

# BLOCKCHAIN

## MASTERCLASS - Q2 - 2017

presented by



neutoware

# INTRODUCING THE NEUROWARE FOUNDER



ONLY MSC BLOCKCHAIN COMPANY



SUPPORTED BY MDEC & MOF

## **Mark Smalley - CEO**

Living in Malaysia for the past 20 Years

Building FinTech Applications for 15 Years

Spent 10 Years Building Tech Communities

Building Blockchain Apps for 5 Years

## **Ruben Tan - CTO**

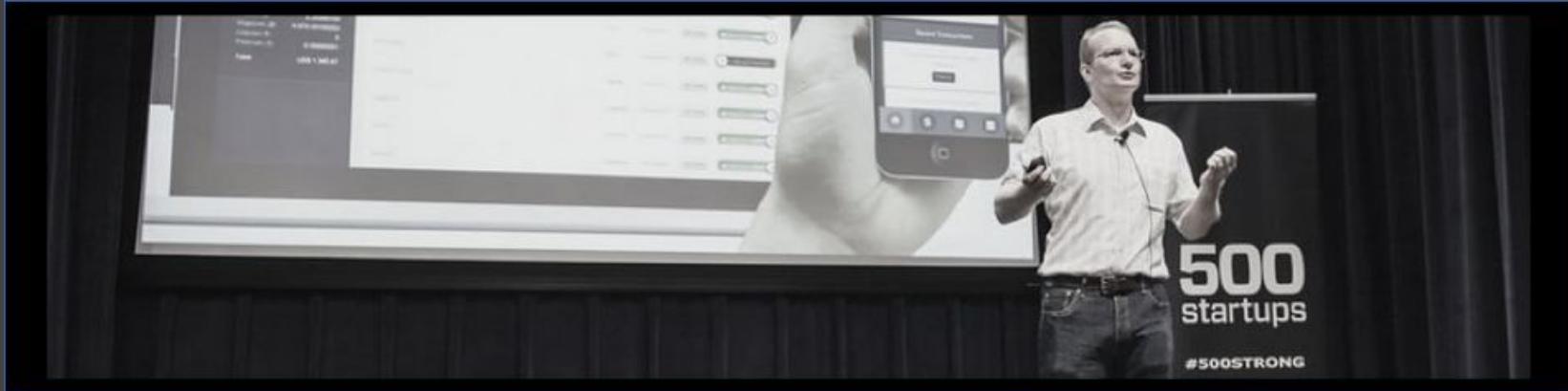
Building Web Applications for 10 Years

Active Community Evangelist & Presenter

Early Developer at MyTeksi and OnApp

Studying Distributed Consensus for 5 Years

# EXPERIENCED INNOVATORS IN AN EARLY ECOSYSTEM

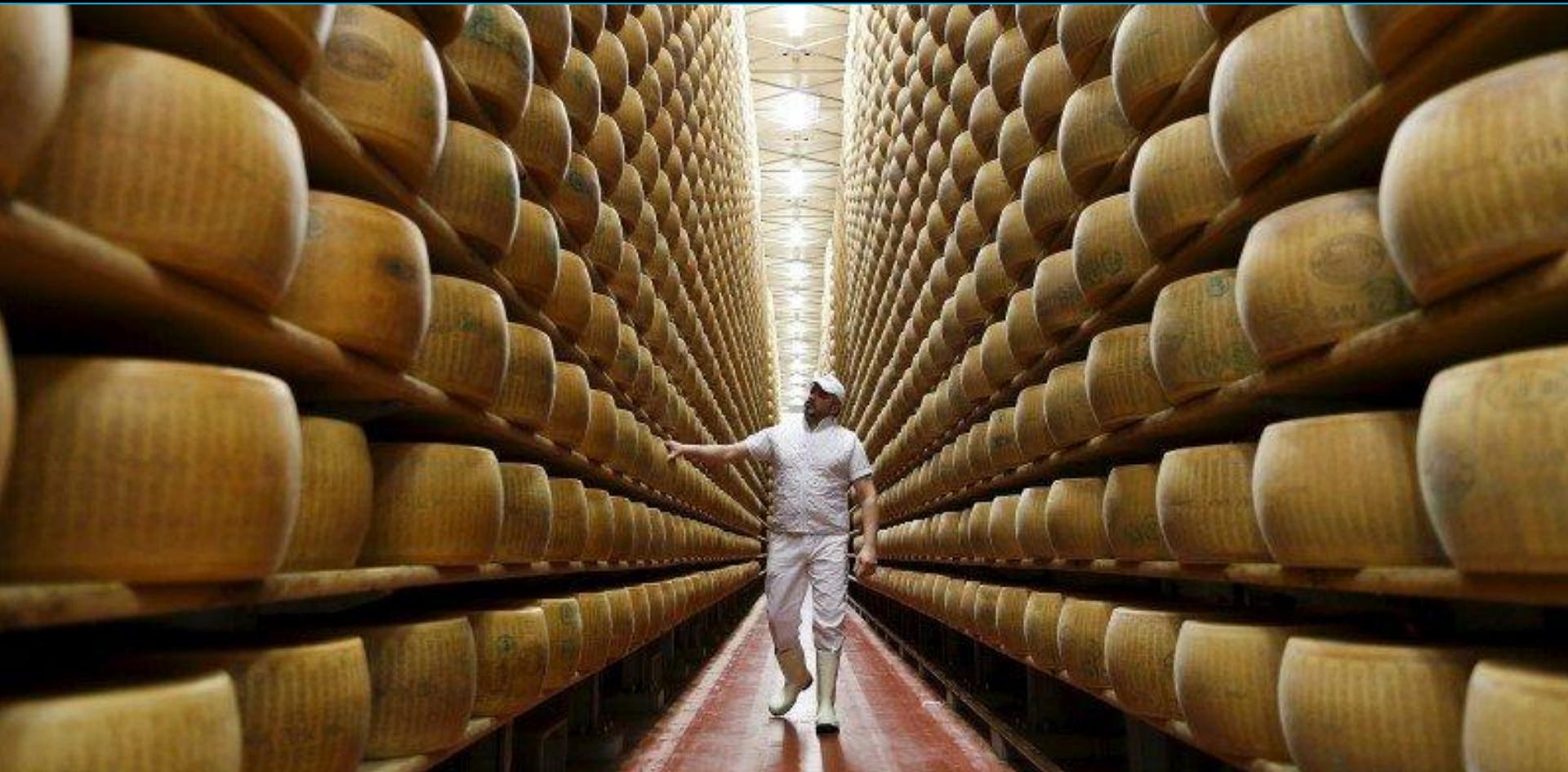


- **Only Malaysian Company** to Graduate from 500 Startups in Silicon Valley
- 1st Company in Asia Providing Public Blockchain APIs & Developer Toolkits
- 1st in The World to Develop Non-Financial Blockchain Agnostic Protocols
- Helped Organize World's 1st Bank-Backed Blockchain Hackathon (DBS)
- Over 15 Years of Collective Blockchain Development Experience

A BRIEF HISTORY OF MODERN MONEY

**WHERE NO IDEA IS A NEW IDEA**

THERE'S BEEN (AND STILL IS) EDIBLE CURRENCIES IN EUROPE



CLOSER TO HOME - THERE WERE EVEN ONES YOU COULD DRINK



BUT NONE ARE AS RELEVANT AS THE RAI STONES OF YAP



# SHOPPING WAS NOT EASY



SO THEY CREATED THE WORLD'S FIRST PUBLIC LEDGER



# UPDATES REQUIRED GROUP CONSENSUS - STILL USED TODAY



- Size wasn't everything
- The history of each stone determined its individual value
- Conducting transactions quite literally involved a song & dance
- This required the majority of people from the village to be present

