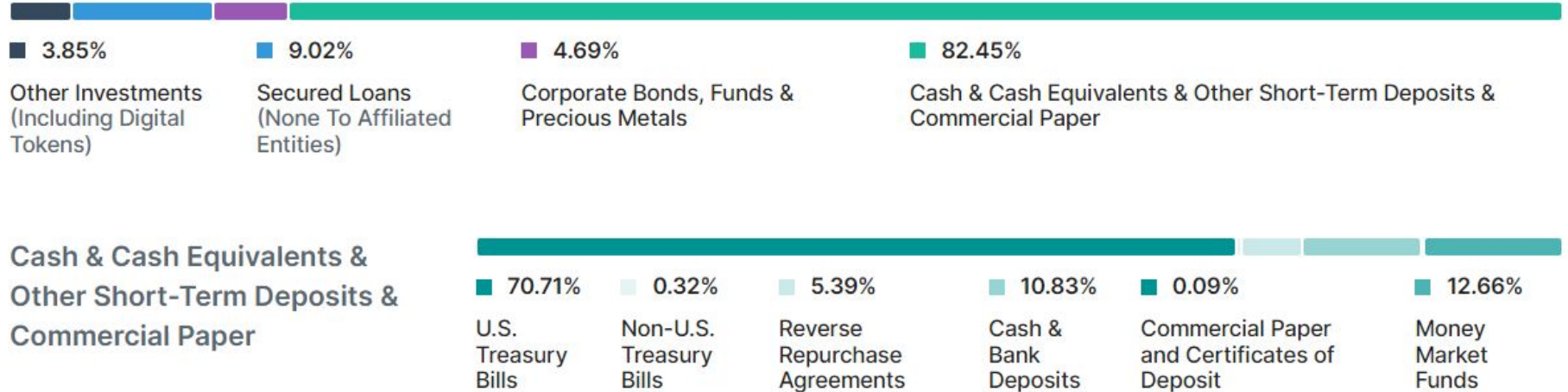
# Stability Mechanisms

<b>On chain</b>	<b>Off chain</b>
<p>Backed by other cryptocurrencies. Beware the circular dependencies.</p>	<p>Backed by traditional financial assets. Fiat currencies, bonds, stocks, fixed assets, etc.</p>
<b>Algorithmic</b>	<b>Mix</b>
<p>Also known as Uncollateralized. Using economic algorithms to controlling circulation and reserve.</p>	<p>Usually a mix of assets and strategies.</p>



# Off Chain Collateralized Stable - Tether

## Reserves Breakdown



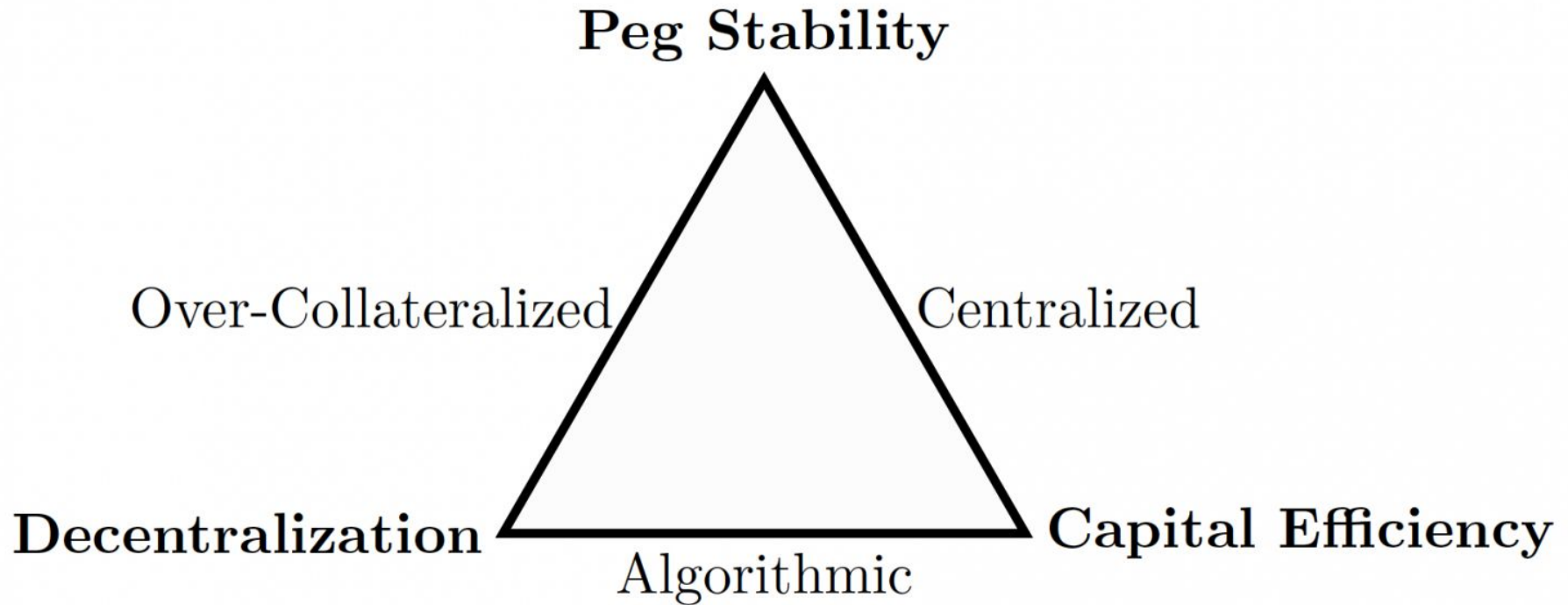
Source: <https://tether.to/en/transparency/#reports>

# On Chain Collateralized Stable - DAI

The infamous "borrow money into existence" strategy

1. User wants 100 DAI coins (Let's say DAI price is at \$1,05)
2. Minimum DAI collateralization ratio stands at **150%**
3. User needs to lock  $\$1,05 \times 100 \times 1.5 = \$157,50$  of ETH
4. User locks the ETH and MakerDAO mints 100 DAI into existence
5. User returns 100 DAI at a later point, the locked value is return (or liquidated)
6. 100 DAI is burned out of existence

