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)
```

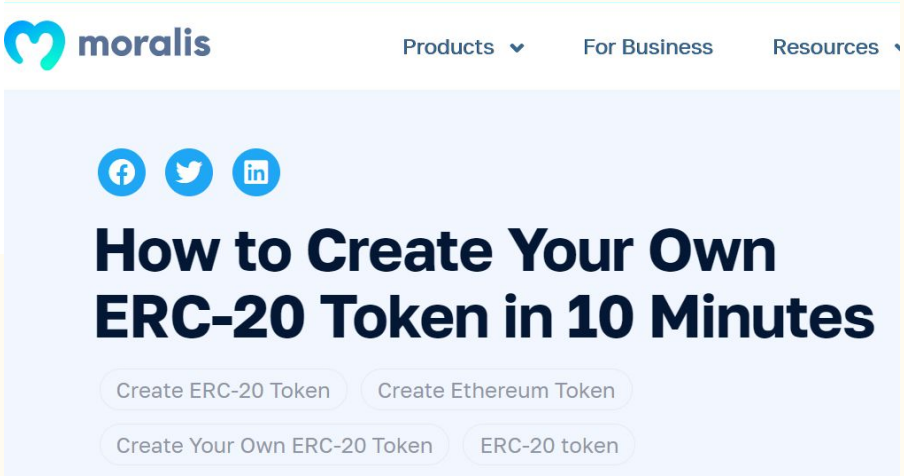
```
function totalSupply() public view returns (uint256)
function balanceOf(address _owner) public view returns (uint256 balance)
function transfer(address _to, uint256 _value) public returns (bool success)
function transferFrom(address _from, address _to, uint256 _value) public returns (bool success)
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

https://wizard.openzeppelin.com/



http://thetokenfactory.com/#/factory

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/0x80934BE6B8B872B364b470Ca30EaAd8AEAC4f63F

Stablecoins

Stability Mechanisms

Stablecoins

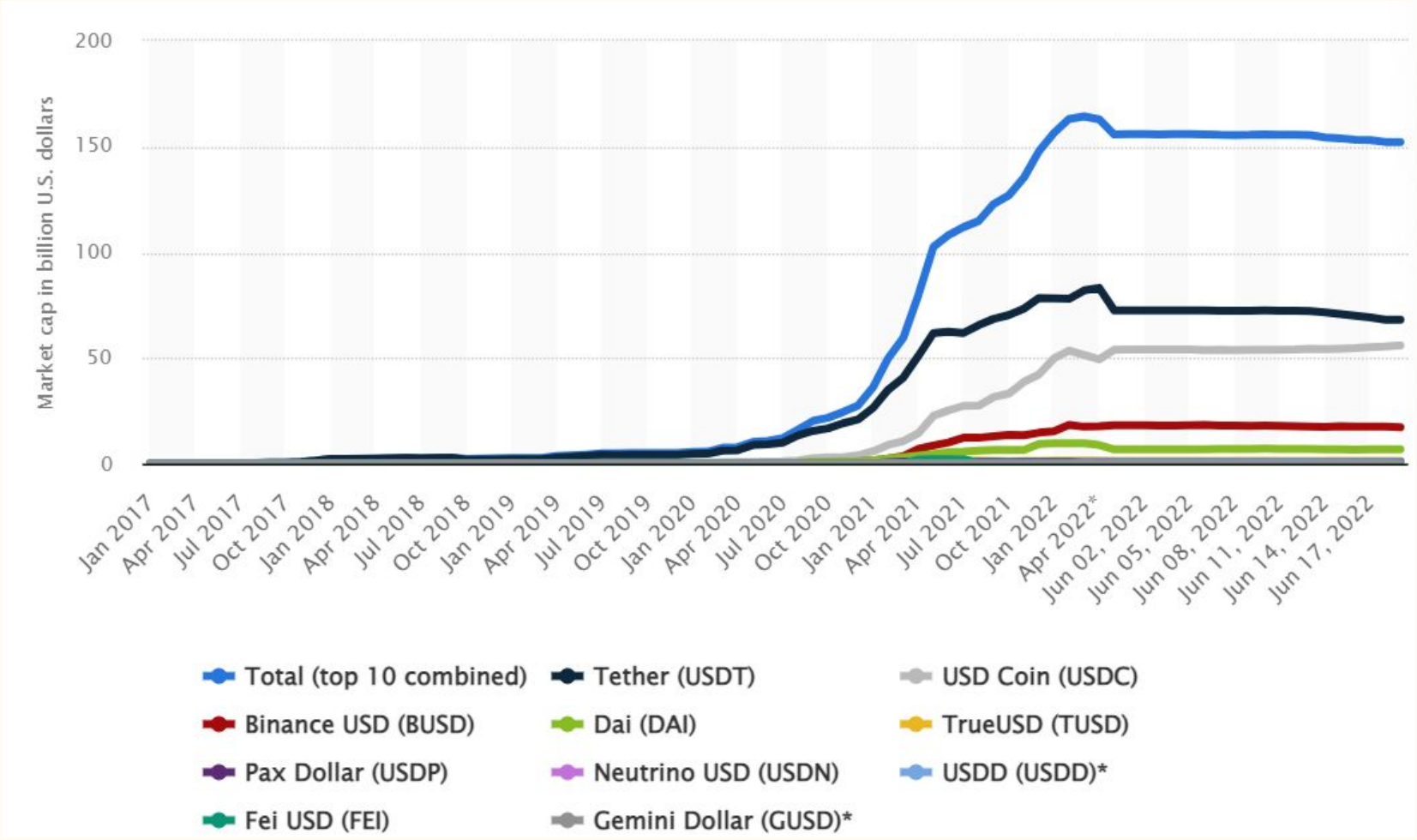
Have a relatively stable value because they are pegged to a target currency.

This target is usually the USD.

