

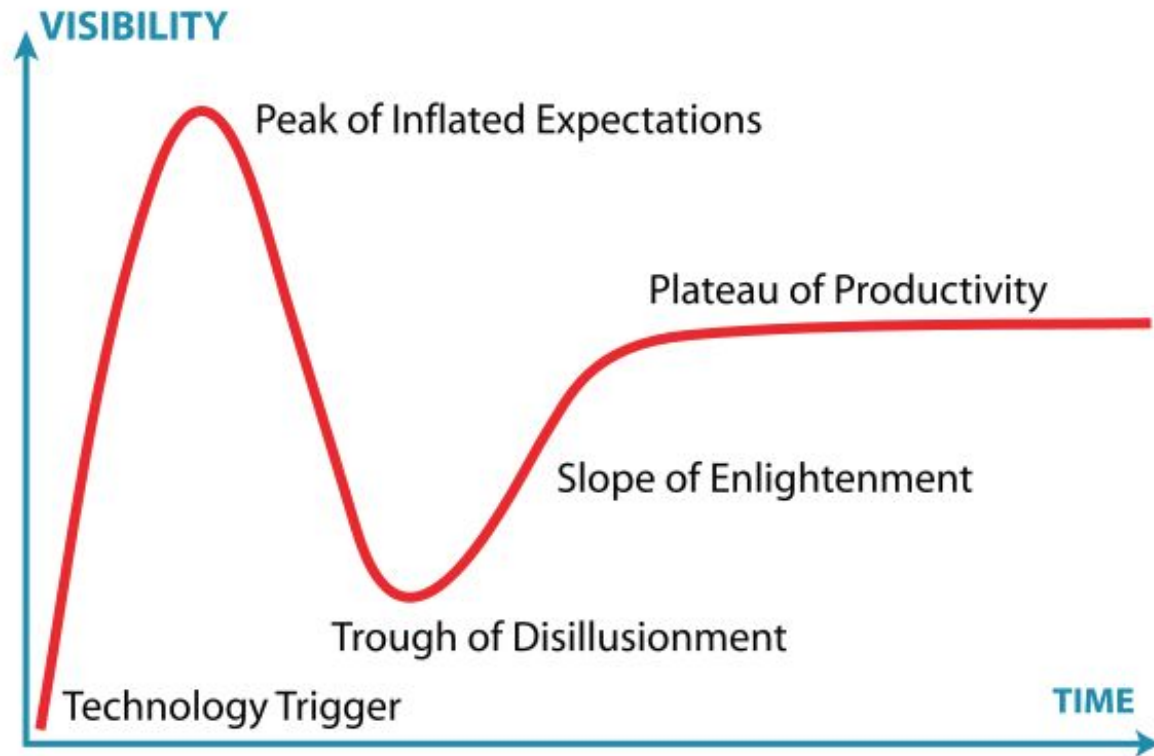
Lauro Grippa Neto

# Hacktoberfest: Blockchain

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# Gartner Hype Cycle





What's a market?