IT COULD NOT SCALE SO THEY EVENTUALLY SWITCHED TO US\$



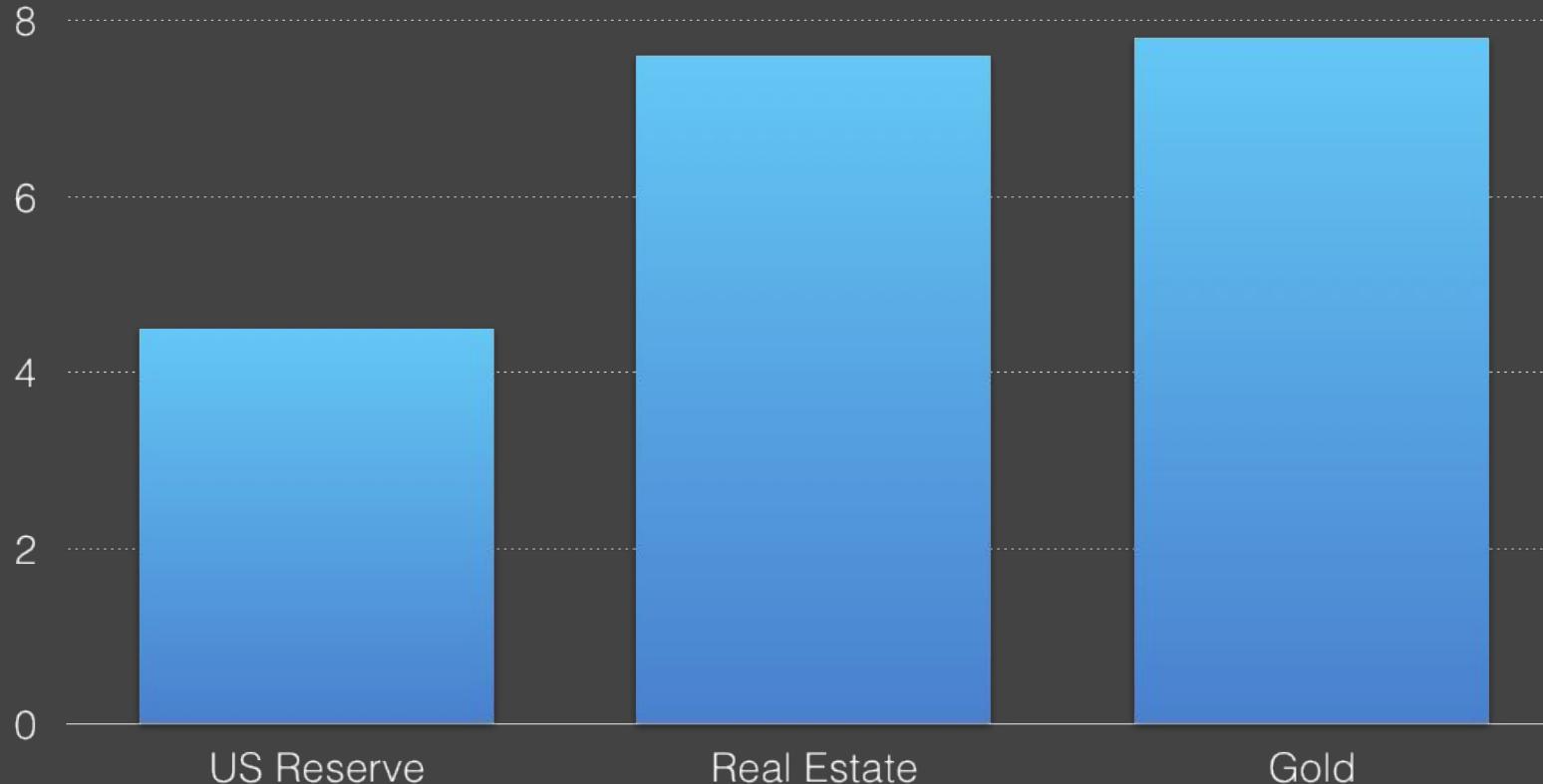
# SETTING THE GOLD STANDARD



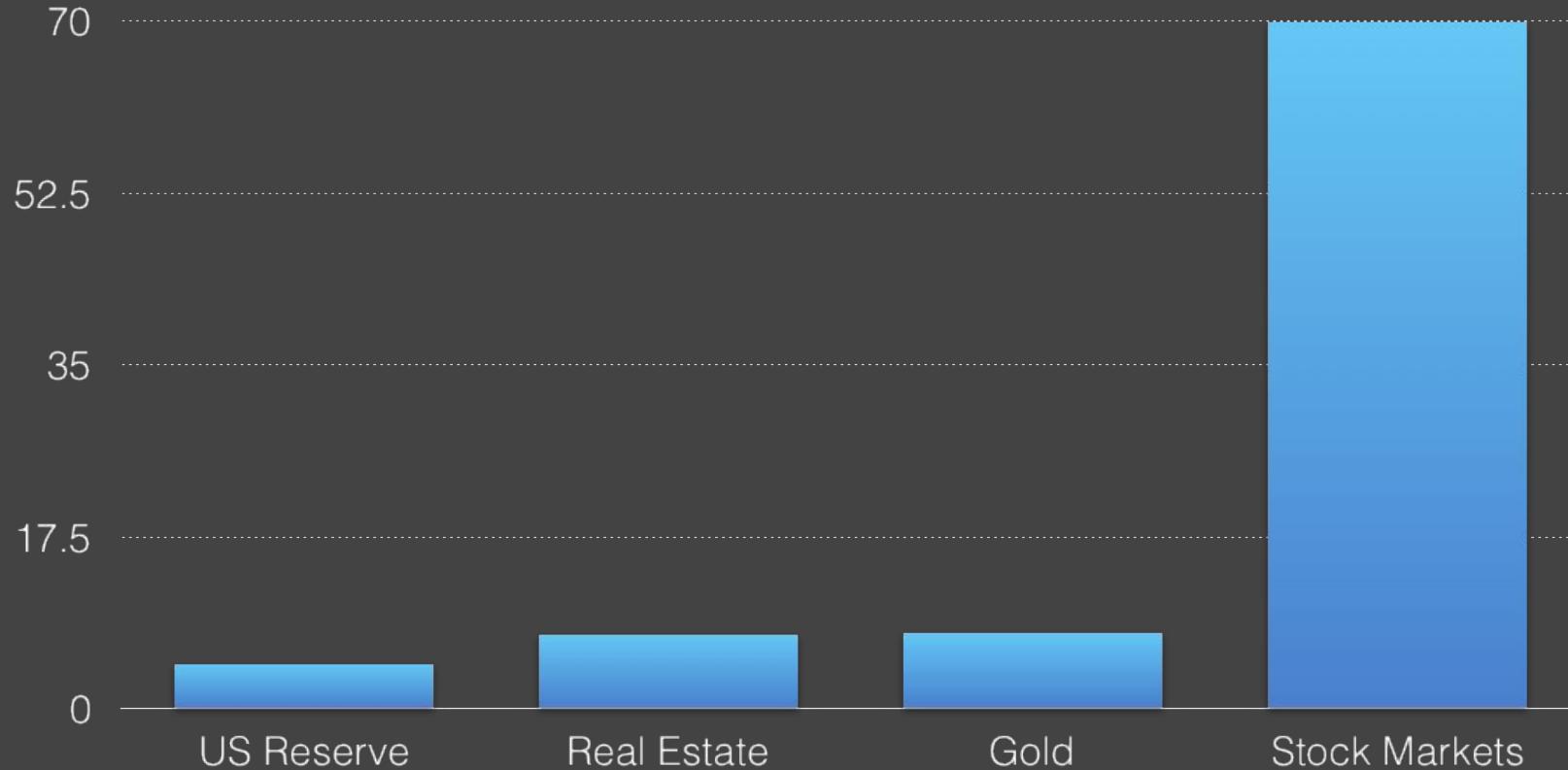
# THE END OF AN ERA

- 1873 to 1914 - All major worldwide currencies were 100% backed by gold
- After WW1 ended the USA switched to Fractional Reserve Banking  
They Printed US\$50 for every US\$20 deposited in gold
- During WW2 the USA accumulated 2/3rd's of all gold, forcing all currencies to switch to fiat-systems pegged to US\$, which was pegged to gold
- 1971 - Richard Nixon ended the gold standard, introducing petrodollars

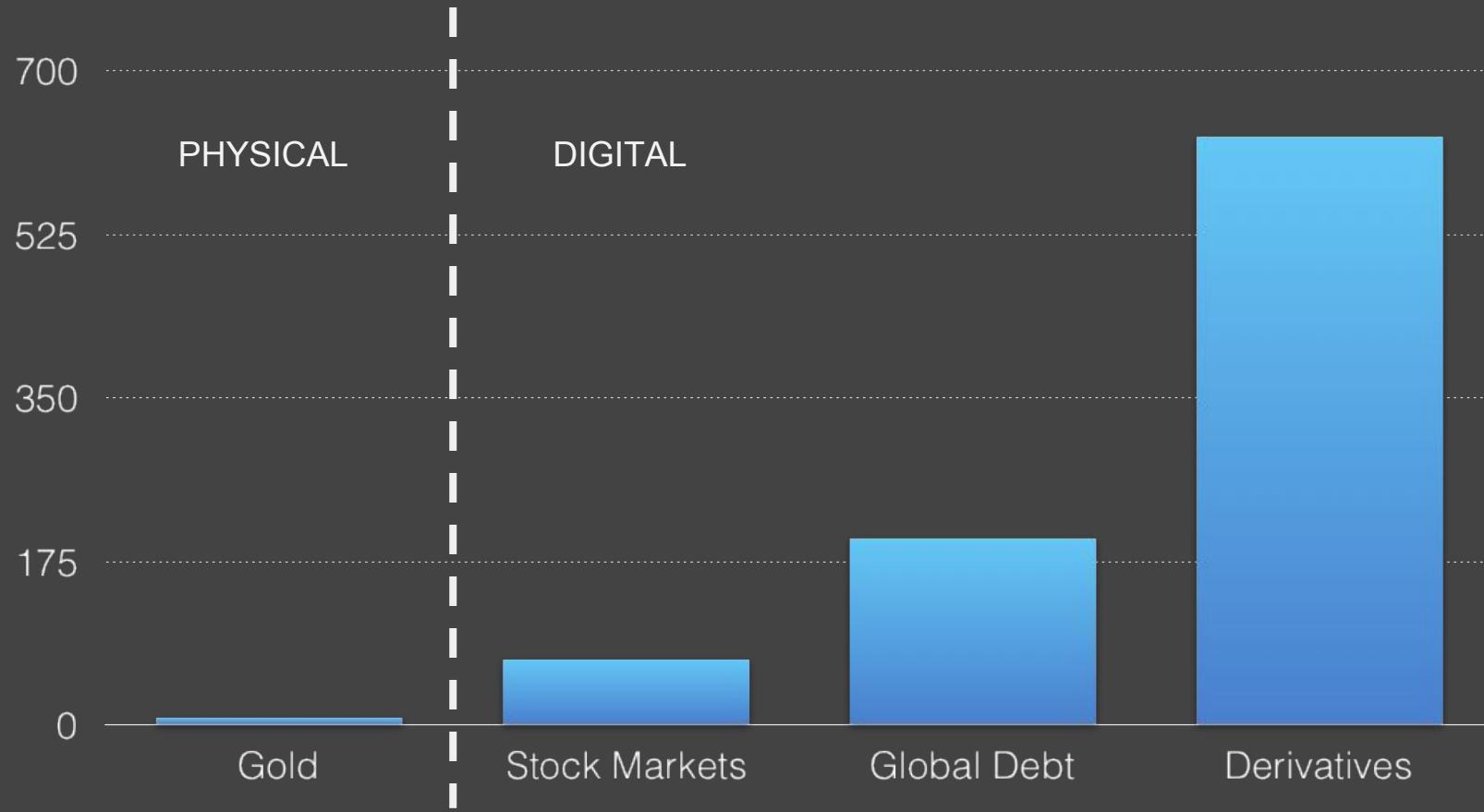
# US\$20+ TRILLION IN PHYSICAL ASSETS WITHOUT LEDGERS



# THEN CAME WALL STREET & CENTRALIZED DIGITAL ASSETS



# THEN CAME THE RE-INVENTION OF DEBT



# IT ALL ENDS IN TEARS (512 US BANKS CLOSED SINCE 2008)



# NOTHING LASTS FOREVER



- Average lifespan of individual currencies is 27 years
- Every 30 or 40 years the reigning monetary system fails
- Over 3,800 fiat currencies worldwide have failed
- 15 of which happened in just the past 25 years

# THE RECENT FAILURE OF FIAT

COUNTRY	YEAR	PROBLEM