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

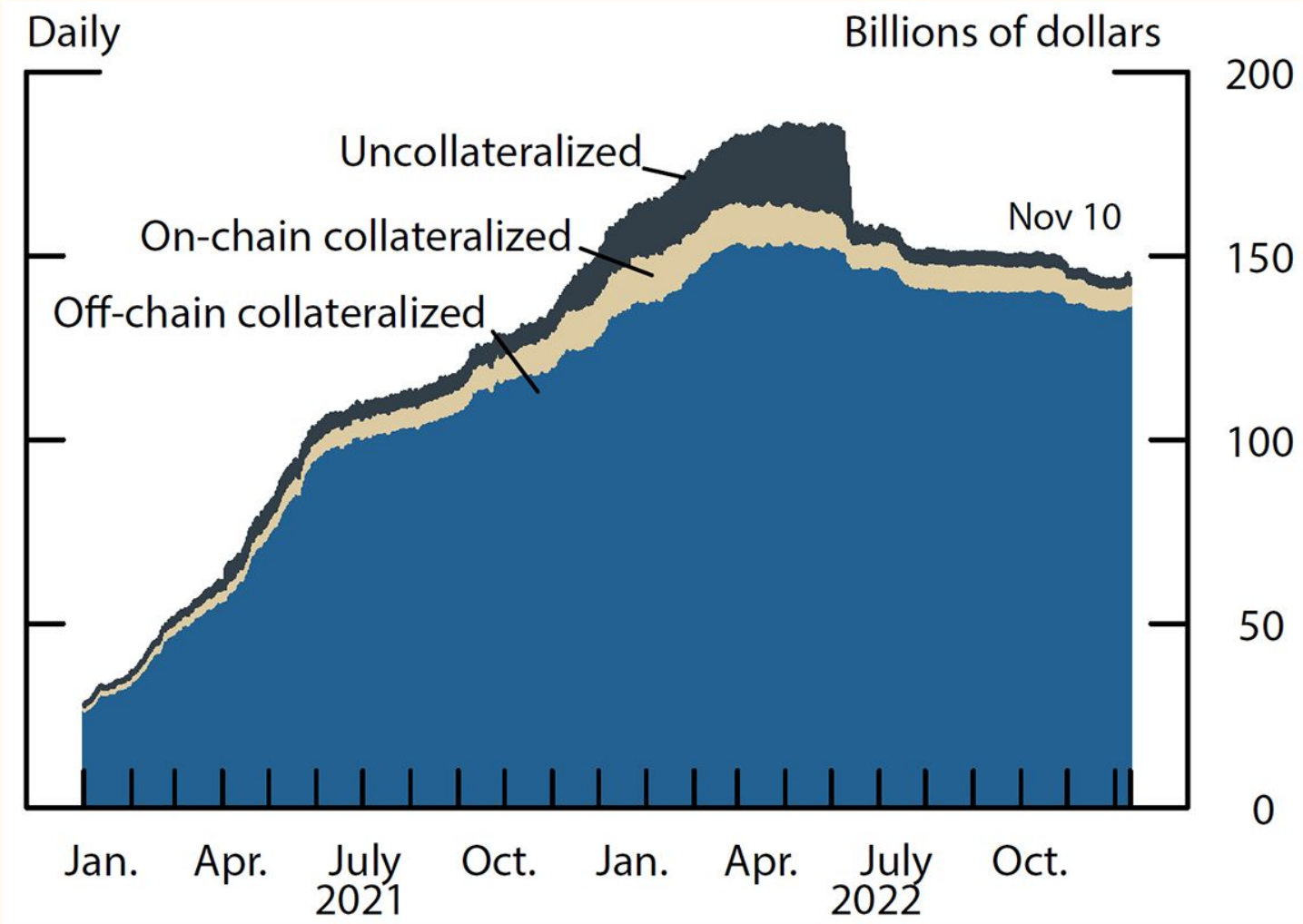
Managing liquidity.

Serve as a medium of exchange between volatile currencies.

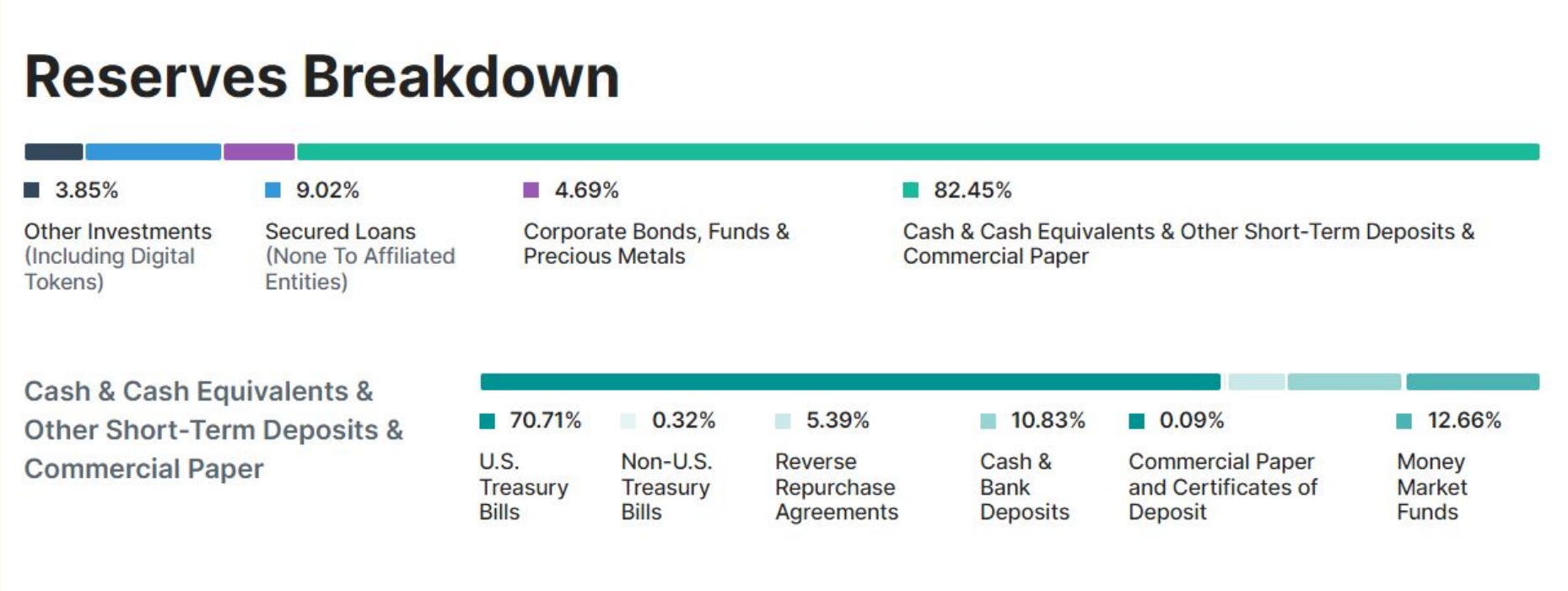

Market cap in billion U.S. dollars
200
150
100
50
0
Jan 2017
Apr 2017
Jul 2017
Oct 2017
Jan 2018
Apr 2018
Jul 2018
Oct 2018
Jan 2019
Apr 2019
Jul 2019
Oct 2019
Jan 2020
Apr 2020
Jul 2020
Oct 2020
Jan 2021
Apr 2021
Jul 2021
Oct 2021
Jan 2022
Apr 2022*
Jun 02, 2022
Jun 05, 2022
Jun 08, 2022
Jun 11, 2022
Jun 14, 2022
Jun 17, 2022
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

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


Daily
Billions of dollars
200
150
100
50
0
Uncollateralized
On-chain collateralized
Off-chain collateralized
Nov 10
Jan.
Apr.
July
Oct.
Jan.
Apr.
July
Oct.
2021
2022