# The Stablecoin Trilemma





# Terra / Luna crash

Stability mechanism:

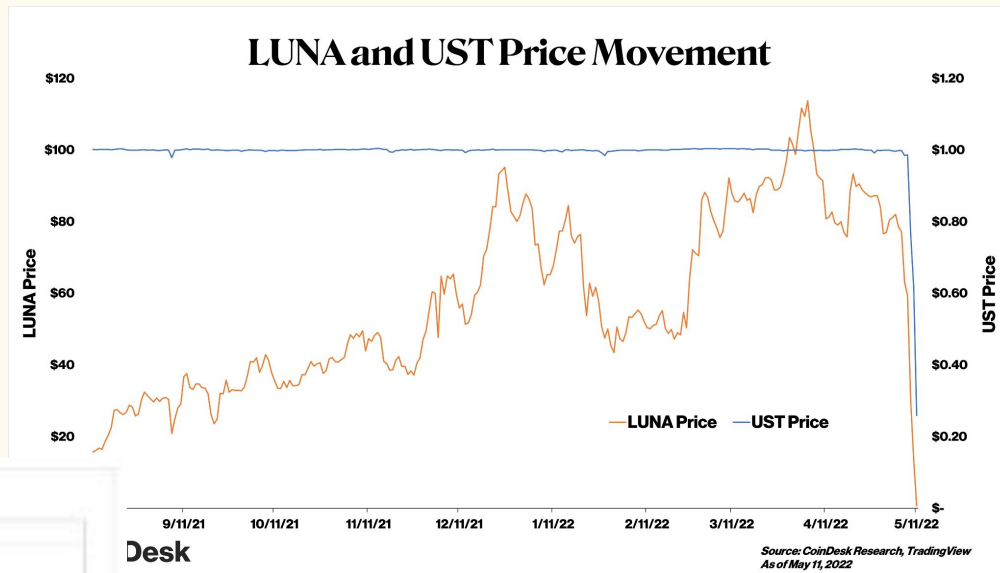
\$1 UST = \$1 LUNA

↑ UST → exchange LUNA for UST

↓ UST → burn UST for LUNA

Emergency: \$2Bn Bitcoin

Incentive: Anchor 20% interest



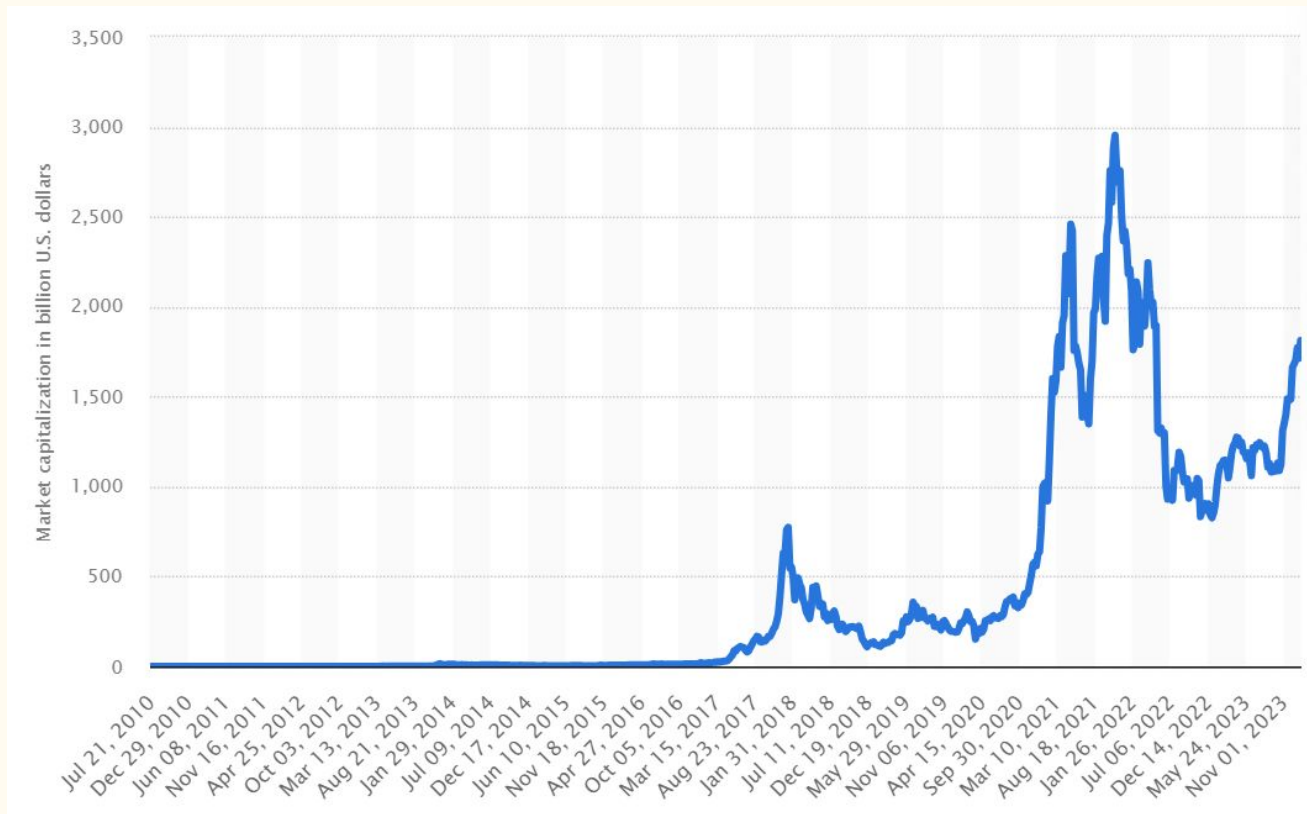
7 May 2022 - \$2Bil UST unstaked

Flood market with UST, price drops  
Huge LUNA mint by everyone  
LUNA crashes, UST crashes