Angola	1991-1999	1 New Kwanza = 1,000,000,000
Belarus	1994-2002	50,000 = 100,000,000 2000 Rublei
Bosnia	1993	Massive hyperinflation
Ecuador	2000	Pegged to USD after 70-80% drop in its dollar
Georgia	1995	1 new lari = 1,000,000 laris
Krajina	1993	Country folded became part of Croatia
Mexico	1993-1994	Defaulted in 1982   1 Nuevo Peso = 1,000 Old Pesos
Poland	1990-1993	1 new Zloty = 10,000 old Zlotych
Romania	2000-2005	1 new Leu = 10,000 old Lei
Russia	1992-1994	100 Rubels = 1 US\$ in 1991   30,000 Rubels = 1 US\$ in 1999
Turkey	1990-2005	1 New Turkish Lira = 1,000,000 Old Lira
Ukraine	1993-1995	1 Hryvnya = 100,000 Karbovantsivi
Zimbabwe	1999 – 2010	Ongoing mess

# TELECOMMUNICATIONS SAVED ZIMBABWE - TIME IS CONSTANT



“ SOFTWARE IS EATING THE WORLD ” - Marc Andreessen



- Uber is the world's largest taxi company, but owns no cars
- AirBnB is the largest accommodation provider, but owns no real estate
- Facebook is the most popular media provider, but creates no content
- Alibaba is the most valuable retailer, but owns no inventory
- Bitcoin is the most valuable digital currency, but there are no coins