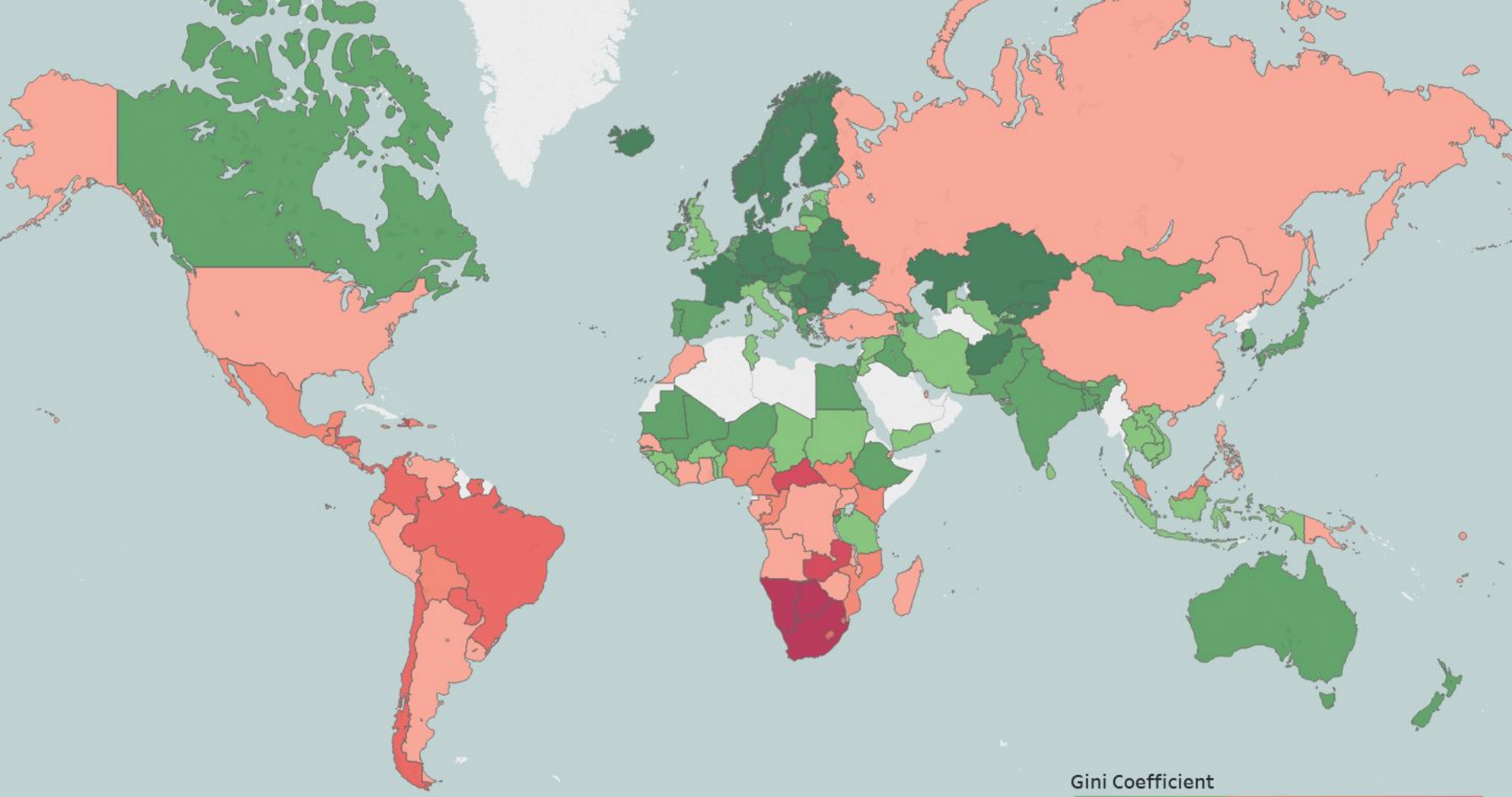
# The need for a currency

- Medium of exchange
- Unit of account
- Store of value



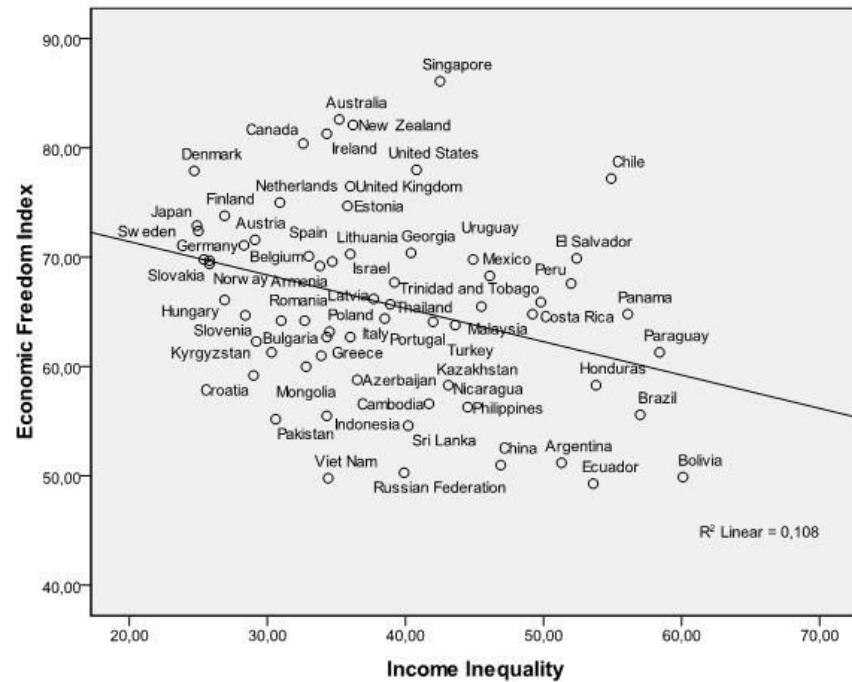






Gini Coefficient

25 30 35 40 45 50 55 60 65



**CYPHERPUNKS TO THE RESCUE?**



# The "Double-spending" problem

"**Double-spending** is the result of successfully spending some money more than once."

# Combating Double-Spending Using Cooperative P2P Systems

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Author(s)[Ivan Osipkov](#) ; [Eugene Y. Vasserman](#) ; [Nicholas Hopper](#) ; [Yongdae Kim](#)[View All Authors](#)[Abstract](#)[Authors](#)[Figures](#)[References](#)[Citations](#)[Keywords](#)[Metrics](#)[Media](#)

## Abstract:

An electronic cash system allows users to withdraw coins, represented as bit strings, from a bank or broker, and spend those coins anonymously at participating merchants, so that the broker cannot link spent coins to the user who withdraws them. A variety of schemes with various security properties have been proposed for this purpose, but because strings of bits are inherently copyable, they must all deal with the problem of double-spending. In this paper, we present an electronic cash scheme that introduces a new peer-to-peer system architecture to prevent double-spending without requiring an on-line trusted party or tamper-resistant software or hardware. The scheme is easy to implement, computationally efficient, and provably secure. To demonstrate this, we report on a proof-of-concept implementation for Internet vendors along with a detailed complexity analysis and selected security proofs.

**Published in:** [Distributed Computing Systems, 2007. ICDCS '07. 27th International Conference on](#)

**Date of Conference:** 25-27 June 2007

**INSPEC Accession Number:** 10290180

**Date Added to IEEE Xplore:** 09 July 2007

**DOI:** [10.1109/ICDCS.2007.91](#)

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**Publisher:** IEEE

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# Distributed Double Spending Prevention\*

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**Abstract.** We study the problem of *preventing* double spending in electronic payment schemes in a *distributed* fashion. This problem occurs, for instance, when the spending of electronic coins needs to be controlled by a large collection of nodes (e.g., in a peer-to-peer (P2P) system) instead of one central bank. Contrary to the commonly held belief that this is fundamentally impossible, we propose several solutions that do achieve a reasonable level of double spending prevention, and analyse their efficiency under varying assumptions.

## 1 Introduction

Many electronic payment schemes exist. For an overview, we refer to Asokan *et al.* [AJSW97] or O'Mahony *et al.* [OPT97]. Some of those are coin based, where some bitstring locally stored by a user represents a certain fixed value.

Coin based systems run the risk that many copies of the same bitstring are spent at different merchants. Therefore, these systems need to incorporate *double spending* prevention or detection techniques. To *prevent* double spending, a central bank is usually assumed which is involved in each and every transaction. In off-line scenarios (where such a connection to a central bank is not available), double spending *detection* techniques are used that will discover double spending at some later time, and that allow one to find the perpetrator of this illegal activity. A major drawback of double spending detection techniques is the risk that a dishonest user spends a single coin a million times in a short period of time before being detected. This is especially a problem if such a user cannot be punished for such behaviour afterwards, e.g., fined, penalised judicially, or being kicked from the system permanently.