Off Chain Collateralized Stable - Tether



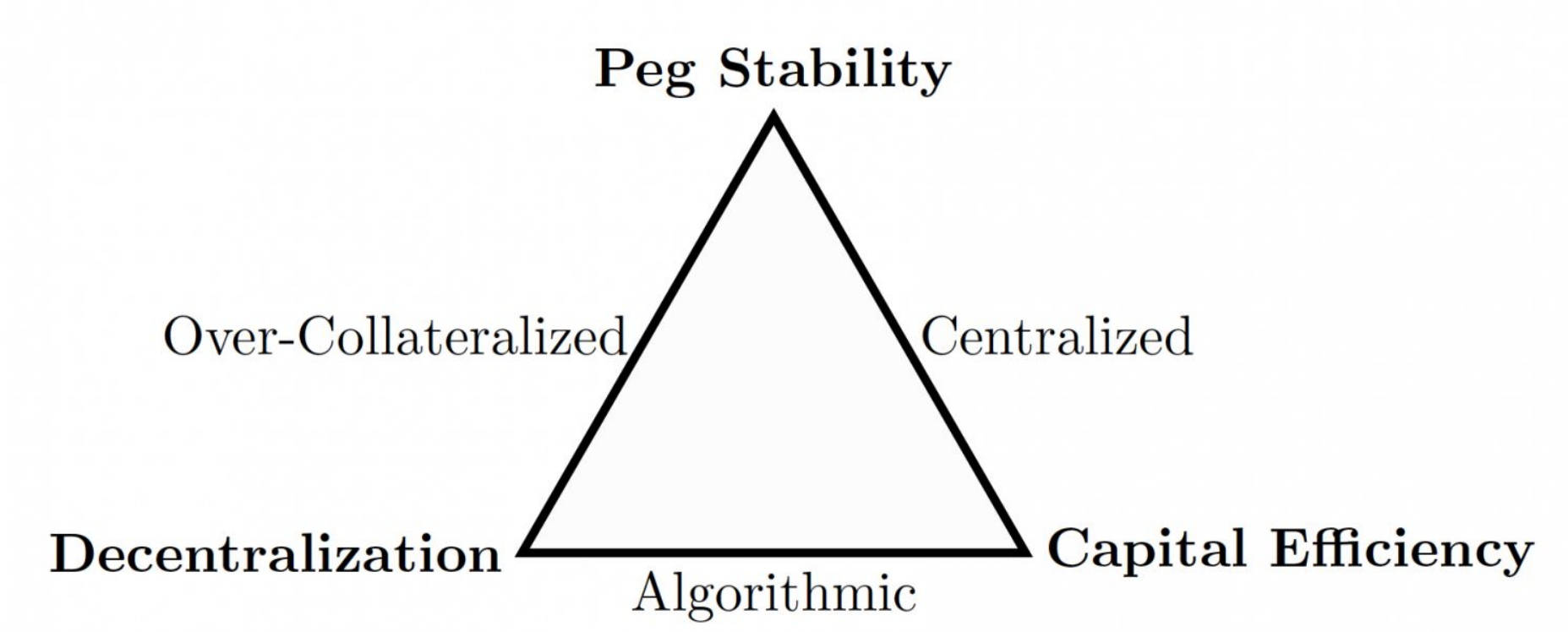
Source: https://tether.to/en/transparency/#reports

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 x 100 x 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

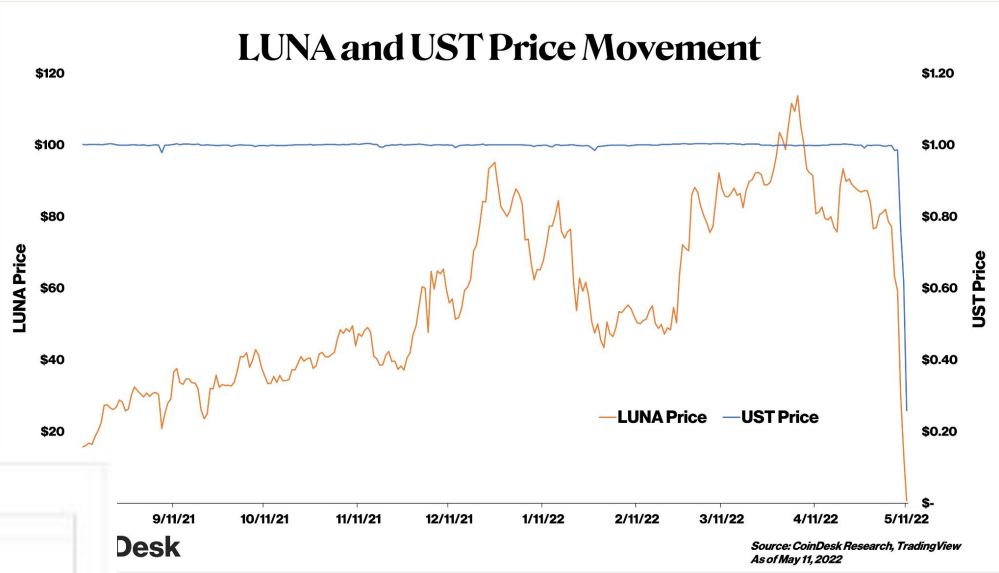
The Stablecoin Trilemma

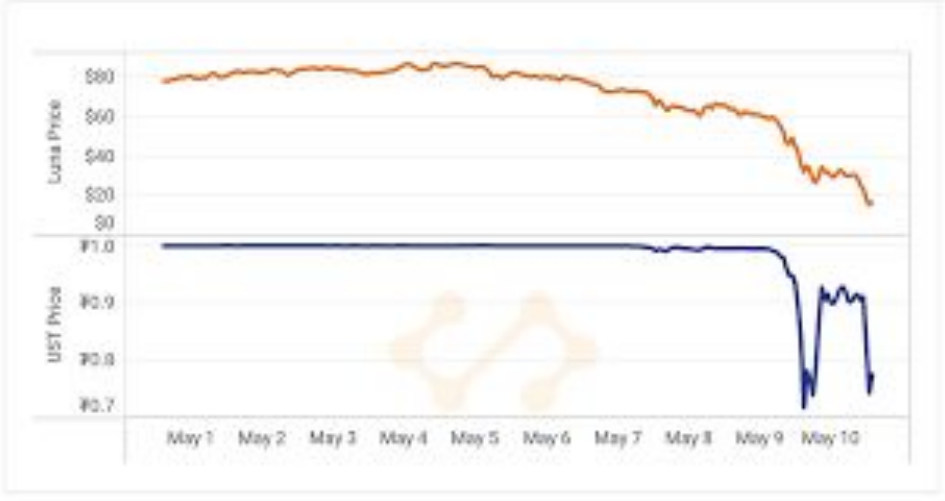


Terra / Luna crash

Stability mechanism:

$1 UST = $1 LUNA
↑ UST → exchange LUNA for UST
↓ UST → burn UST for LUNA





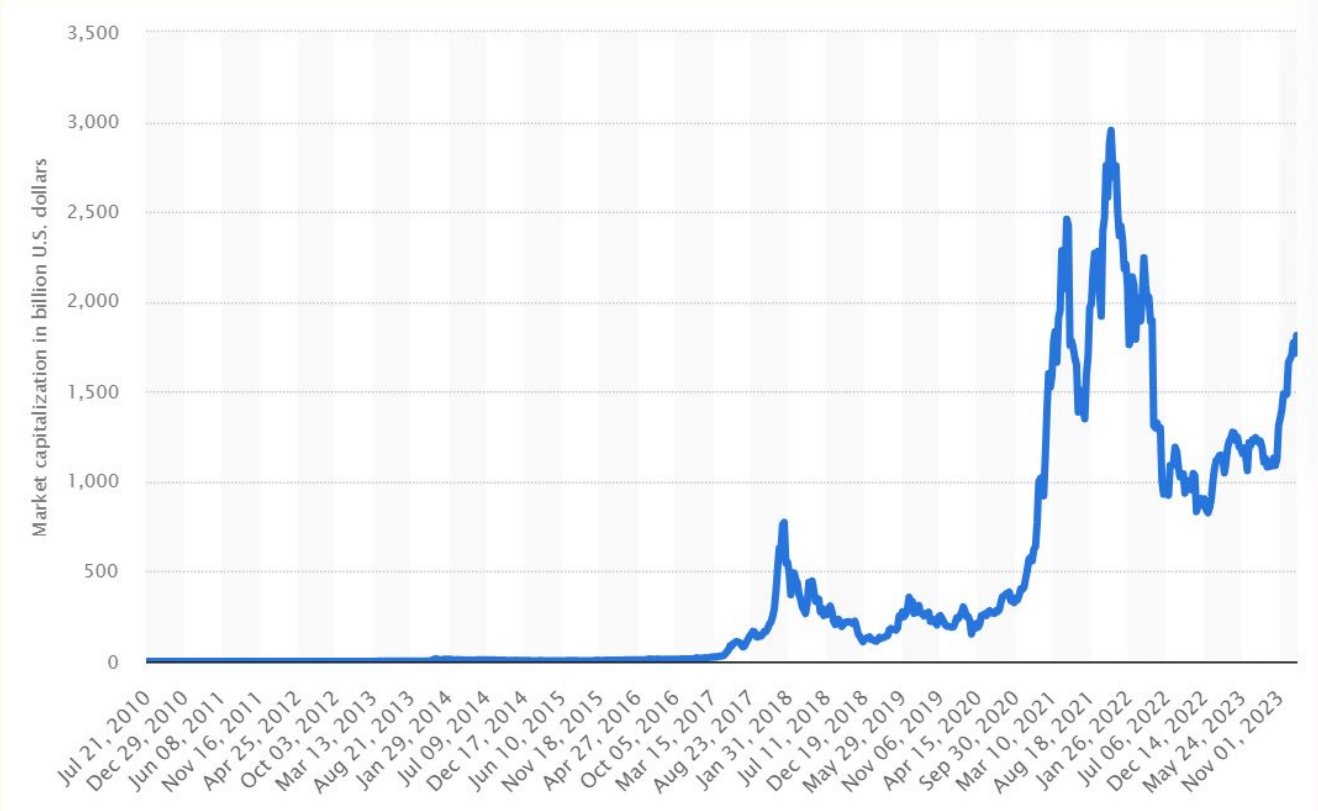
7 May 2022 - $2Bil UST unstaked

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

Does crypto have a future?

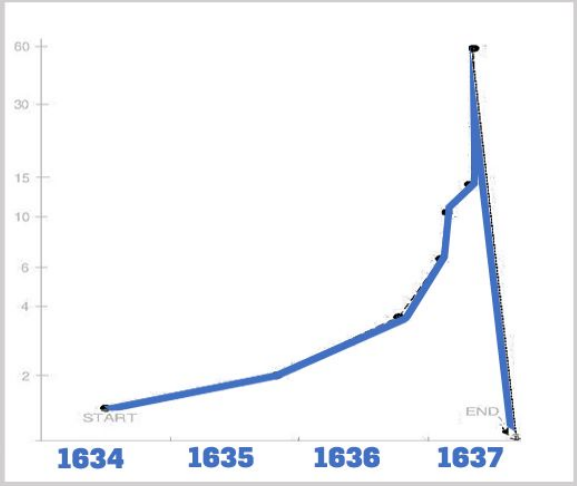
5 minutes of total subjectivity

Crypto market cap 2010 - 2024



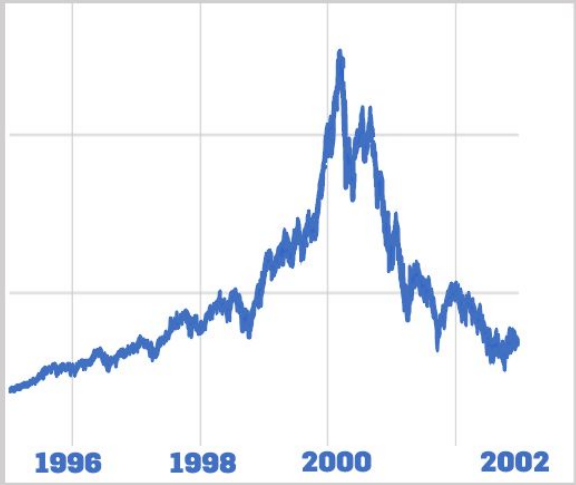
Wait, we have seen this before....