# Does crypto have a future?

5 minutes of total subjectivity

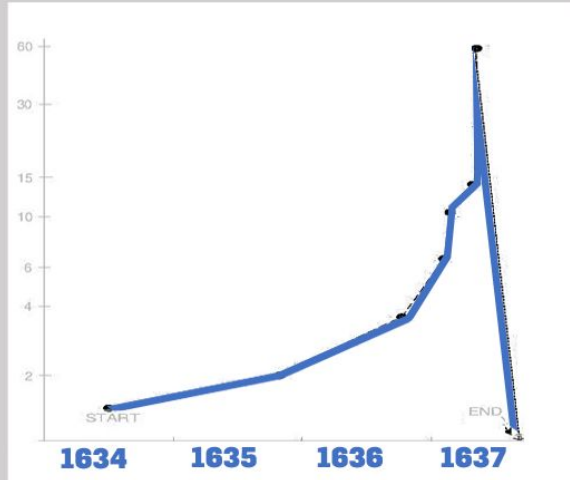
# Crypto market cap 2010 - 2024



Wait, we have seen this before....



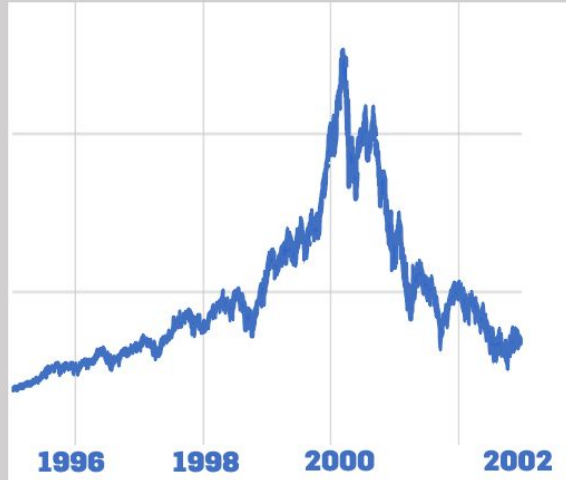
## TULIPMANIA



"The tulipmania: Fact or artifact?" by Earl Thompson



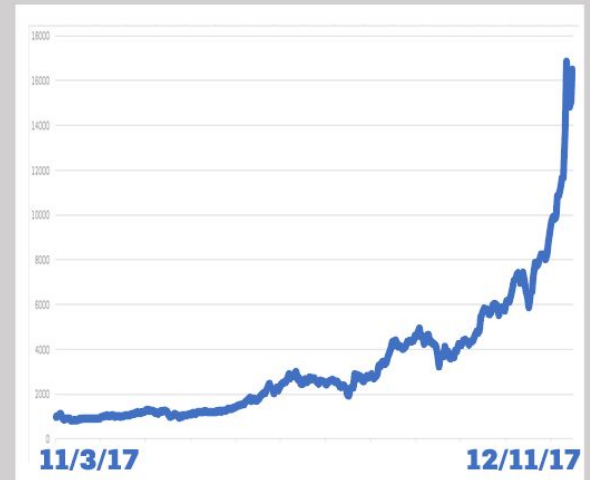