\* This research is/was partially supported by the research program Sentinels ([www.sentinels.nl](http://www.sentinels.nl)), project JASON (NIT.6677). Sentinels is being financed by Technology Foundation STW, the Netherlands Organization for Scientific Research (NWO), and the Dutch Ministry of Economic Affairs.  
Id: double-spending.tex 18 2008-02-06 14:01:34Z jhh



## Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto  
satoshin@gmx.com  
www.bitcoin.org

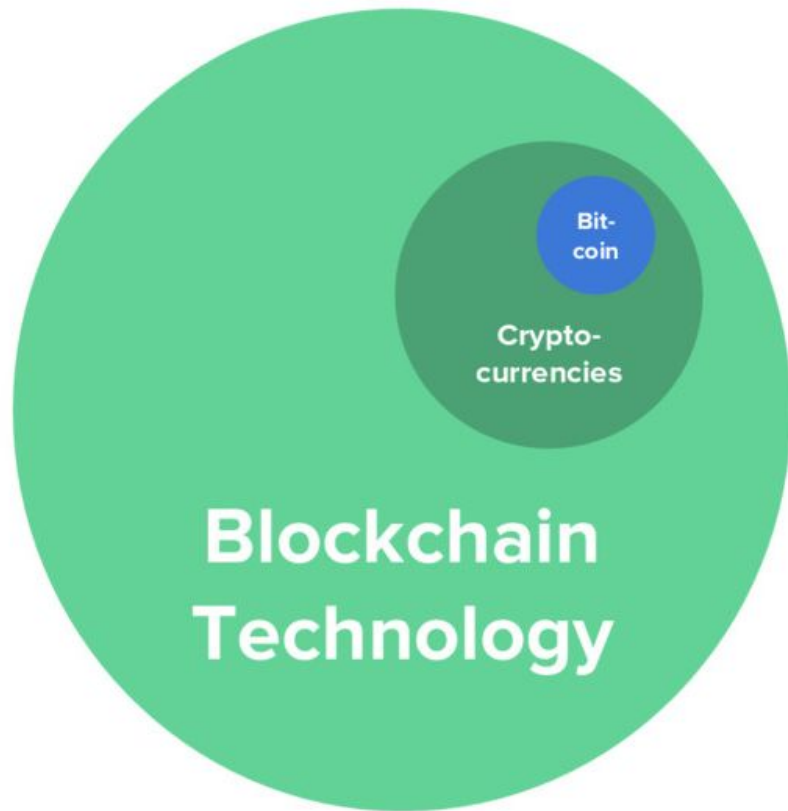
**Abstract.** A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

### 1. Introduction

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust based model. Completely non-reversible transactions are not really possible, since financial institutions cannot avoid mediating disputes. The cost of mediation increases transaction costs, limiting the minimum practical transaction size and cutting off the possibility for small casual transactions, and there is a broader cost in the loss of ability to make non-reversible payments for non-reversible services. With the possibility of reversal, the need for trust spreads. Merchants must be wary of their customers, hassling them for more information than they would otherwise need. A certain percentage of fraud is accepted as unavoidable. These costs and payment uncertainties can be avoided in person by using physical currency, but no mechanism exists to make payments over a communications channel without a trusted party.

What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. The system is secure as long as honest nodes collectively control more CPU power than any cooperating group of attacker nodes.