TULIPMANIA



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

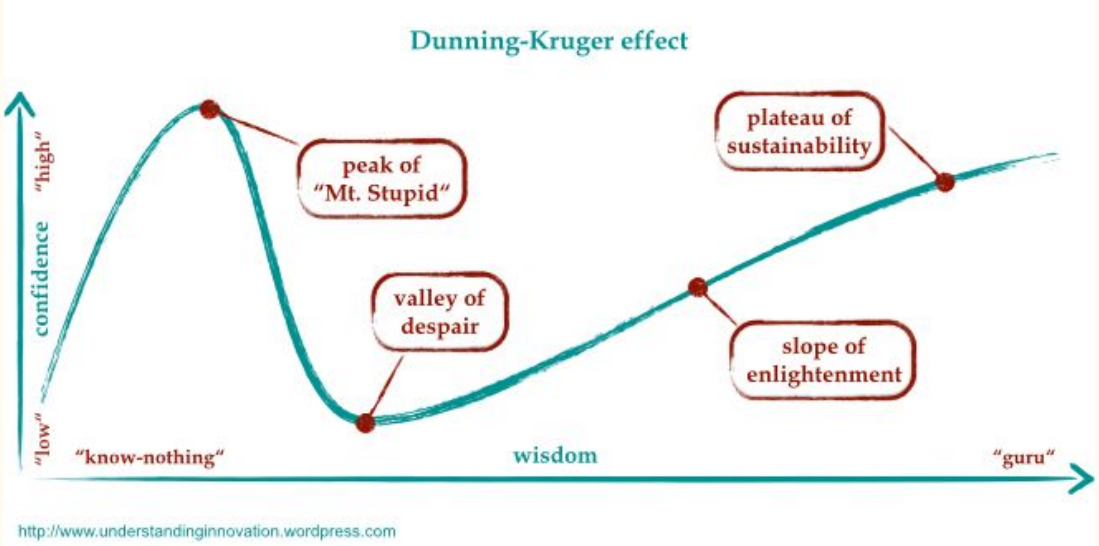
DOTCOM BOOM

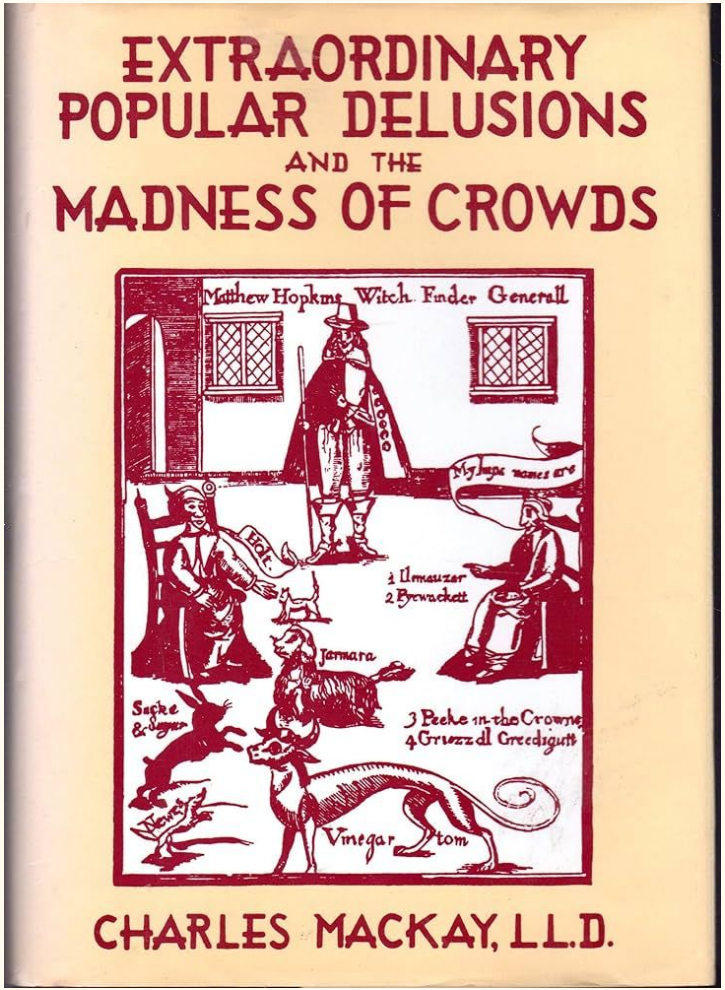


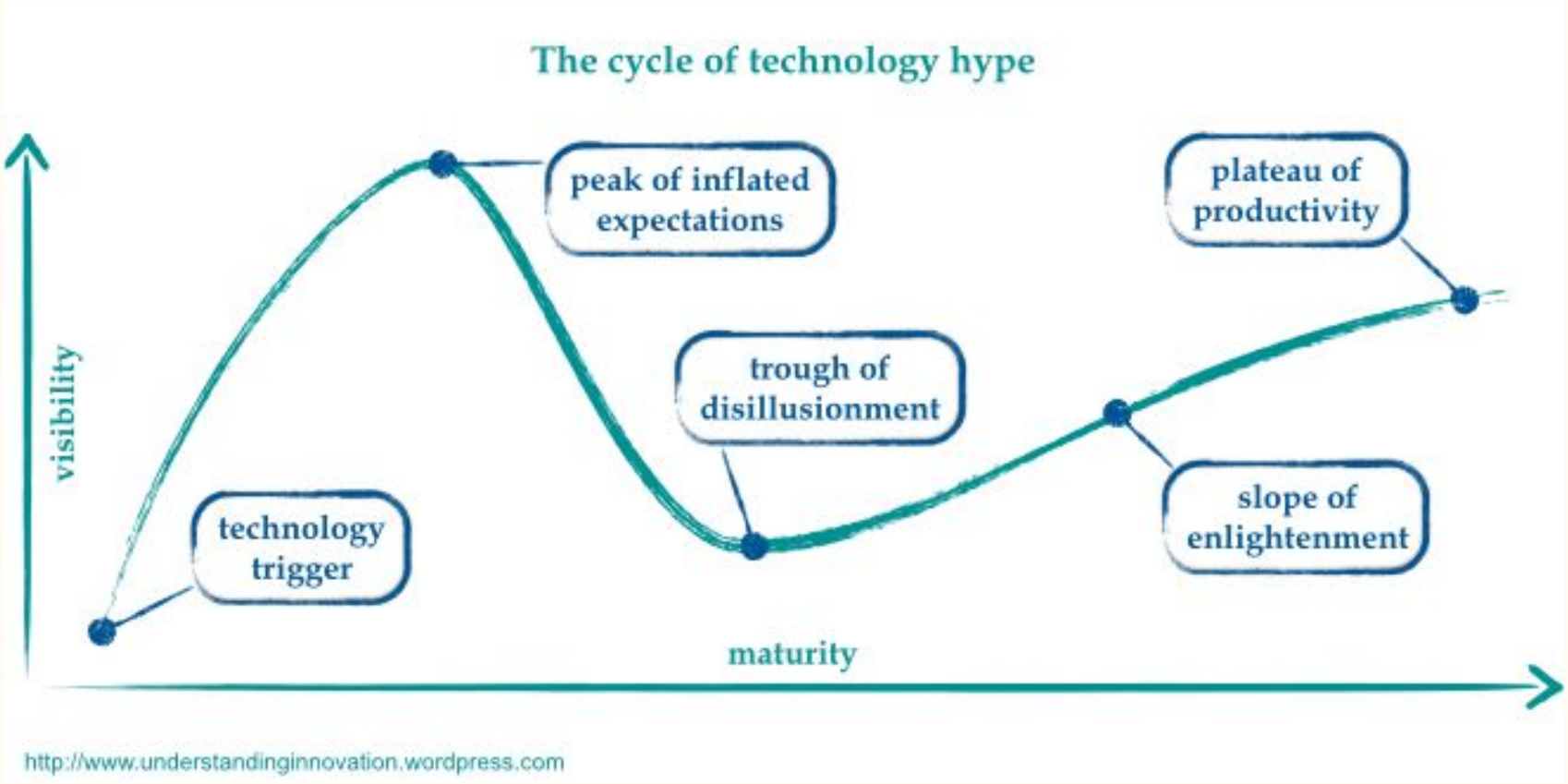
Yahoo Finance

BITCOIN BOOM

Yahoo Finance


Dunning-Kruger effect
confidence
"high"
"low"
peak of "Mt. Stupid"
valley of despair
plateau of sustainability
slope of enlightenment
"know-nothing"
wisdom
"guru"
http://www.understandinginnovation.wordpress.com

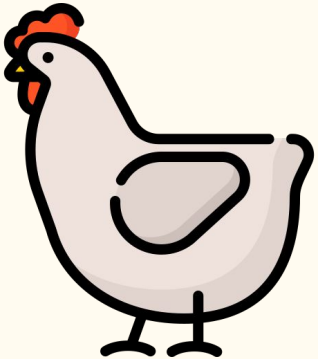

EXTRAORDINARY POPULAR DELUSIONS AND THE MADNESS OF CROWDS
Matthew Hopkins Witch Finder Generall
CHARLES MACKAY, L.L.D.