## DOTCOM BOOM



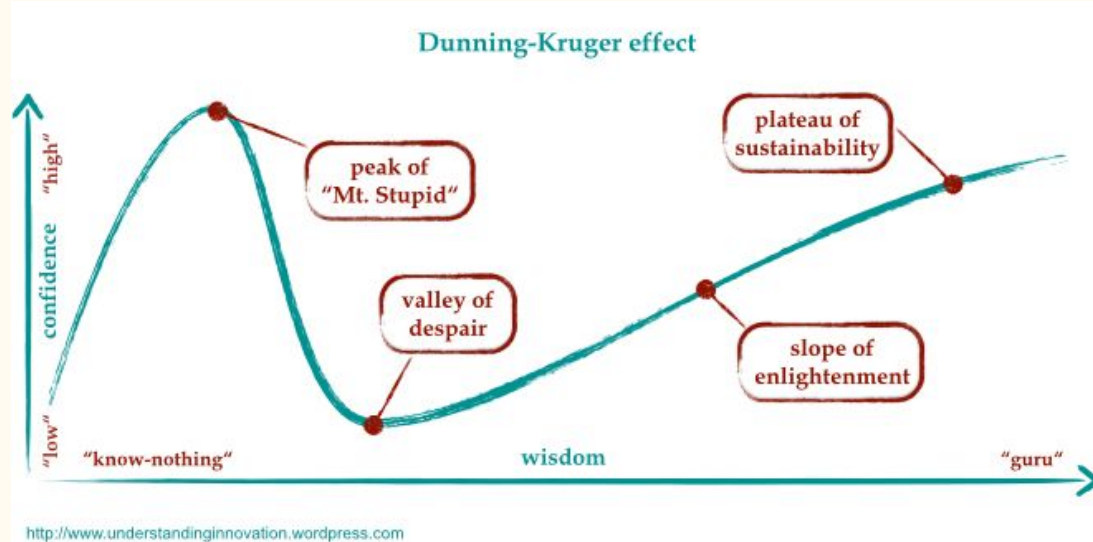
Yahoo Finance



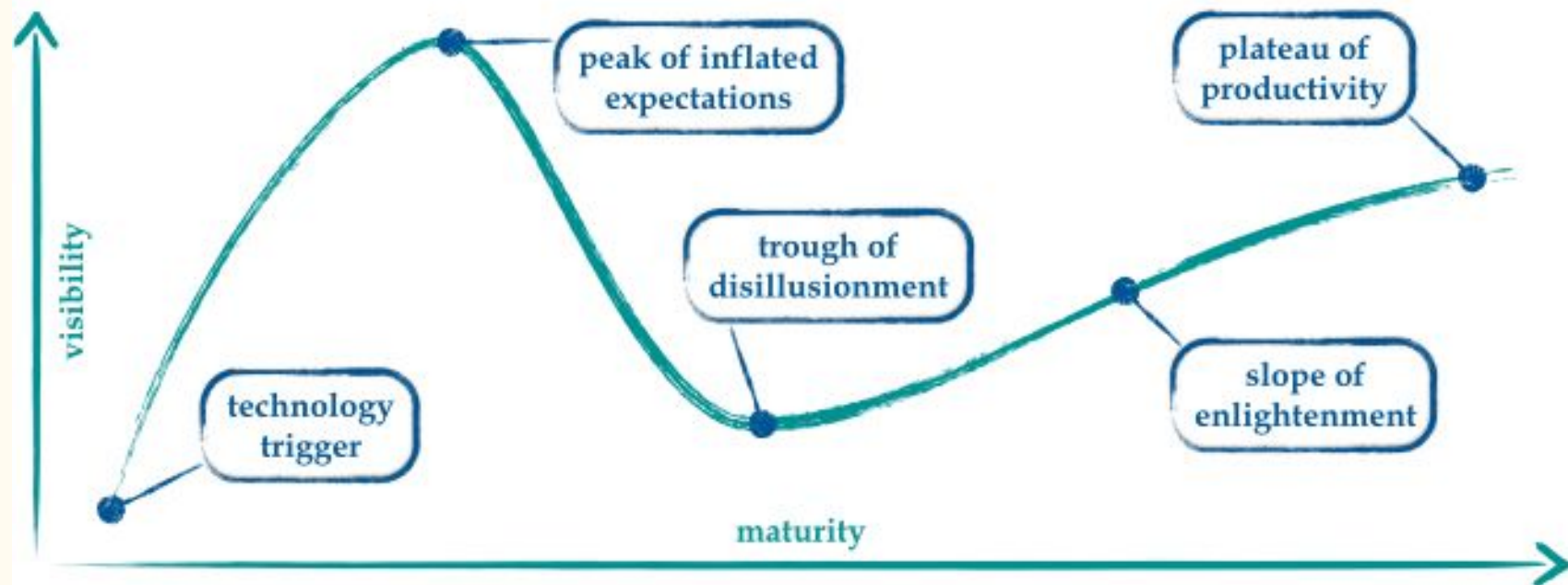
## BITCOIN BOOM



Yahoo Finance



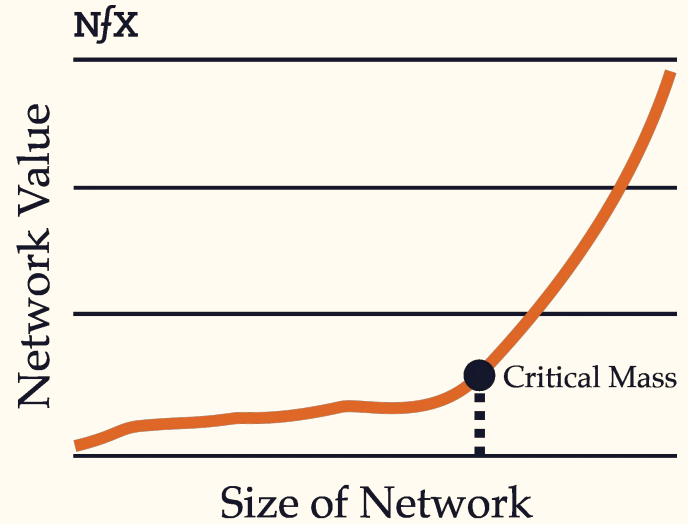
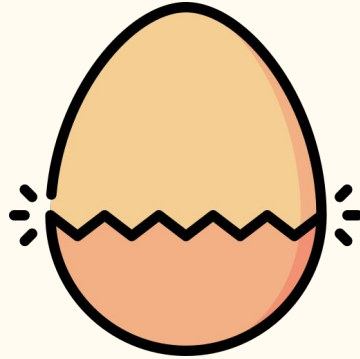
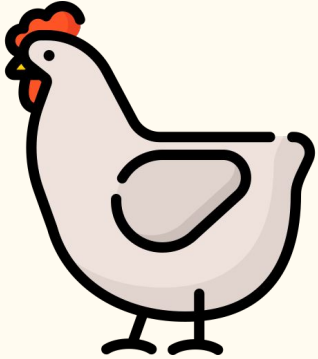
## The cycle of technology hype