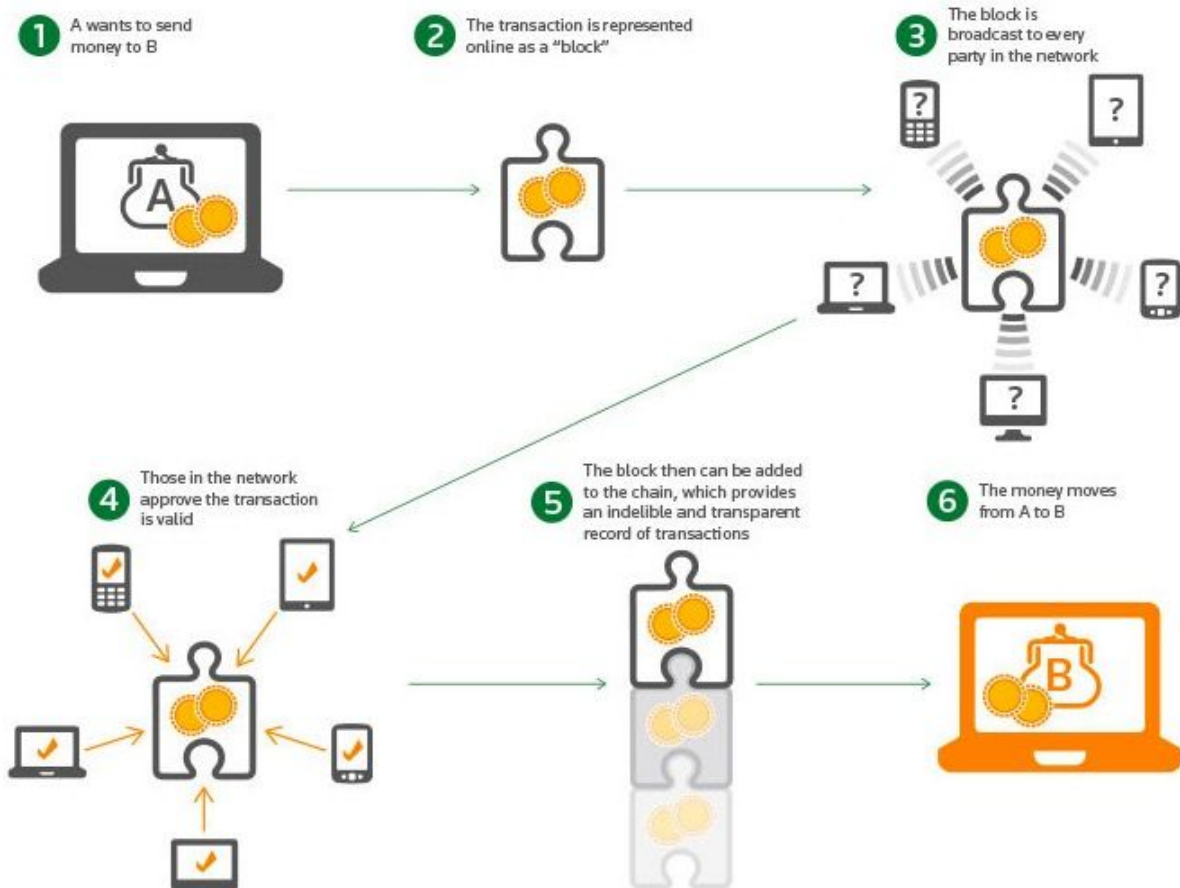
**BITCOIN ≠ BLOCKCHAIN**





# Game Theory

"The primary role of blockchains are to solve **coordination problems** among **multilateral agreements** between a **network of participants**."



# ETHEREUM

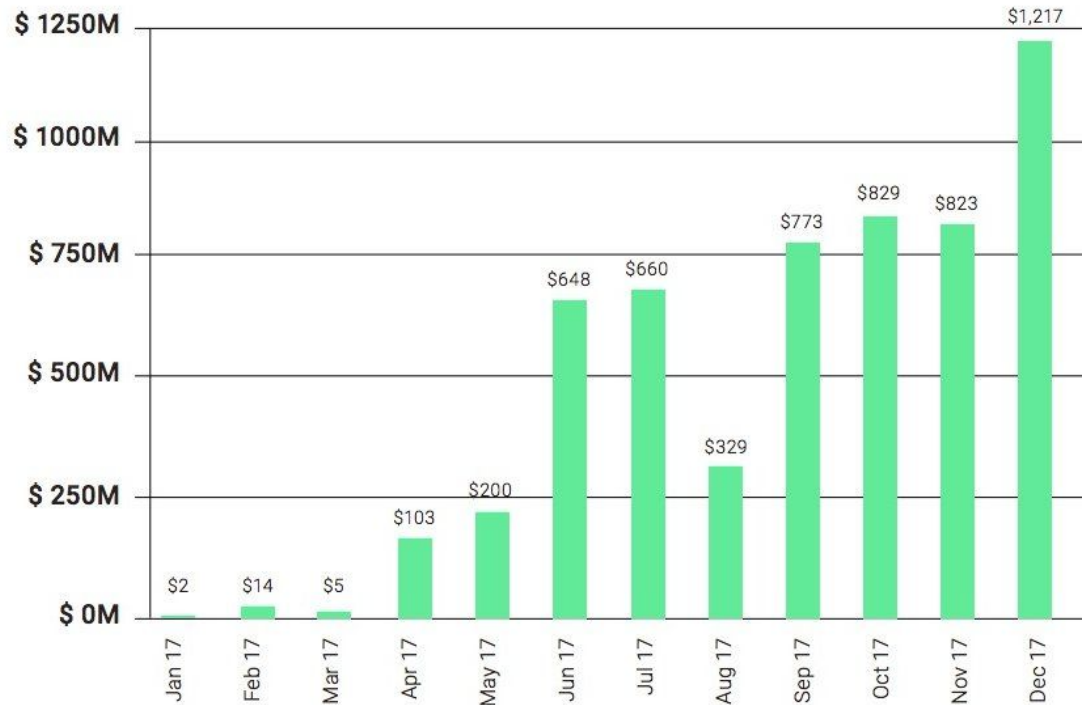
“Ethereum is a decentralized platform that runs smart contracts: **applications** that run exactly as programmed **without any possibility of downtime, censorship, fraud or third party interference.**”







### USD Raised by ICOs in 2017 - Monthly Totals



# Google Trends

Interest over time ?