# DOES ANYONE REMEMBER KODAK?



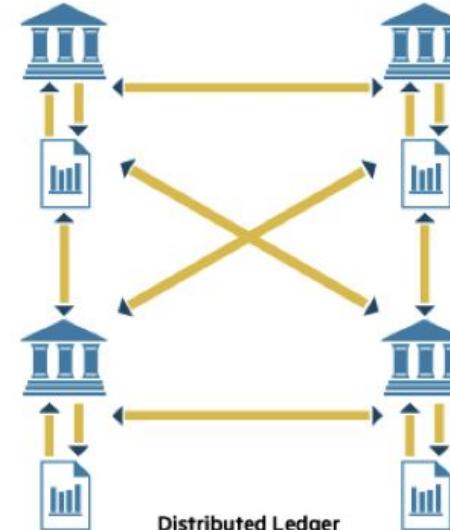
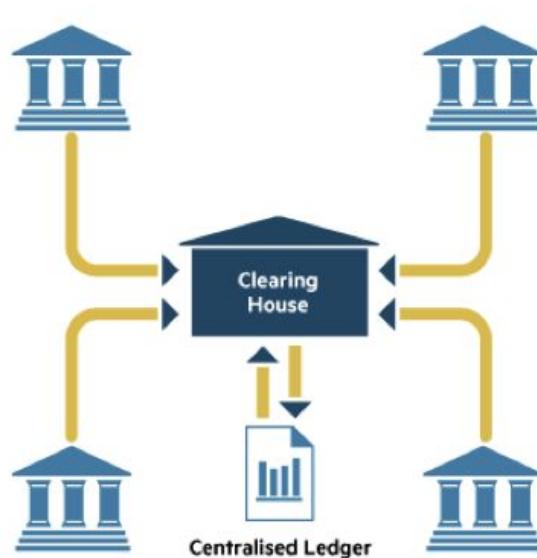
- Founded in 1892
- 90% of film sales in 1976
- 85% of camera sales in 1976
- 4th biggest global brand in 1996
- Removed from S&P 500 in 2010
- Bankrupt in 2012
- And yet...

# ARE BANKS HAVING THEIR KODAK MOMENT?



- Founded in 1892
- 90% of film sales in 1976
- 85% of camera sales in 1976
- 4th biggest global brand in 1996
- Removed from S&P 500 in 2010
- Bankrupt in 2012
- They built 1st digital camera in 1975

# SANTANDER BANK - FIRST TO ADMIT US\$20B ANNUAL SAVINGS



- Reconciling Multiple Central Ledgers Vs Auto-Audited Distributed Ledgers?
- Batch Processing CSVs every 24 Hours Vs Really Real-Time Settlement?

# BITCOIN

( the first application / popular digital asset )

Vs

# BLOCKCHAINS

( underlying tech / shared public ledger )



## PUBLIC NETWORKS

( built from the ground-up to be secure )

Vs

## PRIVATE NETWORKS

( very similar to traditional databases )



## PUBLIC BLOCKCHAINS

( battle tested, secure - able to go anywhere )

Vs

## DISTRIBUTED LEDGERS

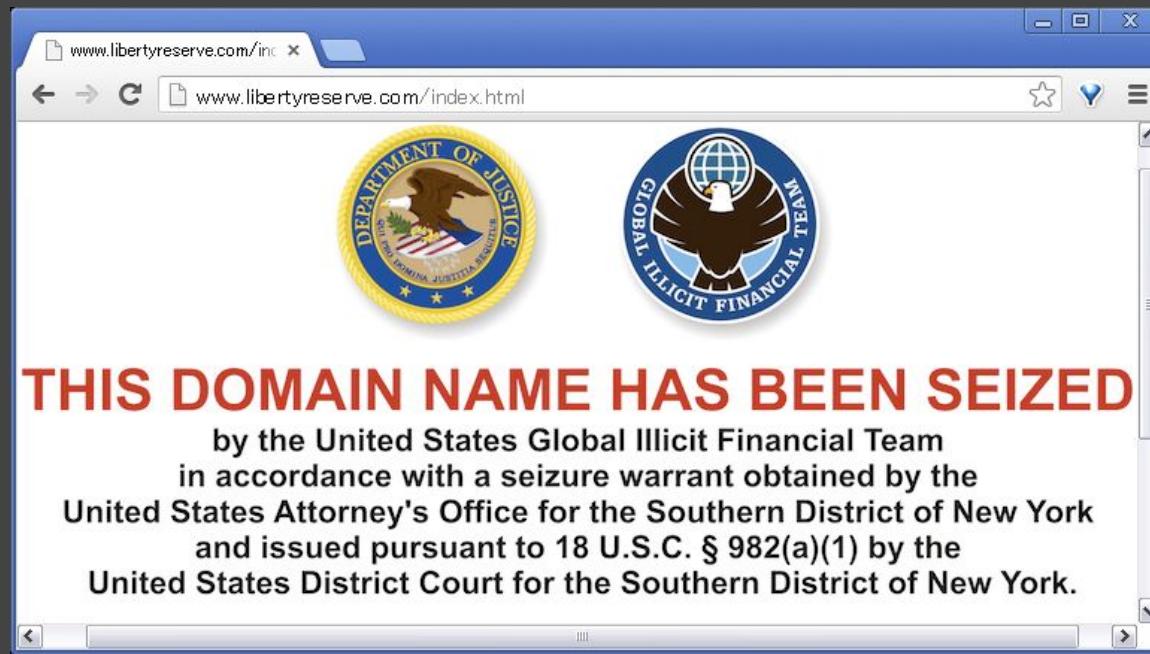
( missing blocks is also missing the point )



# CONSENSUS - WHAT MAKES PROOF OF WORK SO SPECIAL ...?



# BITCOIN NOT FIRST DIGITAL CURRENCY - 1st DISTRIBUTED ONE



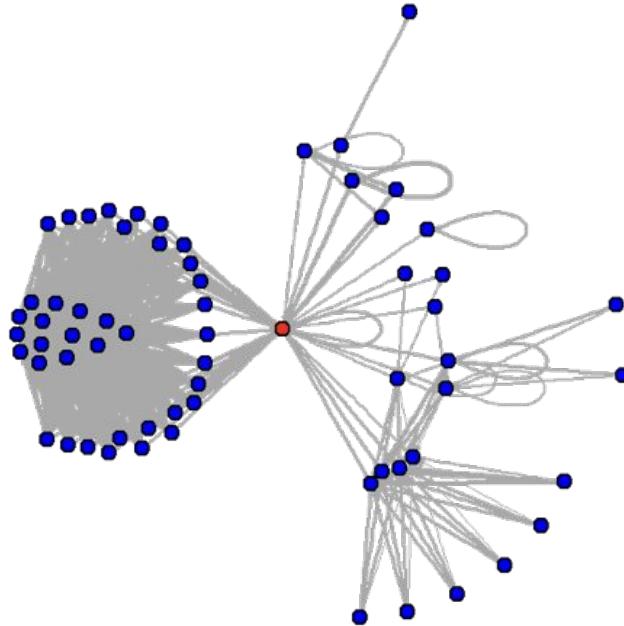
- FLOOZ - Shut down by FED in 2001
- LIBERTY RESERVE - Shut down by FED in 2013