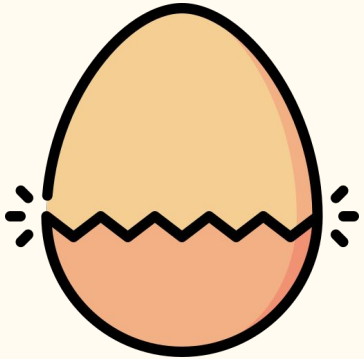

The cycle of technology hype
visibility
technology trigger
peak of inflated expectations
trough of disillusionment
slope of enlightenment
plateau of productivity
maturity
http://www.understandinginnovation.wordpress.com

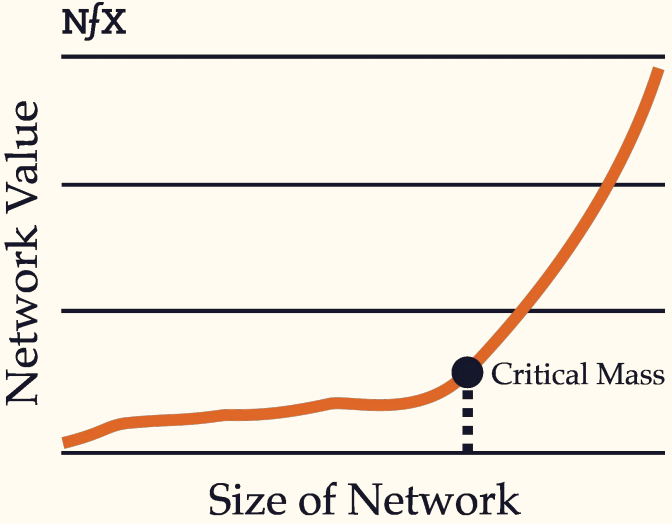
Tokenomics

Network Effects and Incentives

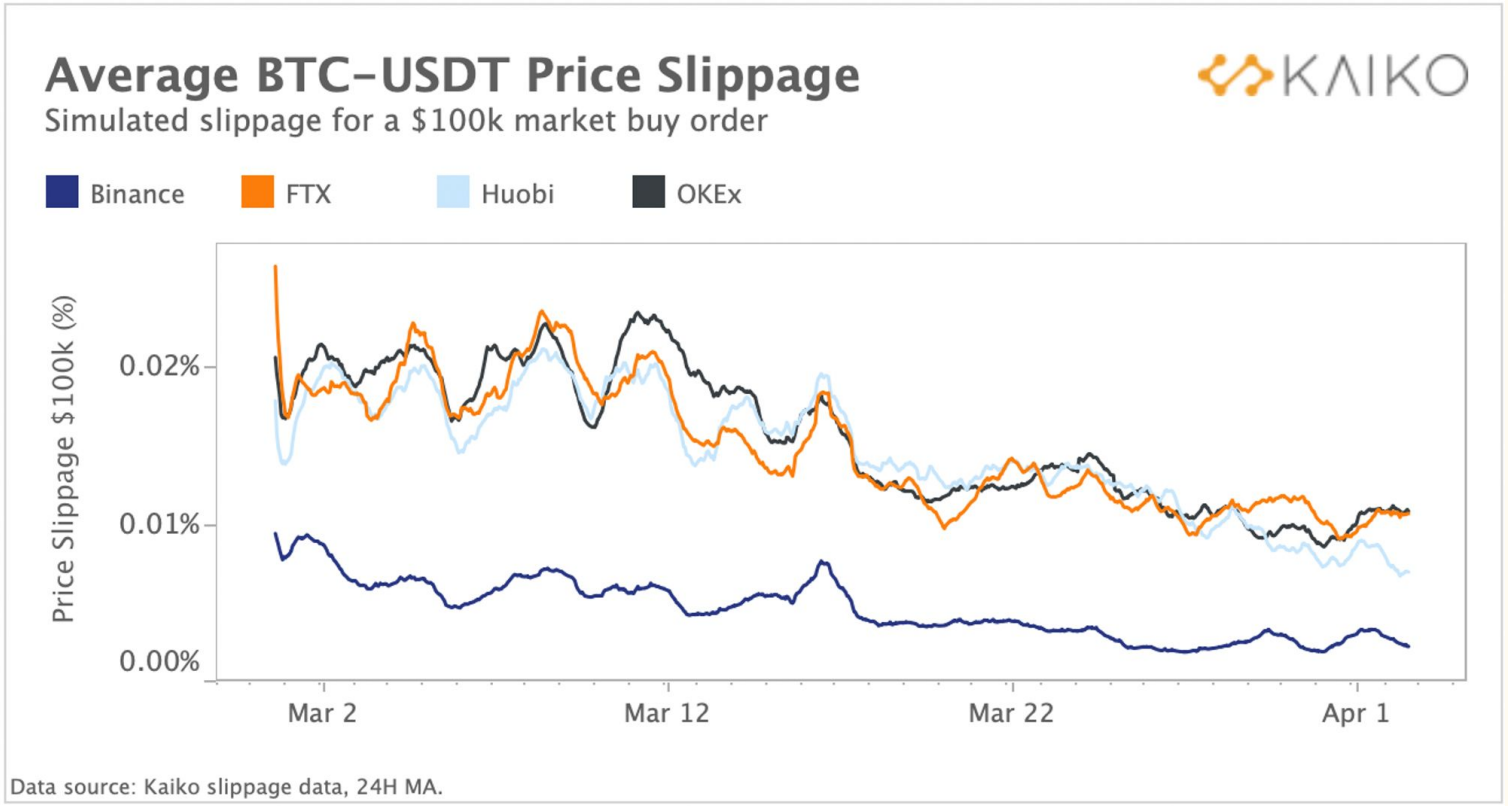
The bootstrapping problem







More network = stable utility