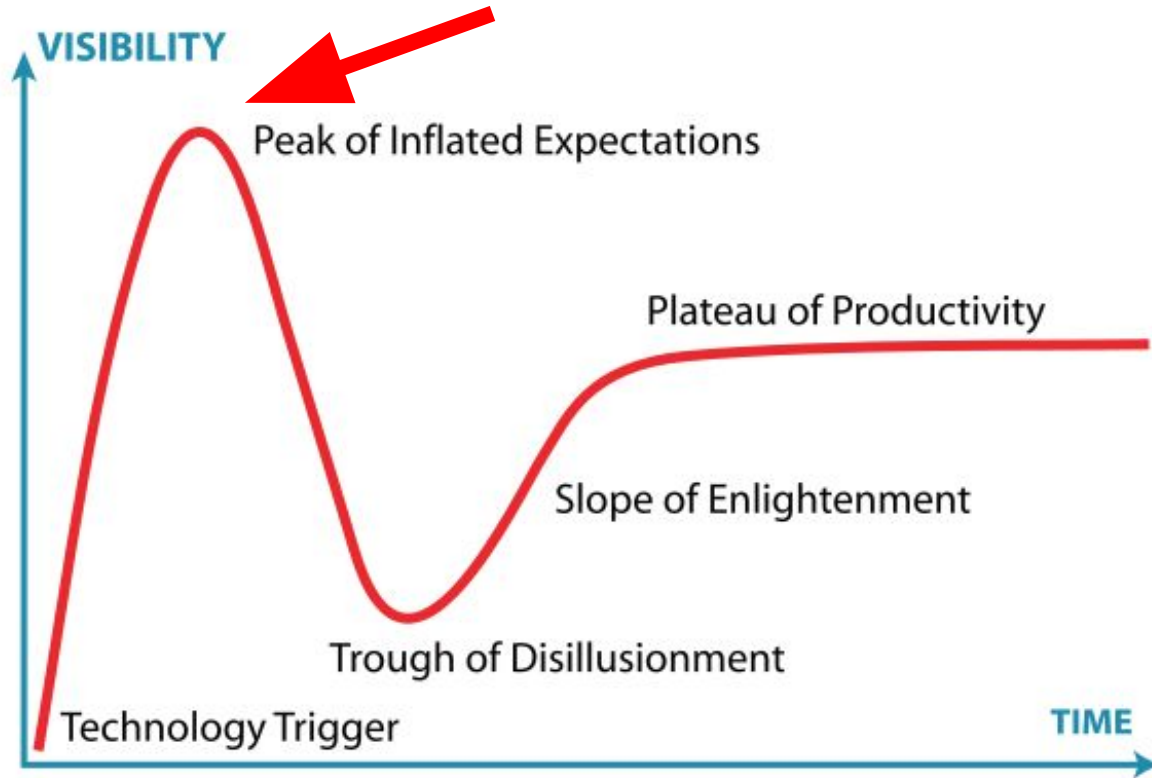
# Market Capitalization

## Global Charts

### Total Market Capitalization



# Gartner Hype Cycle



**PROBLEMS**

# Fraudulent ICOs



By Ana Alexandre

JUL 13, 2018

## **New Study Says 80 Percent of ICOs Conducted in 2017 Were Scams**

source: [https://research.bloomberg.com/pub/res/d28giW28tf6G7T\\_Wr77aU0gDgFQ](https://research.bloomberg.com/pub/res/d28giW28tf6G7T_Wr77aU0gDgFQ)

Bugs and hacks

# Ethereum bug causes integer overflow in numerous ERC20 smart contracts (Update)

'Accidental' bug may have frozen \$280 million worth of digital coin ether in a cryptocurrency wallet

Security

\$30 million below Parity: Ethereum wallet bug fingered in mass heist

Aug 29, 2018 | Kai Sedgwick | 3692

25% of All Smart Contracts Contain Critical Bugs



# Centralization

Blockchain isn't about democracy and decentralisation - it's about greed

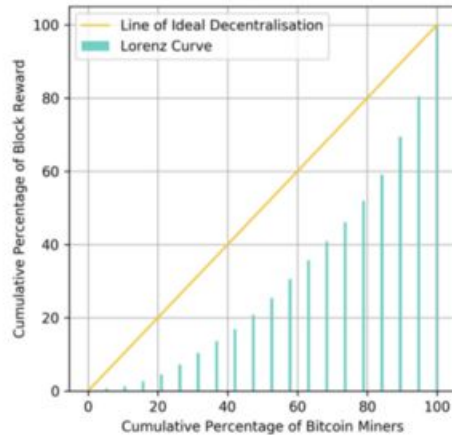
*Nouriel Roubini*

source:

<https://www.theguardian.com/technology/2018/oct/15/blockchain-democracy-decentralisation-bitcoin-price-cryptocurrencies>

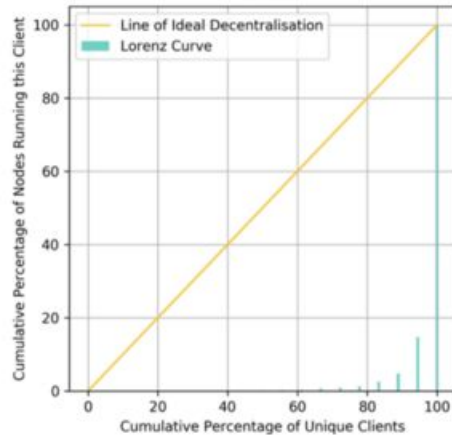
### Bitcoin Mining Decentralization (by Block Reward)

Measure: BTC block reward over past 24 hours  
Gini: 0.40



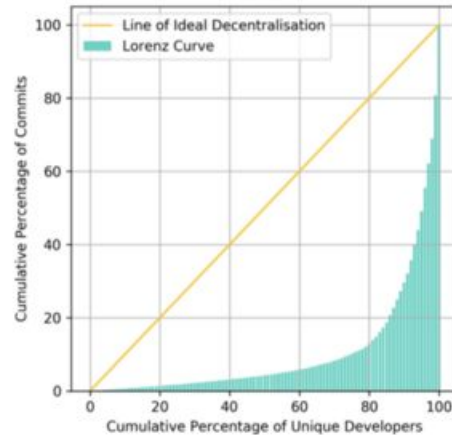
### Bitcoin Client Decentralization (by Codebase)

Measure: Bitcoin clients across the network  
Gini: 0.92



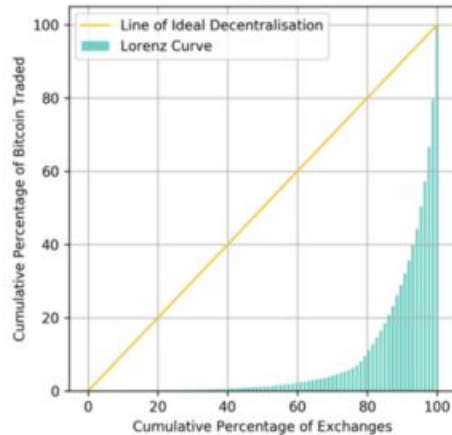
### Bitcoin Dev Decentralization (by Commits to Core)

Measure: Bitcoin Core Commits since inception  
Gini: 0.79



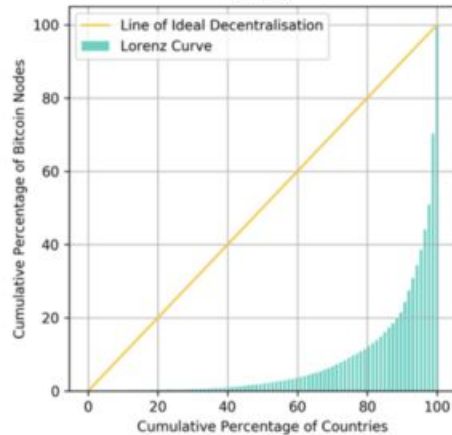
### BTC Exchange Decentralization (by 24h Volume)