# TRUST IS SOLVED VIA TRANSPARENCY - IT'S OPEN TO ALL

```
{  
  "address": "DEHfgFYKL97gFFoYHM7UejXBGKjLFzD4za",  
  "total_received": 1000000000,  
  "total_sent": 800000000,  
  "balance": 200000000,  
  "unconfirmed_balance": 0,  
  "final_balance": 200000000,  
  "n_tx": 4,  
  "unconfirmed_n_tx": 0,  
  "final_n_tx": 4,  
  "txs": [  
    {  
      "block_hash": "e9a38d8fa6b7abcla35a2fad93bfa52e3eb9b1ca5cb2825692db0a3c2f054354",  
      "block_height": 1213596,  
      "block_index": 35,  
      "hash": "3ebaecf042e0dbe20a35c0dd2700c83b13a5a1764e1882c2cc39e4bd81c326cf",  
      "addresses": [  
        "DEHfgFYKL97gFFoYHM7UejXBGKjLFzD4za",  
        "DJHXpkQGcRydRvocWaeUtZir6c2pXHkUn4"  
      ],  
      "total": 400000000,  
      "fees": 100000000,  
      "size": 225,  
      "preference": "high",  
      "relayed_by": "",  
      "confirmed": "2016-05-16T14:13:56Z",  
      "received": "2016-05-16T14:13:56Z",  
      "ver": 1,  
      "lock_time": 0,  
      "script": "OP_DUP OP_HASH160 20a35c0dd2700c83b13a5a1764e1882c2cc39e4bd81c326cf OP_EQUALVERIFY OP_RETURN"  
    }  
  ]  
}
```

EVERYONE HAS A RECORD OF **EVERYTHING** - SO BE CAREFUL

BTC transaction network for  
1NfRMkhm5vjizzqkp2Qb28N7geRQCa4XqC



## WHAT ARE THE BENEFITS OF PUBLIC BLOCKCHAINS?

- They provide an immutable tamper-proof audit-trail of the truth
- Data can be easily shared and independently verified by third-parties
- Vastly increased security that is much less vulnerable to attack or outage
- Programmable contracts that can radically reduce costs and errors



“While Fintech Disrupts Banks,  
the Blockchains Disrupt Fintech”

# THIS GIVES BITCOIN THE CURRENCY SOME UNIQUE PROPERTIES

Traits of Good Money	Gold	\$\$\$	Private DLTs	Bitcoin
Durability		fragile		
Portability	heavy			
Divisibility	difficult	limited		
Uniformity	if processed		censored	
Limited Supply	theoretically	printed at will	central mint	
Sunnah Money	Commodities	\$\$\$		Bitcoin
Intrinsic Value		representation	none	
Inflation Proof	unknown	debt based	no	
Acceptability	limited		unknown	growing daily
Decentralized		man made	unregulated	

THE MOST IMPORTANT OF ALL - THERE ARE NO BITCOINS

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## LOOKING AHEAD - COULD ENERGY BE NEXT GLOBAL RESERVE?



ESPECIALLY NOW THAT ENERGY CAN BE EASILY STORED

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EVEN BIGGER PLANS AHEAD - BUT HOW FAR AHEAD ???



WITH SOLAR POWERED ROBOTS PRODUCING AUTONOMOUS CARS



RE-CHARGED AT HOME BY A LIFETIME GUARANTEED SOLAR ROOF



## SECTION SUMMARY

### WHY DO WE HAVE BITCOIN?

- Currencies are ALWAYS changing
- Lack of regulation led to creation of bitcoin
- Designed to be transparent whilst remaining private
- Feels a lot like gold, but vastly superior - and now more valuable

SALT = CRYPTO | UN = CURRENCY | PW = BOOTCAMP

## WHAT DOES THE FUTURE OF MONEY LOOK LIKE ?



THIS SLIDE SHOULD CONTAIN 100 DOGECOIN

SETTING-UP A **DONATION** ADDRESS ( DGtEipQbxhKNUkg5g1PTQ4x88J14L3tHQe )

## WHAT DOES THE FUTURE OF **BANKING** LOOK LIKE ?



# ACCOUNTS CAN BE CREATED BY ANYONE, ANYWHERE, ANYTIME

**Input Control**

Input Type	Private Keys
Private Key 01	Private key to use
ANOTHER ADDRESS	

**Output Control**

change	Auto Send
01	Send to this address
ANOTHER ADDRESS	

**Generate Key Pairs**

Generate standard key-pairs using any and (or) all of the options below. However, please note that by not using all 3 fields and (or) insecure values, you may be vulnerable. These tools are merely designed to help understand how cryptographic transactions work.

Blockchain	Dogecoin Testnet
Salt / Full Name	Optional salt for added security...
Seed / Username	Optional seed for added security...
Password	Optional password for added security...

Combining the fields above will result in the following key-pairs and public address:

```
var hash = bitcoin.crypto.sha256(salt + seed + pw + chain).toString("hex")
var keys = $.fn.blockstrap.blockchains.keys(hash, chain, 1, false, true);
```

HD Public	Waiting for inputs ...		
Public	qr	Waiting for inputs ...	
Public Address	qr	check	Waiting for inputs ...

HD Private	Waiting for inputs ...	
Private	qr	Waiting for inputs ...

**GENERATE KEY-PAIR**

**DERIVE CHILD KEYS**

# ANYONE CAN AUDIT ANY ACCOUNT, ANYTIME, ANYWHERE

## Address Details (D)

DGtEipQbxhKNUkg5g1PTQ4x88J14L3tHQe

Little Shibe

Address	DGtEipQbxhKNUkg5g1PTQ4x88J14L3tHQe
Coin	Dogecoin (DOGE, D)
Balance	100.00000000
Pending	Nothing
Received	100.00000000
Transactions	1
Shortlink	<a href="https://chain.so/a/hq9jru">https://chain.so/a/hq9jru</a>
Other Info	<a href="#">Raw Data</a>



**Send Dogecoin**

Transaction ID: e57cb8c069b287c4fd837930036b68d78bbe55e83346e57980ea799b6322caa2

May 9, 2017 at 19:59

Confirmed

< DJHXpkQGcRydRvocWaeUtZir6c2pXhkUn4 >

Balance Change +100.00000000



# BITCOIN CORE = FULL NODE ( RAW CHAIN = 120GB+ )

 bitcoin [Introduction](#) [Resources](#) [Innovation](#) [Participate](#) [FAQ](#) [English](#)

## Choose your Bitcoin wallet

Find your wallet and start making payments with merchants and users.

 Mobile  Desktop  Hardware  Web

---



Bitcoin Core



Bitcoin Knots



Bither



GreenBits



Coin.Space



Simple Bitcoin



MultiBit HD



Armory



Electrum



mSIGNA



Bitcoin Wallet



breadwallet

 **Take time to educate yourself**

Bitcoin is different from what you know and use every day. Before you start using Bitcoin for any serious transaction, be sure to read [what you need to know](#) and take appropriate steps to [secure your wallet](#). Always remember that it is your responsibility to choose your wallet carefully and adopt good practices in order to protect your money.

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# DOGECON CORE = FULL NODE ( RAW CHAIN = 20GB+ )

**CHOOSE YOUR WALLET.**



**MultiDoge**  
The Dogecoin Light Wallet.



**Dogecoin Core.**  
The Dogecoin "Full" Wallet.  
(Currently maintained by the original developer.)

Learn how to set up your wallet with the [Getting Started Guide](#).

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What are the differences between the two?

You have to sync with the blockchain to use Dogecoin. MultiDoge is a "light" wallet. It syncs with the blockchain by "skimming" through the blockchain, providing fast sync times. Dogecoin Core, on the other hand, is a "full" wallet. It syncs by downloading it, providing a solid-working Dogecoin wallet.

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Advantages and Disadvantages?

# BLOCKSTRAP - ADVANCE BRAIN WALLET (ALL CHAINS = 0GB)



**Setup Wizard**  
(Here to help you get started)

[INSTALL GUIDE](#) [DOCS](#)

**SALT GENERATION**

Before we create any addresses we first need to establish a device salt. Each piece of information you enter is hashed and re-hashed before ever leaving the browser. We never see any of your details from the resulting hashes. At the end of the process a device salt is generated that we can use to more securely create new accounts.