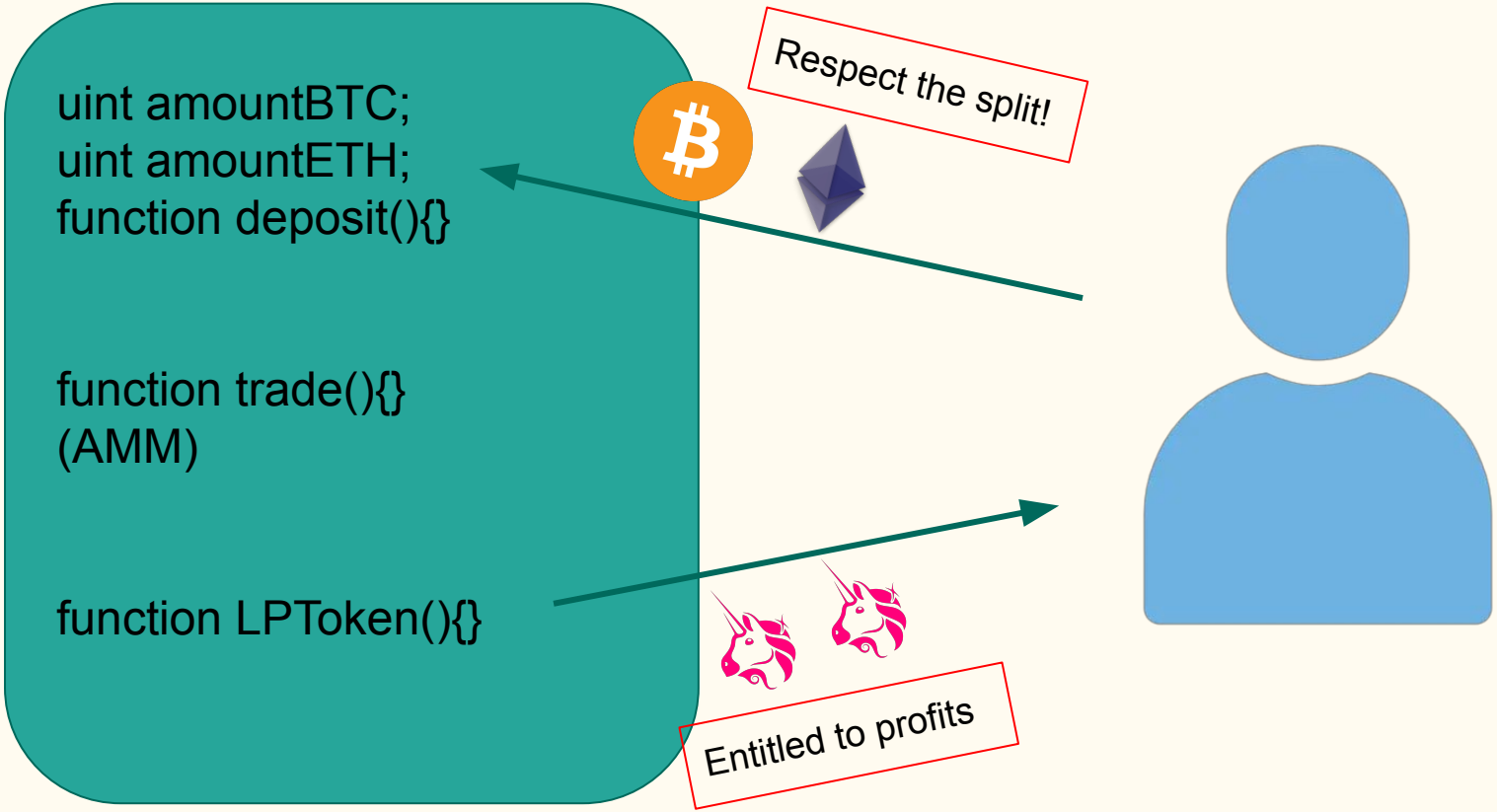


TradFi can use *force*

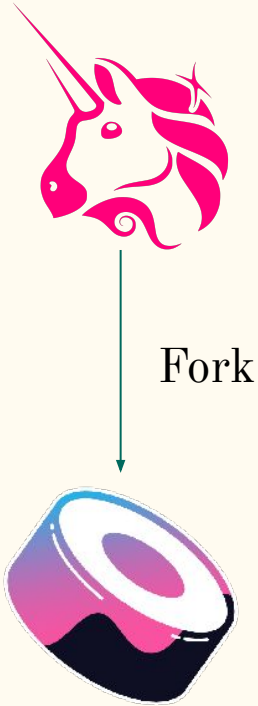
- Backed by judiciary and political political power
- Centralized and easily controlled - monopoly?
- Entities are able to enforce consequences

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

Sushi Vs Uni - Vampiric Bootstrapping



Sushi Vs Uni - Vampiric Bootstrapping



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

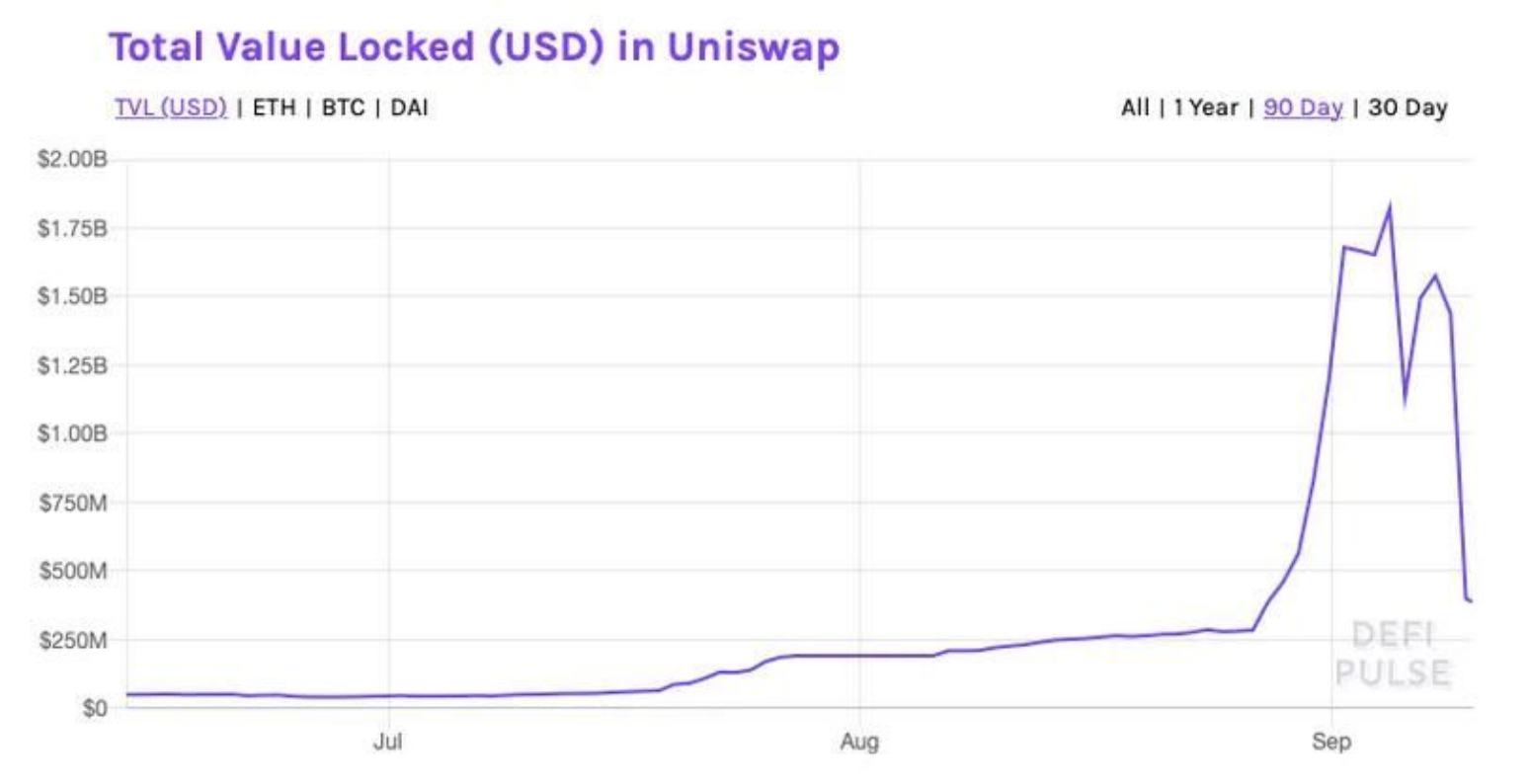
Then...