Measure: 24 hour daily volume per exchange  
Gini: 0.83



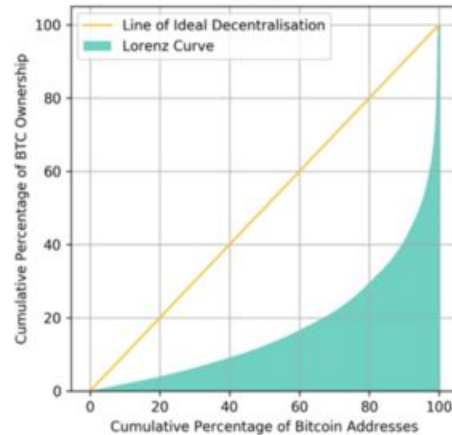
### Bitcoin Node Decentralization (by Country)

Measure: Number of nodes in each country  
Gini: 0.84



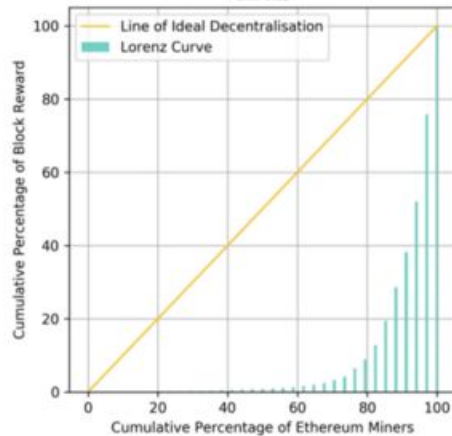
### Bitcoin Owner Decentralization (By Address)

Measure: BTC held per address given  $\geq 185$  BTC per address  
Gini: 0.65



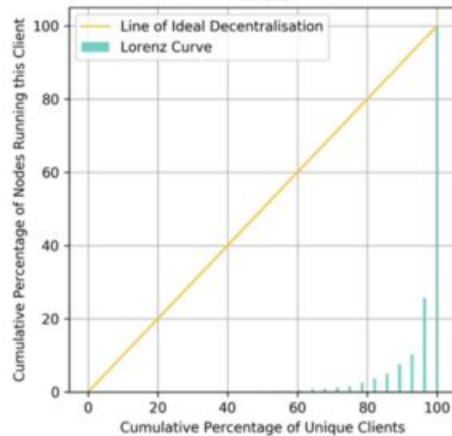
### ETH Mining Decentralization (by Block Reward)

Measure: ETH block reward over past 24 hours  
Gini: 0.82



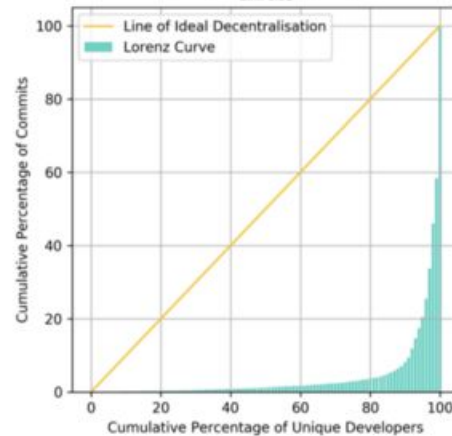
### Ethereum Client Decentralization (by Codebase)

Measure: Ethereum clients across the network  
Gini: 0.92



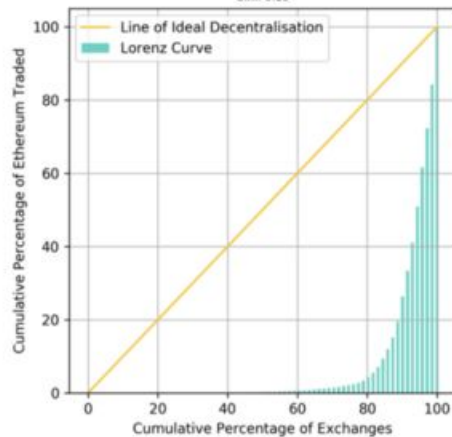
### Eth Dev Decentralization (by Commits to Geth)

Measure: geth commits since inception  
Gini: 0.91



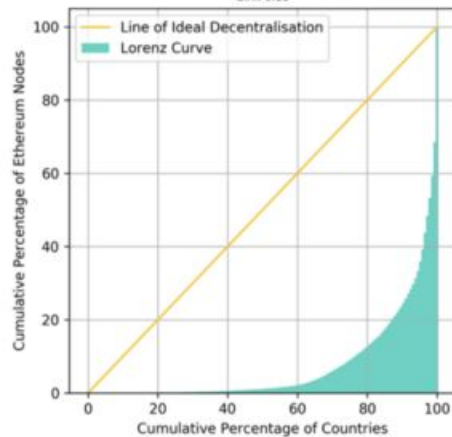
### ETH Exchange Decentralization (by 24h Volume)

Measure: 24 hour daily volume per exchange  
Gini: 0.85



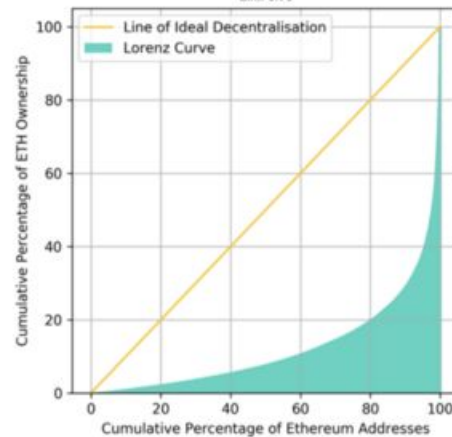
### Ethereum Node Decentralization (by Country)