Once entering these details you cannot change them later or recover them without recreating this process with the exact same data.

powered by [blockstrap.com](#)

STEP 1: SALT GENERATION    STEP 2: CREATE ACCOUNT    HELP

**Generating Your Device Salt**  
This is a one time installation process. Please read the instructions carefully...

**RESET** **IMPORT**

**Required Salt Components**

Your Name: Using your actual name is easier to remember

Your Username: Pick a simple yet memorable username

Your Password: This cannot be changed later

Repeat: Confirm your password again

Password:

Date of Birth: Day Month Year

City of Birth: It is easier to remember your real city of birth

**Optional Security & Settings**

App URL: <http://localhost/neuroware/blockstrap/framework/manual.htm>

Salt Component: -- Select Additional Salt Components --

API Service: Blockstrap

Profile Photo:

Add Photo to Salt? **SET** **NO**

Create custom question for salt? **SET** **NO**

**NEXT STEP**

# JAXX - ANOTHER API WALLET - NOW SUPPORTING DOGE

[Support](#)[View Source Code](#)[Install Now](#)**Android**

Mobile

Tablet

**iOS**

Mobile

Tablet

**OS X**

Desktop

**Chrome**

Extension

**Firefox**

Extension

**Windows**

Desktop

**Linux**

Desktop

**Hardware**

Coming soon

# WHERE TO BUY COINS? 400K NEW USERS IN 30 DAYS @ COINBASE

coinbase

Products ▾

Help

1 BTC = \$1,671.18

Sign In

Sign Up

## BUY AND SELL DIGITAL CURRENCY

Coinbase is the world's most popular way to buy and sell bitcoin, ethereum, and litecoin.

Enter your email address

Get Started

New to bitcoin? | What is ethereum?

# CLOSER TO HOME - LUNO - THE ONLY TRUSTED LOCAL EXCHANGE

Luno makes it safe and easy to buy, store and learn about Bitcoin in Malaysia

[Sign up on our Website](#) [Download on the App Store](#) [GET IT ON Google Play](#)



Global Bitcoin community  
20 million +

Available in  
Malaysia

Buy bitcoin with

The wallet is easy to navigate and  
really functional.

★★★★★

# WITH BITCOIN - YOU CAN SHAPESHIFT IT TO ANY OTHER CRYPTO



ShapeShift

About API + Tools Resources Support COIN CAP English

## The Safest, Fastest Asset Exchange on Earth

Trade any leading blockchain asset for any other.  
Protection by Design. No Account Needed.

Crypto	Current Price	24h Change
BTC	\$1,676.6100	-6.17%
XRP	\$0.2101	11.4%
ETH	\$85.3395	0.8%
LTC	\$26.6958	-1.67%
DASH	\$87.6530	-3.79%
XMR	\$27.6971	-7.28%
MAID	\$0.3206	+3.2%
DOGE	\$0.0011	-5.5%
WAVES	\$1.0838	-10.58%
BTS	\$0.0369	-2.46%

### Choose Which Assets to Trade

Deposit      Receive

Bitcoin      Dogecoin

Quick      Precise

Continue

HOW DOES IT WORK?

# BLOCKCHAIN TECHNOLOGY

# INTERESTING BITCOIN BLOCKCHAIN FACTS TO REMEMBER

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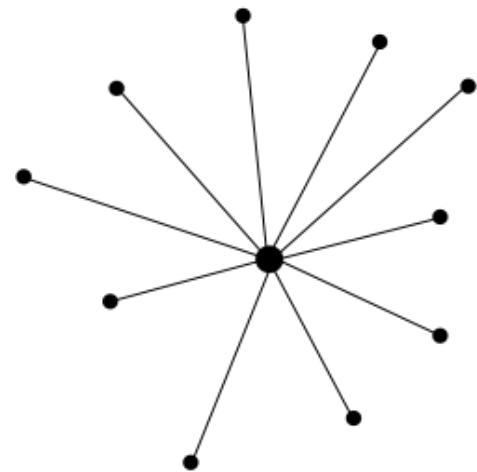
- Bitcoin blockchain released in January 2009 by Satoshi Nakamoto
- US\$13 per coin in 2013 (when we bought) - now US\$1,800+ per coin
- The network is currently processing over 230,000+ daily transactions
- Contributes to over US\$1.5+ billion of daily global crypto-transactions
- The network's market capitalization is currently over **US\$28+ billion**
- 21 million finite supply, with 16 million coins discovered so far
- Supply is decreasingly dispersed every 10 minutes
- Final coins released on May the 7th, 2140
- **But most important of all is the technology...**

# BITCOIN AND BLOCKCHAINS HAVE NO NEW TECHNOLOGY

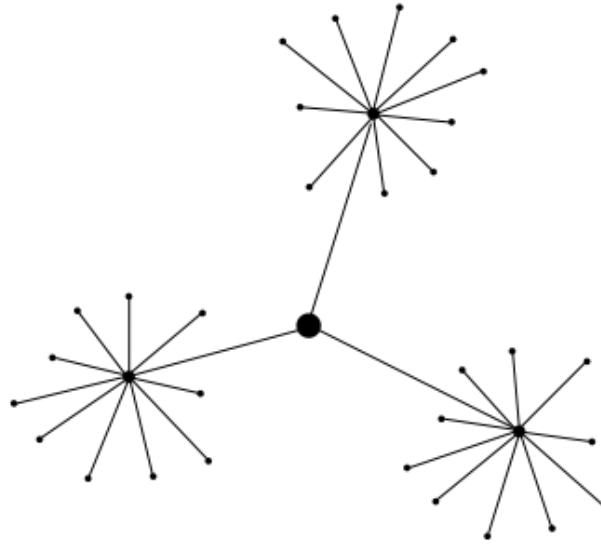


- HASH - Theorized in the 1800s - Coined by IBM in the 1950s
- ECDSA - Digital Signatures using Elliptic Curve Cryptography
- P2P - Peer to peer protocol popularized by Napster in 1999