# Token Design

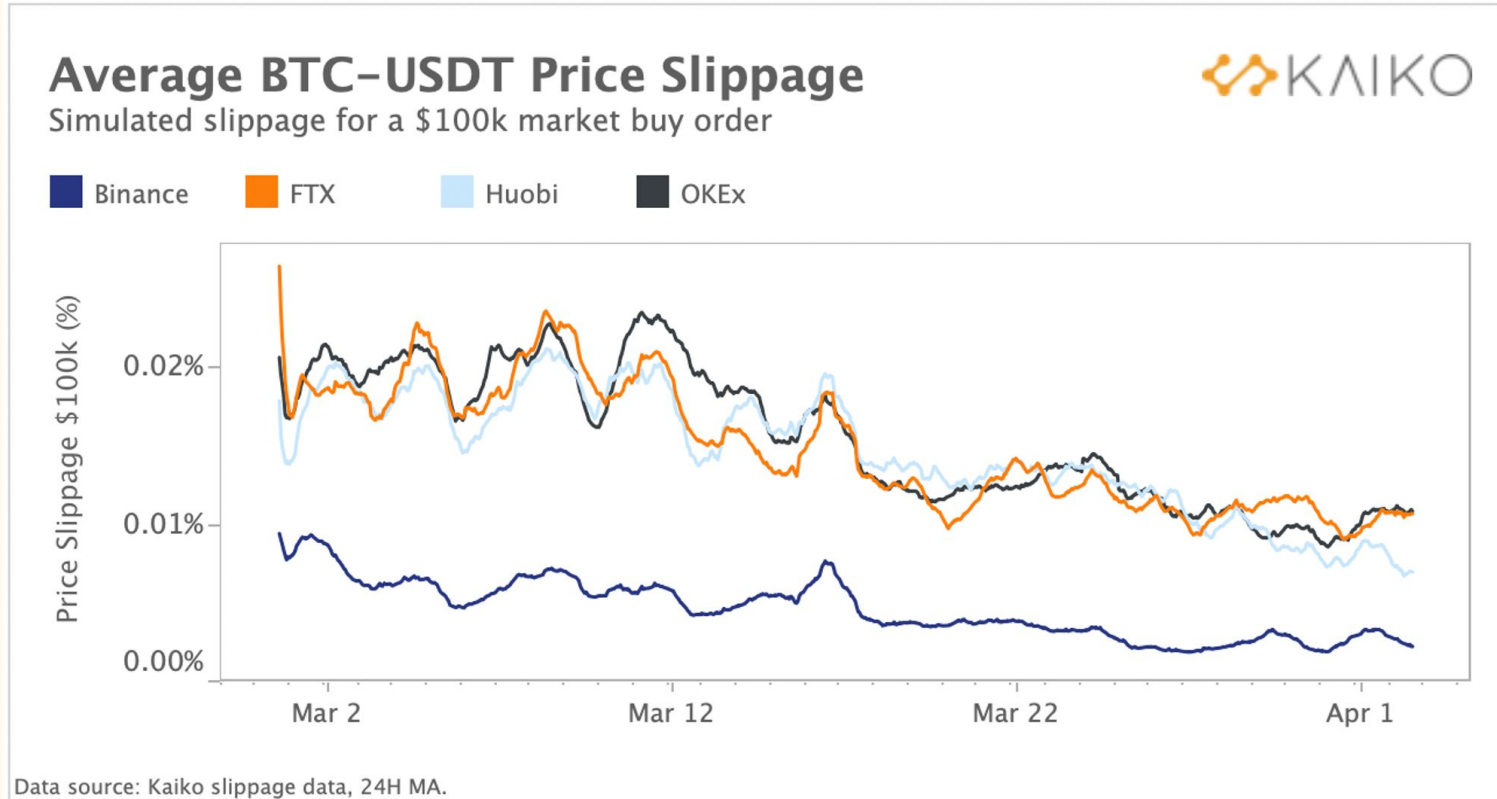
## Network Effects and Incentives

# The bootstrapping problem





# More network = stable utility



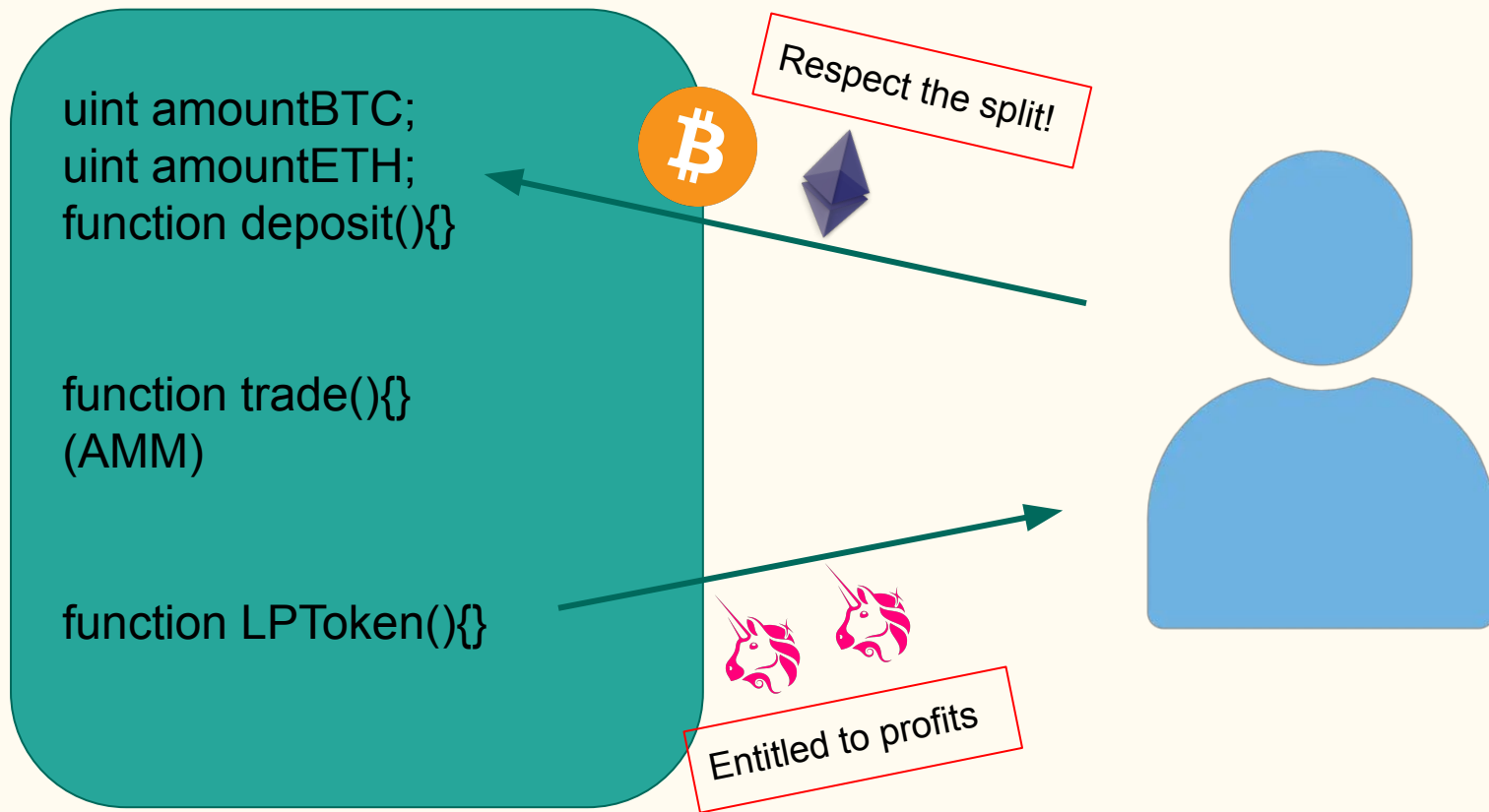
# TradFi can use *force*



- Backed by judiciary and political power
- Centralized and easily controlled - monopoly?
- Entities are able to enforce consequences

In a decentralized world, we can only **incentives**

# Sushi Vs Uni - Vampiric Bootstrapping



# Sushi Vs Uni - Vampiric Bootstrapping



Fork!