Uni users pumped liquidity into the protocol

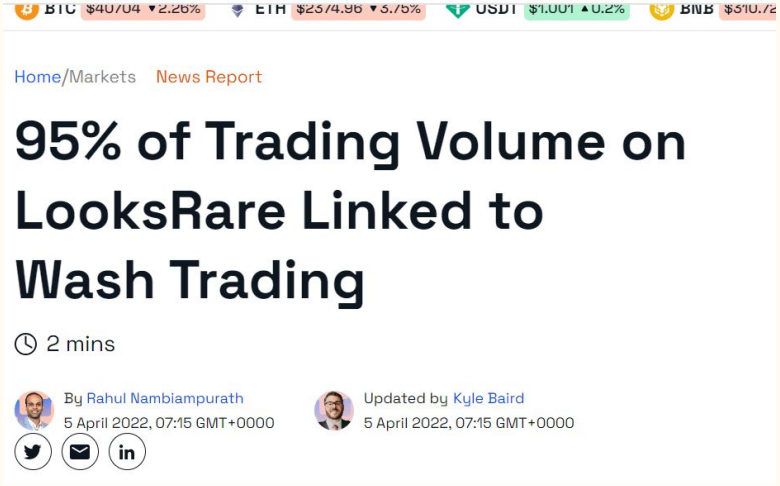
Finally

Sushiswap drains 55% of Uniswap's liquidity

Sushi sucks $800Mil from Uni



The wrong kind of incentive - NFT wash trading



Tokenomics....

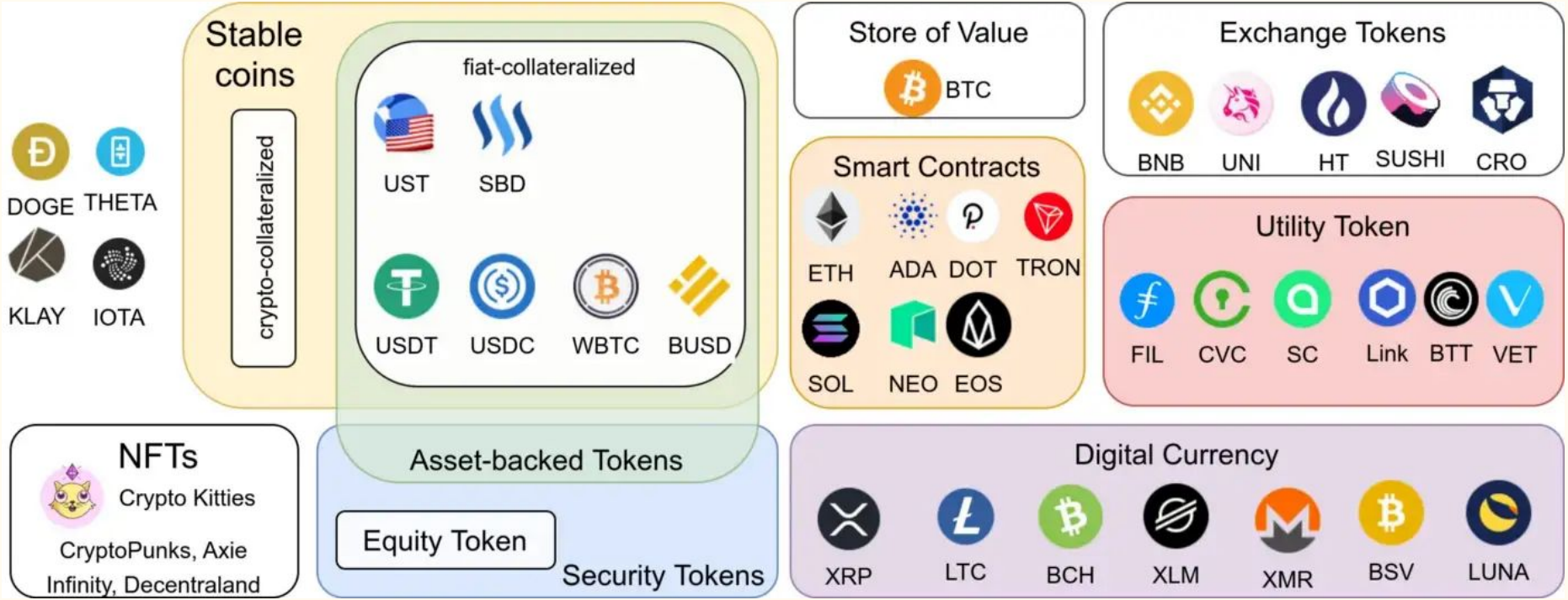
Overcome the initial bootstrapping problem and reach critical mass

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

Market Cap = Circulating Supply x 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

Incentives, supply, demand

https://tokenomics-guide.notion.site/1-3-The-Good-The-Bad-and-The-Aligned-3dfc31a65d3349

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 burned 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% < 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 < 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

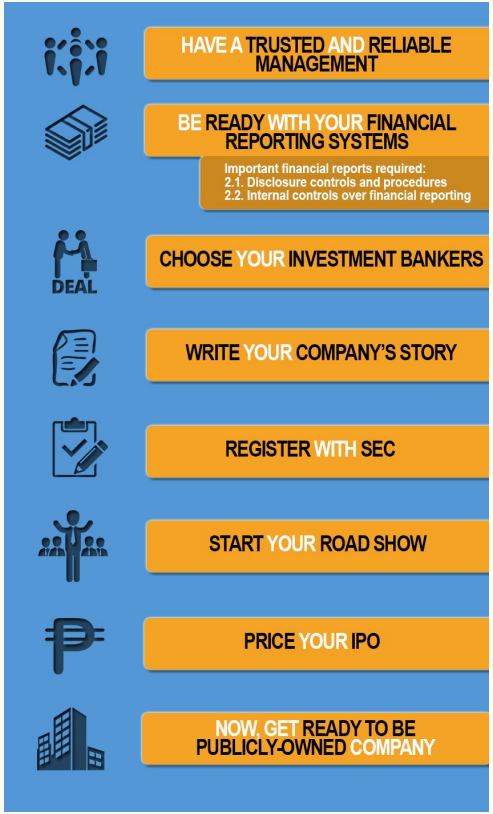
(F) Unintended Incentives	(G) Prevention mechanics
Drivers create many fake riders accounts to earn both rewards	riders with many different drivers earn a stablecoin
Drivers buy UBR from riders on a separate exchange in order to lock up more	Only allow lock up equal to ride amount

Blockchain Fundraising

ICO, STO, IEO, IDO

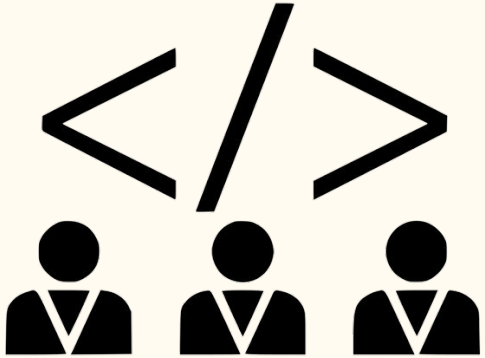
Fundraising - Traditional

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

STO - Security Token Offering

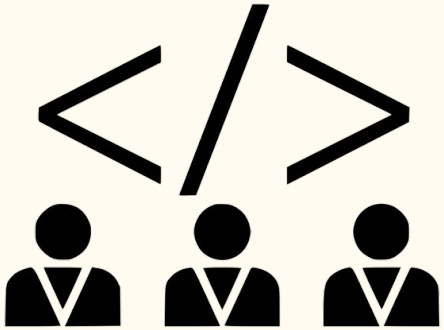
US Securities Act:

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

QUADENCY

TOKEN SALE COMPARISON | ICO, IEO, IDO

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