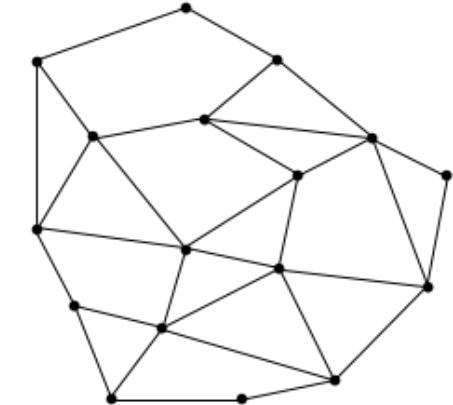
# THE EVOLUTION OF NETWORKS



CENTRALIZATION  
DATABASE

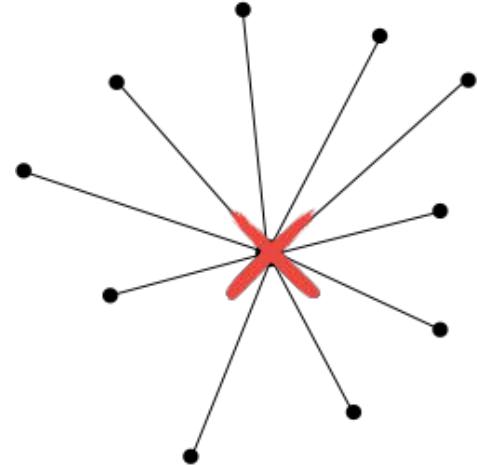


DECENTRALIZATION  
THE CLOUD

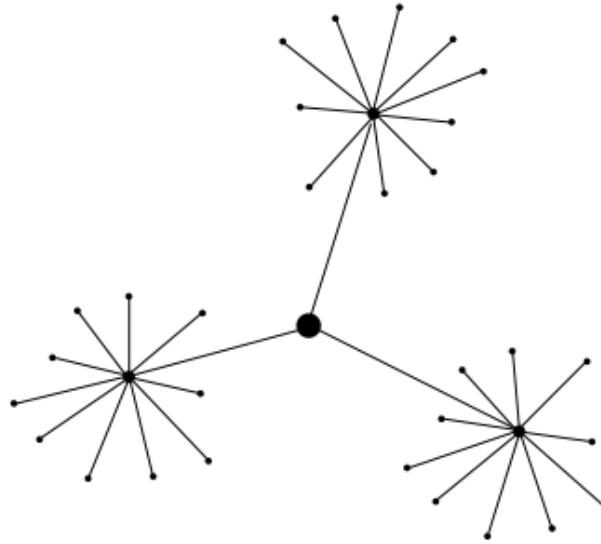


DISTRIBUTION  
BLOCKCHAINS

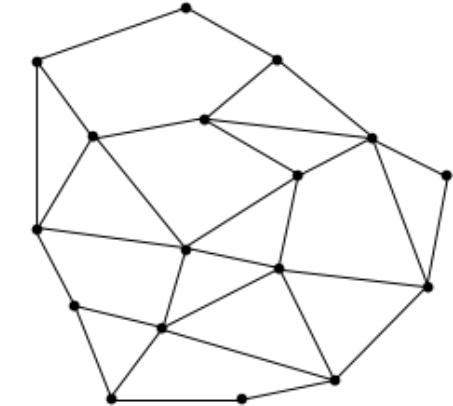
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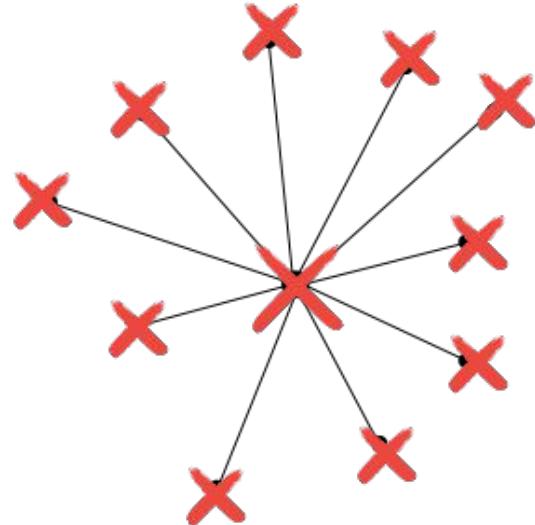


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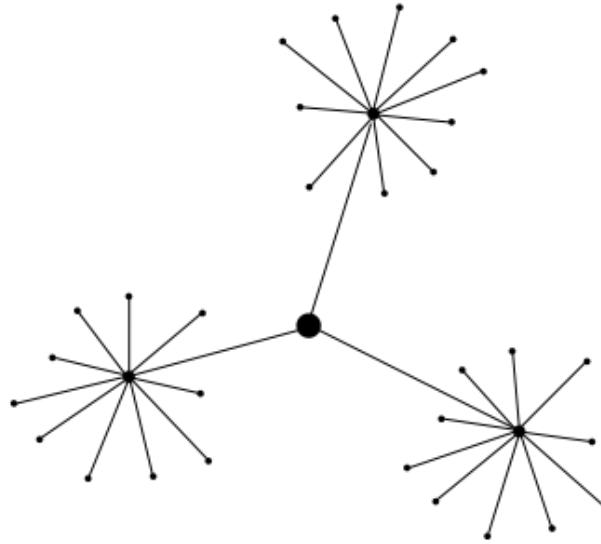


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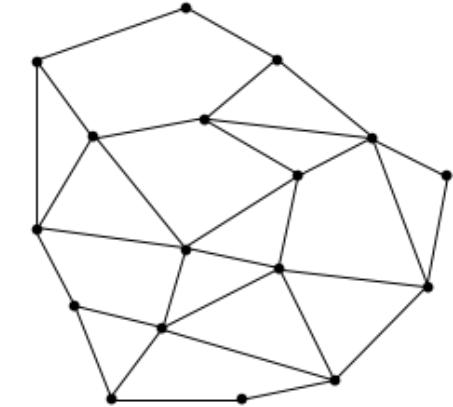
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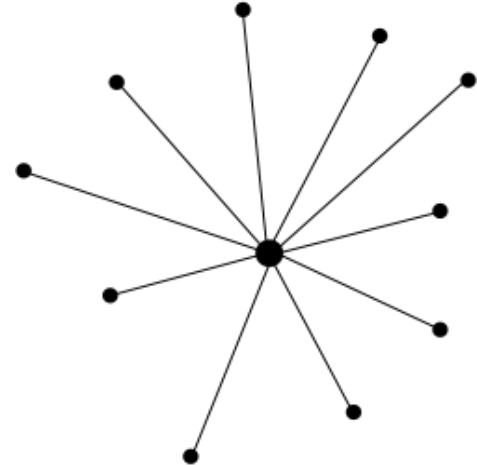


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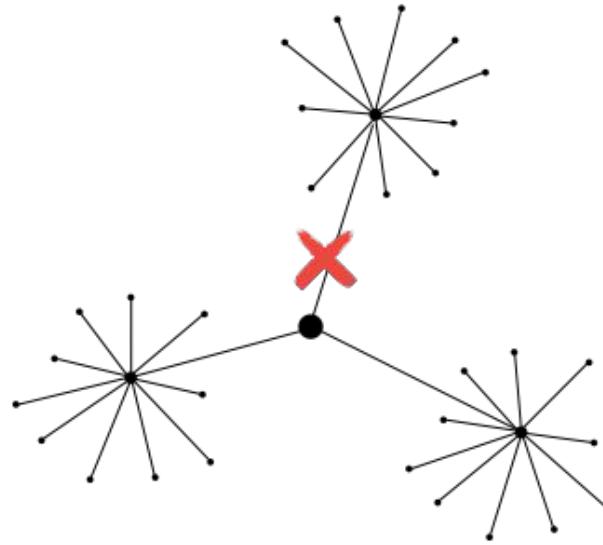


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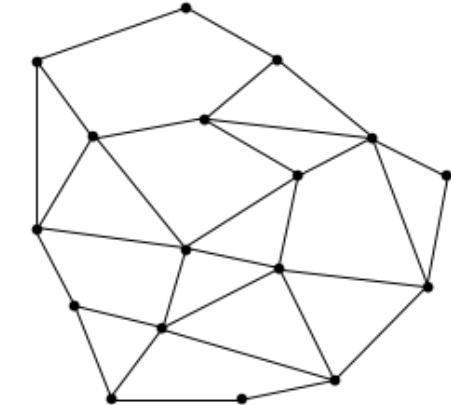
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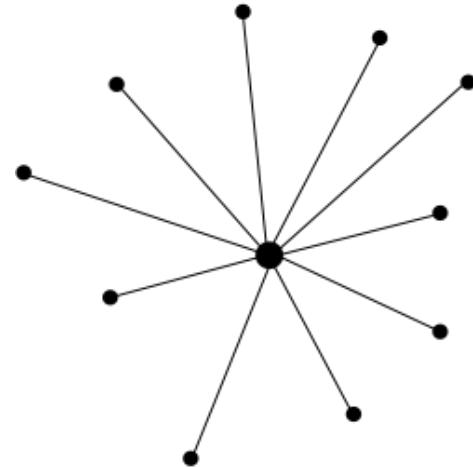