Sushi gave its users one more incentive - stake the Sushi token and receive protocol returns (like equity)

BUT

1 Sushi = 1 Uni - only way to receive sushi tokens

Then...

Uni users pumped liquidity into the protocol

Finally

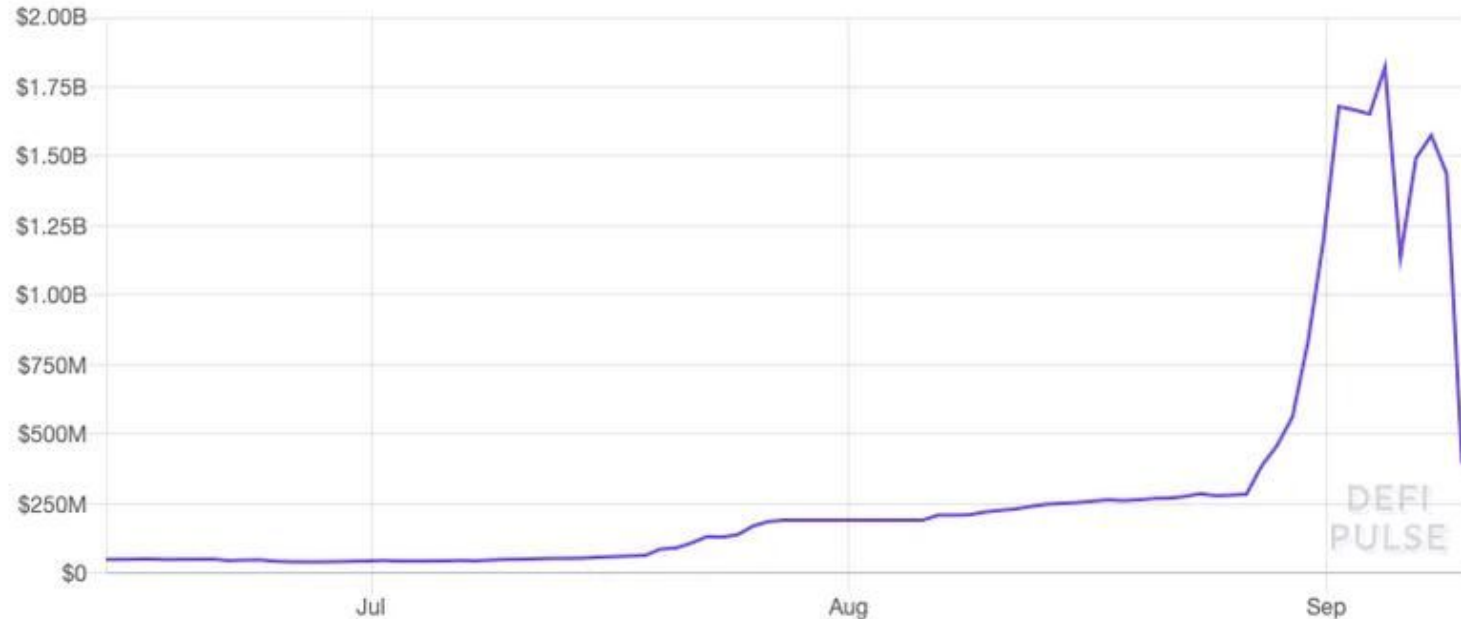
Sushiswap drains 55% of Uniswap's liquidity

# Sushi sucks \$800Mil from Uni

## Total Value Locked (USD) in Uniswap

[TVL\(USD\)](#) | [ETH](#) | [BTC](#) | [DAI](#)

All | 1 Year | [90 Day](#) | 30 Day




# The wrong kind of incentive - NFT wash trading


BTC \$40704 ▼2.26% ETH \$2374.96 ▼3.75% USD1 \$1.001 ▲0.2% BNB \$310.72




[Home/Markets](#) [News Report](#)

## 95% of Trading Volume on LooksRare Linked to Wash Trading

🕒 2 mins

 By [Rahul Nambiampurath](#)  
5 April 2022, 07:15 GMT+0000

 Updated by [Kyle Baird](#)  
5 April 2022, 07:15 GMT+0000



# Tokenomics....

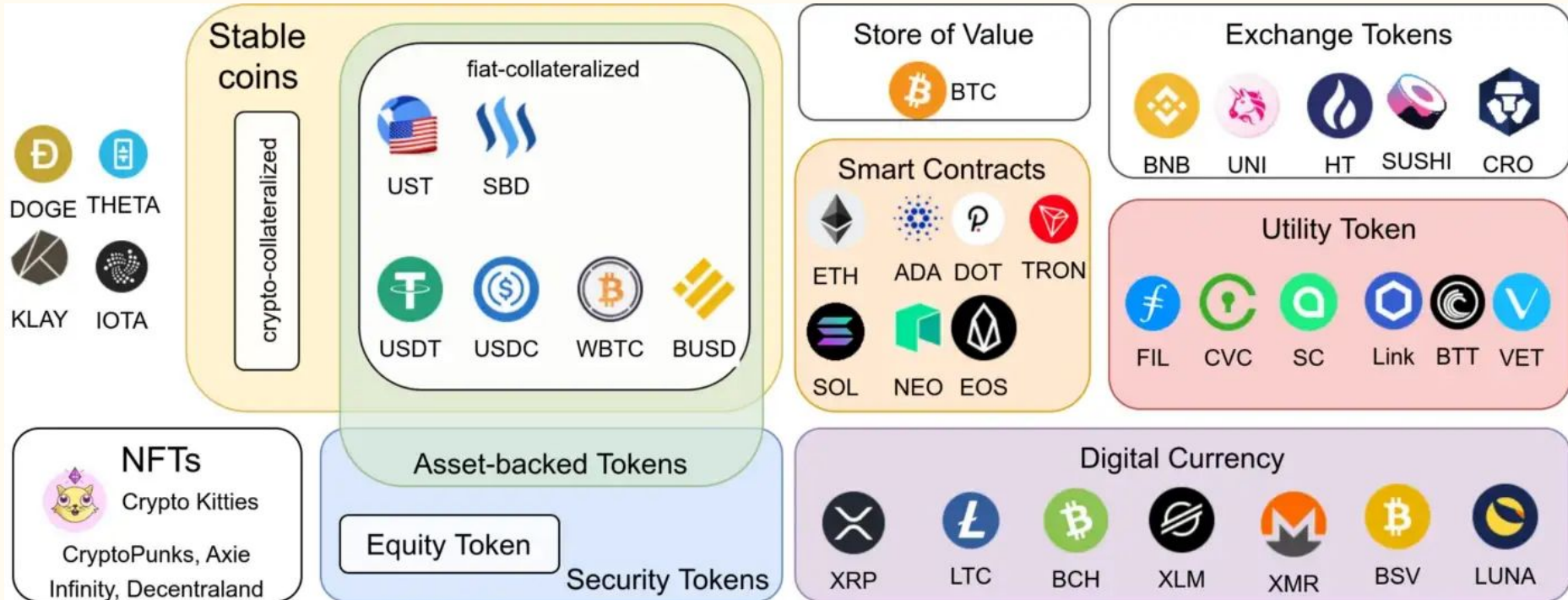
Overcome the initial bootstrapping problem and reach critical mass