Measure: Number of nodes in each country  
Gini: 0.85

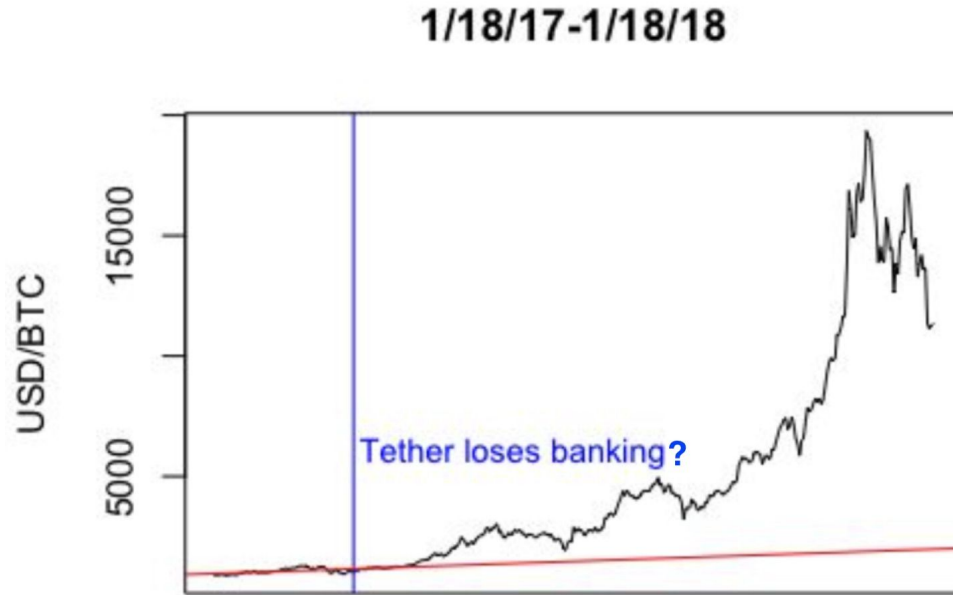


### Ethereum Owner Decentralization (by Address)

Measure: ETH held per address, given  $\geq 2477$  ETH / Address  
Gini: 0.76



# Centralization

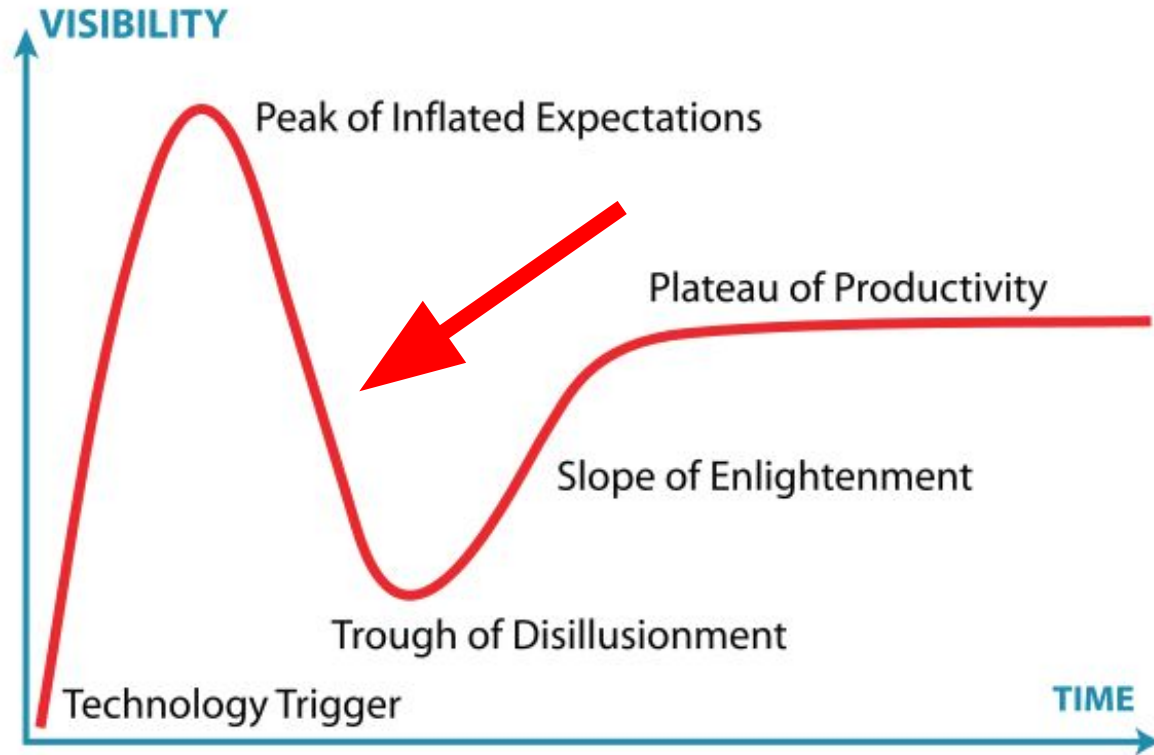


# Big attack surface

- DDoS
- 51% attacks
- Sybil attacks
- Nothing-at-stake
- Hash collision
- Bugs and hacks
- Social engineering
- Scamming and phishing

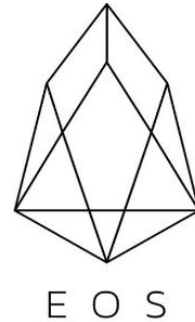


# Gartner Hype Cycle



POTENTIAL

# Decentralized Autonomous Organizations



# Ethereum Ecosystem

Two different clients built from scratch

- Parity
- Geth

Switch from PoW to PoS

Proposals to fight inequality



# Fastest growing open source projects

Overall, we're seeing trends in growth of projects related to machine learning, gaming, 3D printing, home automation, scientific programming, data analysis, and full stack JavaScript development. \*