Code is CHEAP. Design incentives which empower individual users

Incentives contribute to the utility and security of the protocol

Achieve the correct incentives, then apply traditional economic wisdom

# Tokens - A representation of Value





# Tokenomics - Metrics

Supply, Demand, Valuation

# Token Supply - Definitions

**Max Supply** - The total number of coins that can ever exist

- Bitcoin has a Max supply of 21 Million.
- Solana, Dogecoin has unlimited supply!

**Issuance Rate / Supply schedule** - rate at which coins are minted

- 90% of bitcoin has been mined. Last coin in 120 years
- Affects inflation / deflation of coin

**Circulating Supply** - Amount currently on the market

- Affected by issuance and burning

**Total Supply** - circulating supply plus locked/staked/reserved tokens

- Gap too big - possible market shock if there is supply flood

# Token Supply - Control Mechanics

**Reserve / Lockup** - Company holds coins to prevent it circulation. Worrisome for users if too large, suspect of market manipulation.

**Buyback / Burn** - Company buys back tokens and destroys them to reduce supply, control inflation, boost prices.

**Vesting and penalties** - Amount locked for a certain amount of time, pay a penalty if liquidated early. Drives stability.

**Staking** - locking up funds for services. To receive rewards from nodes or earn yield from lending. Improves stability and ensures continued activity.

# Token Demand Generation

**Community / User base** - How big is the community and how engaged they are.

- Attention Economy - Elon bought Dogecoin
- Artificial Users - trading bots

**Technological Niche** - project solves a technical need of the community.

- Data interactions from on and off chain.
- Consensus Mechanisms
- Trading Mechanisms

**Conversion** - blue ocean strategy, partnerships with existing large web2 companies.  
Developing traditional use cases.

- Celo phone number to wallet mapping / DT SMS API

# Valuation - Market Capitalization

$$\text{Market Cap} = \text{Circulating Supply} \times \text{Coin Price}$$

# Market Capitalization - Example

There are currently 1000 Dauphine Coins in circulation. The current price is \$5 per coin.

**Question 1:** What is the current Market Capitalization?

**Question 2:** Dauphine decides to mint 1000 more coins and puts 500 in a reserve. After the mint, new coin price is \$3. What is the new Market Capitalization?

**Question 3:** A user locks 50 Dauphine Coins for rewards and Dauphine decides to burn 100 coins. Now, price goes up to \$4. What is the new Market Capitalization?

# Valuation - Other Metrics

**Total Addressable Market** - What is the maximum amount of users that your protocol can capture?

**Utility Token Model** - How is the native platform token being used? What need does it address?

**Core Team** - Crypto is very new, what expertise does the core team have? Tech/Finance/Legal mix.

**Community and Partnerships** - Both users and enterprise service providers

**Other Traditional Financial Metrics** - Mostly used by VCs and applicable to exchanges and financial services. P/E ratio, Discounted Cash Flow, etc.

# Putting it in practice

## Token (Incentive) Design

<https://tokenomics-guide.notion.site/1-3-The-Good-The-Bad-and-The-Aligned-3dfc31a65d33497394e3a4965ed90e4b>



# Web3 Uber V1

(A) Role	(B) Desired Behaviors	(C) Frictions to Desired Behaviors	(D) Incentive Mechanisms
Riders	Book rides	Costs money, faster or cheaper alternatives	To make rides cheaper: riders earn 10% of their spending as “ride-to-earn” UBR rewards.
Drivers	Provide rides	Providing rides requires time and money	To make drivers more likely to offer rides, drivers get paid by riders in UBR, and earn 10% extra “drive-to-earn” UBR rewards.

# Web3 Uber V2

(A) Role	(B) Desired Behaviors	(C) Frictions to Desired Behaviors	(D) Incentive Mechanisms
Riders	Book rides	Costs money, faster or cheaper alternatives	Riders can pay drivers in DAI (stablecoin) or get a discount if paying in UBR tokens. In either case, the protocol's fee (X% of payment, where X% is less than Web2 Uber's commission) must be paid in UBR tokens. The protocol's fee is partially burned in each transaction.
Drivers	Provide rides	Providing rides requires time and money	Give driver's a bigger cut of rider's payment (i.e. UBR protocol fee is $<$ Web2 Uber's fee), drivers can keep even bigger cut by locking up UBR.