	Change
1 <a href="#"><u>MicrosoftDocs/azure-docs</u></a>	4.7x
2 <a href="#"><u>pytorch/pytorch</u></a>	2.8x
3 <a href="#"><u>godotengine/godot</u></a>	2.2x
4 <a href="#"><u>nuxt/nuxt.js</u></a>	2.1x
5 <a href="#"><u>ethereum/go-ethereum</u></a>	2.0x
6 <a href="#"><u>wix/react-native-navigation</u></a>	1.9x
7 <a href="#"><u>spyder-ide/spyder</u></a>	1.8x
8 <a href="#"><u>tensorflow/models</u></a>	1.8x
9 <a href="#"><u>home-assistant/home-assistant</u></a>	1.6x
10 <a href="#"><u>MarlinFirmware/Marlin</u></a>	1.6x



# Decentralized exchanges

Oasis **Direct**

**THE FIRST DECENTRALIZED  
INSTANT MARKETPLACE**

No Registration. No Fees.

Select Wallet Client



Connected  
Metamask

CONTINUE

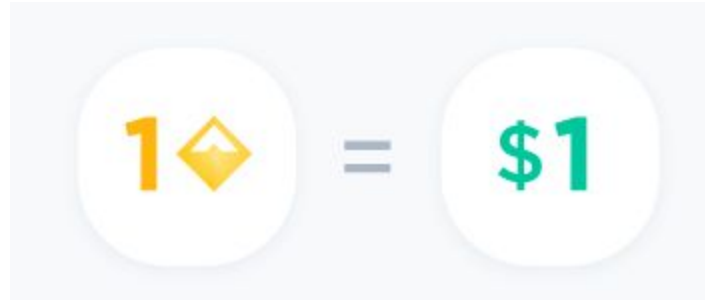


LEDGER



TREZOR

# Stablecoins (DAI)



# Marketplaces

## Privacy-focused Decentralized Applications

Private currency • Decentralized Marketplace • Crypto agnostic



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# Bounty Programs



source:

<https://medium.com/gitcoin/gitcoins-hacktoberfest-98825f199af2>

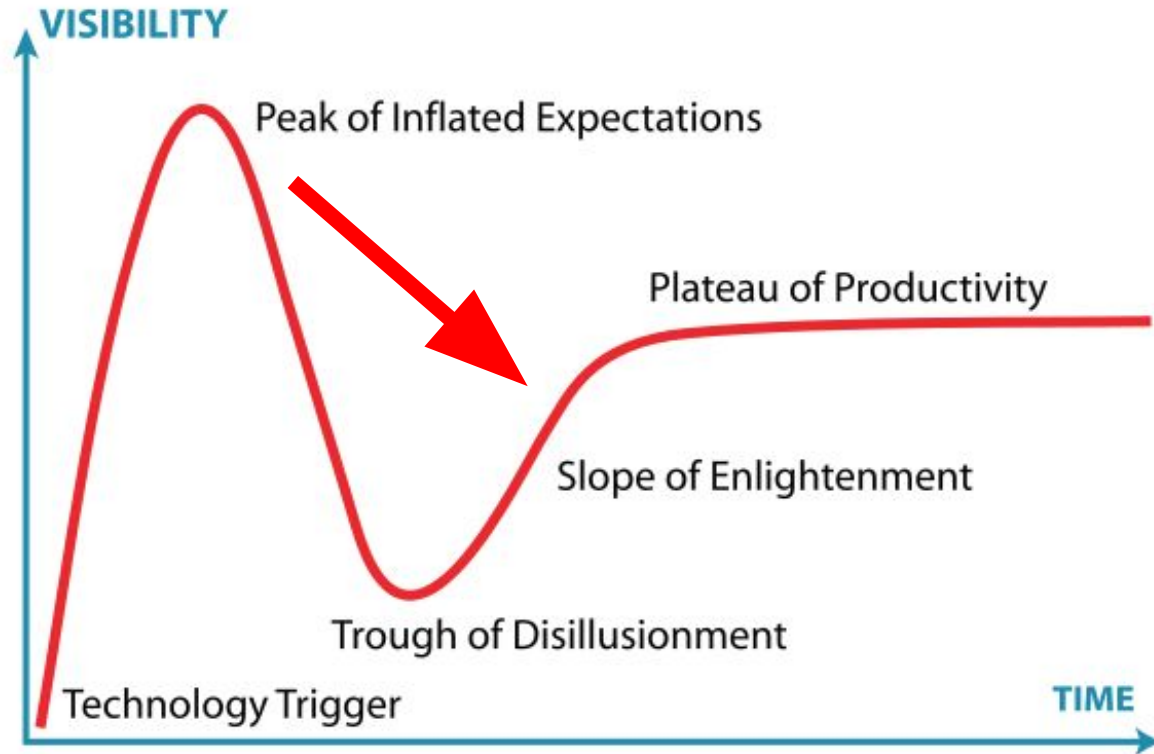
<https://medium.com/gitcoin/a-maintainers-guide-to-hacktoberfest-21405c8ff09f>

# Repositories

- <https://github.com/ethereum/go-ethereum>
- <https://github.com/ethereum/pyethereum>
- <https://github.com/ethereum/EIPs>
- <https://github.com/ethereum/mist>
- <https://github.com/bitcoin/bitcoin>
- <https://github.com/trufflesuite/truffle>
- <https://github.com/trufflesuite/ganache>
- <https://github.com/embark-framework/embark>
- <https://github.com/dvf/blockchain>
- <https://github.com/anders94/blockchain-demo>



# Gartner Hype Cycle





# Questions?

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Blockchain Joinville

<https://www.meetup.com/Blockchain-Joinville/>





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[contact@magrathealabs.com](mailto:contact@magrathealabs.com)





# Thank you!

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