# Web3 Uber V1 vs V2

(D) Incentive Mechanisms	(E) Supply Effect
To make rides cheaper: riders earn 10% of their spending as “ride-to-earn” UBR rewards.	Increase in token mint
To make drivers more likely to offer rides, drivers get paid by riders in UBR, and earn 10% extra “drive-to-earn” UBR rewards.	Increase in token mint
Riders can pay drivers in a stablecoin or get a discount if paying in UBR tokens. In either case, the protocol’s fee ( $X\%$ of payment, where $X\% < \text{Web2 Uber's commission}$ ) must be paid in UBR tokens. The protocol’s fee is burned after each transaction.	Decrease supply through burning
Give drivers a bigger cut of rider’s payment (i.e. UBR protocol fee is $< \text{Web2 Uber's fee}$ ), drivers can keep even bigger cut by locking up UBR.	Supply stable, increase in incentive mechanisms

# Ponzinomics

- In V1, more and more tokens get minted. Holders get more tokens but how much is it worth?
- There is no way for the protocol to naturally get the minted tokens back. They can buy it back... with what money?
- Beware of protocols promising huge returns and no supply control mechanics. Inflation driven returns are not valuable returns!
- Unless you get in early and pump and dump :(

# Web3 Uber - Unintended incentives

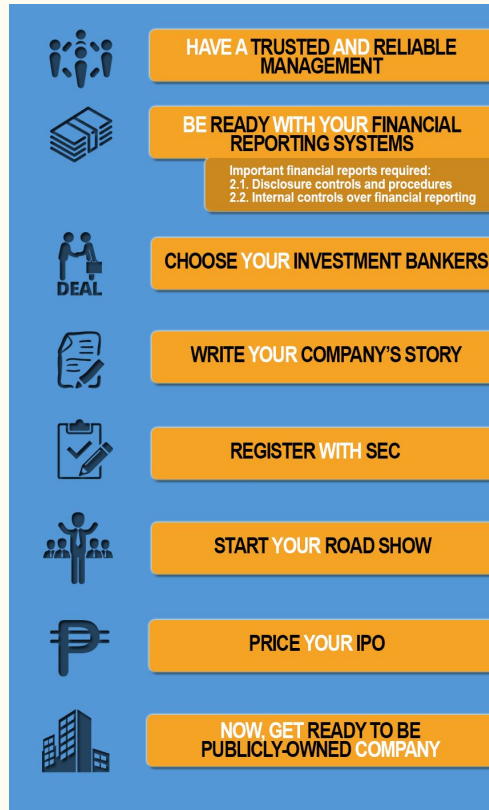
(F) Unintended Incentives	(G) Prevention mechanics
Drivers create many fake riders accounts to earn both rewards	riders with many different drivers earn a stablecoin
Drivers buy UBR from riders on a separate exchange in order to lock up more	Only allow lock up equal to ride amount

# Blockchain Fundraising

ICO, STO, IEO, IDO

# Fundraising - Traditional

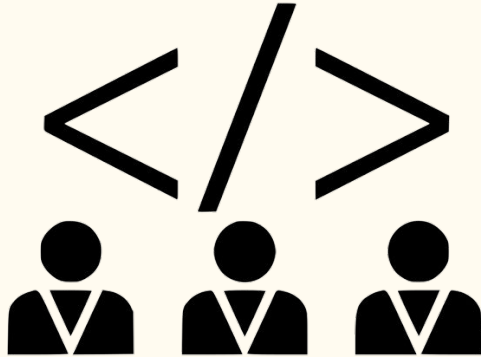
## IPO



## Crowdfunding



# ICO - Initial Coin Offering



1. Offering discounted tokens, utility tokens or STOs
2. Raise capital without VCs. Fast and flexible.
3. High decentralization, low regulation
  - Site not functioning correctly and transactions fail
  - Marketing done by development team
  - Plagued by scams - development team vanishes
4. Users
  - Healthy competition
  - Believers and community
  - Liquidity and developers



xxx.wordpress.com



# STO - Security Token Offering

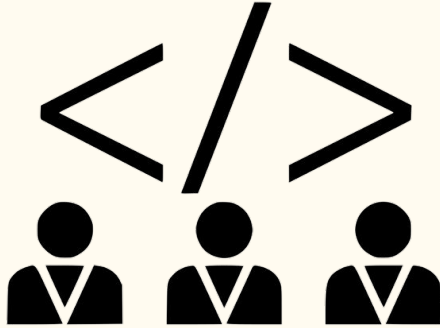
US Securities Act:

A contract, transaction or scheme whereby a person invests his money in a common enterprise and is led to expect profits solely from the efforts of the promoter or a third party.

# STO - Some Examples




- Bitcoin
  - No, Bitcoin has no registered entity that is for profit
- NFT that records ownership of a car
  - No, this is proof of ownership, not profit generation
- DauphineSwap tokens issued by Dauphine university
  - Depends. If Dauphine uses these tokens to open DauphineSwap exchange and give token holders a share of the profit then yes.
  - If the tokens are simply traded by students then not a security.
  - SEC vs Ripple

# IEO - Initial Exchange Offering



1. Similar token offering to ICO
2. Must partner with an exchange! (Binance, FTX)
3. Exchange does the due diligence checks
  - User trust - Exchange reputation
  - Marketing done by exchange
  - Less scams (2% acceptance Binance launchpad)
4. Users
  - Tap into exchange user base
  - Liquidity secure - market making mechanisms

# IDO - Initial DEX Offering

CEX	DEX
  	   
Listing fees Other fees: trade volume, Market Making	No listing fees Other fees: lower but unstable
Opaque vetting process	Community voted
Large or global user base	Small or local user base

<b>Type of Token Sale</b>	<b>Initial Coin Offering (ICO)</b>	<b>Initial Exchange Offering (IEO)</b>	<b>Initial DEX Offering (IDO)</b>
<b>Where Sale Takes Place</b>	Token Issuer's Website	Exchange Platform	DEX (Decentralized Exchange) Launchpad
<b>Centralized vs Decentralized</b>	Centralized	Centralized	Decentralized
<b>KYC Required</b>	Yes	Usually	Sometimes
<b>Due Diligence</b>	By Participant	By Exchange & Participant	By DEX LaunchPad & Participant
<b>Popularity</b>	Highest in 2017	Highest in 2018-19	Highest in 2020-21