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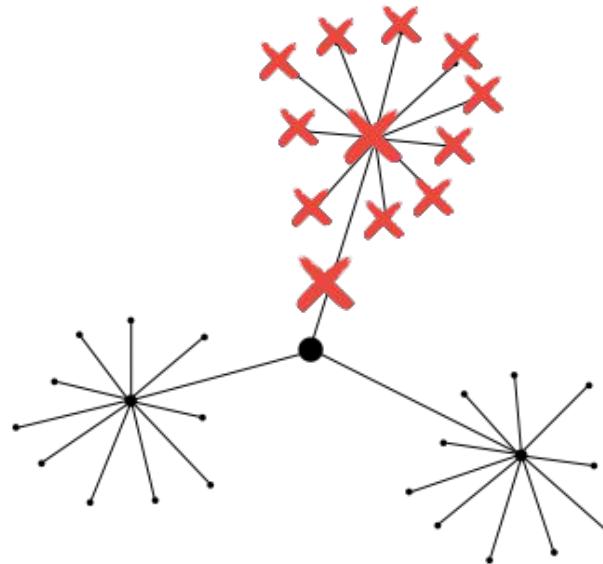


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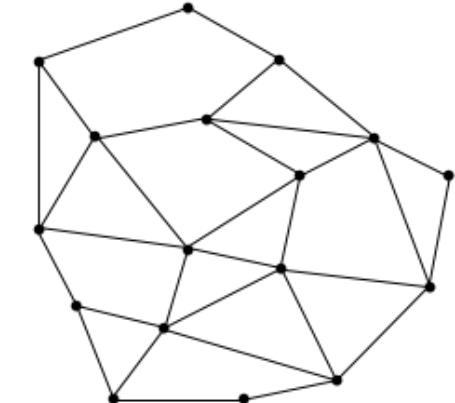
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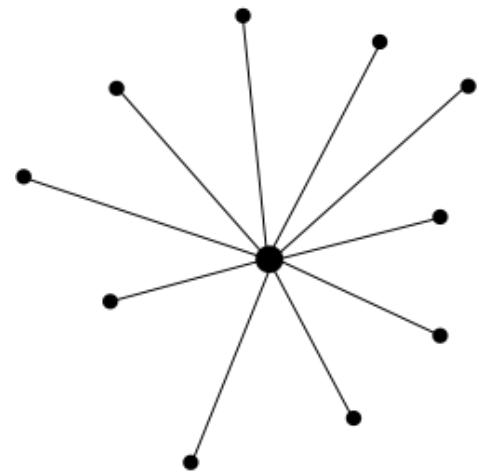


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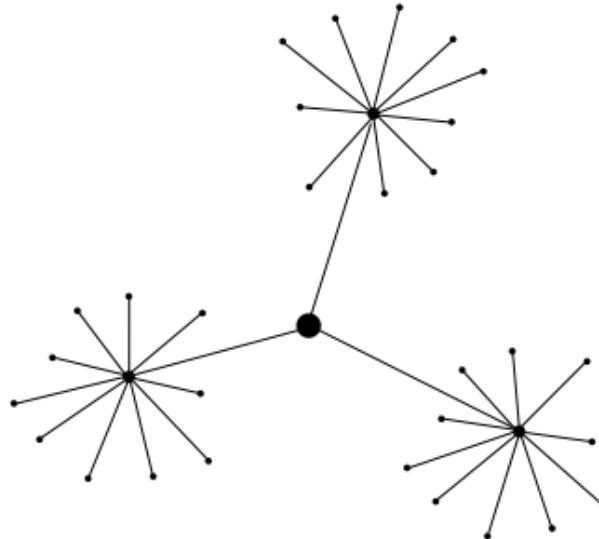


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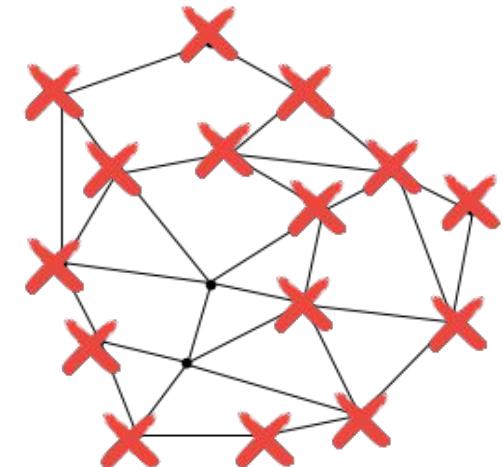
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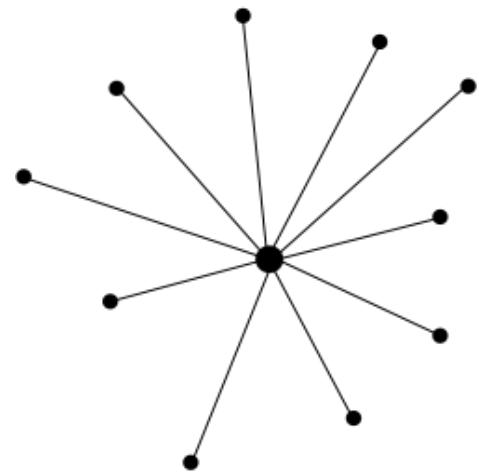


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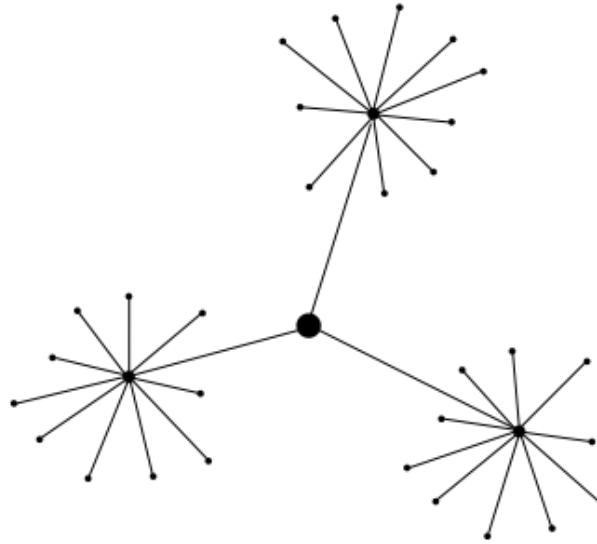


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BLOCKCHAINS

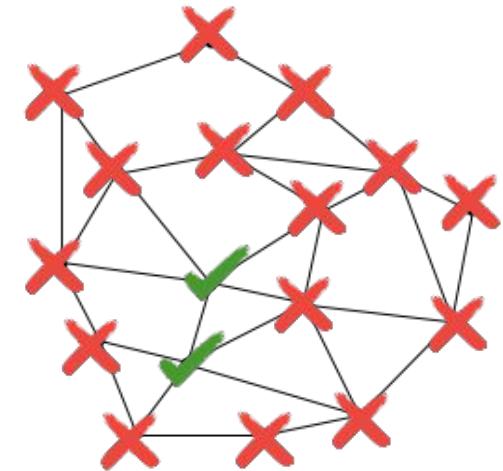
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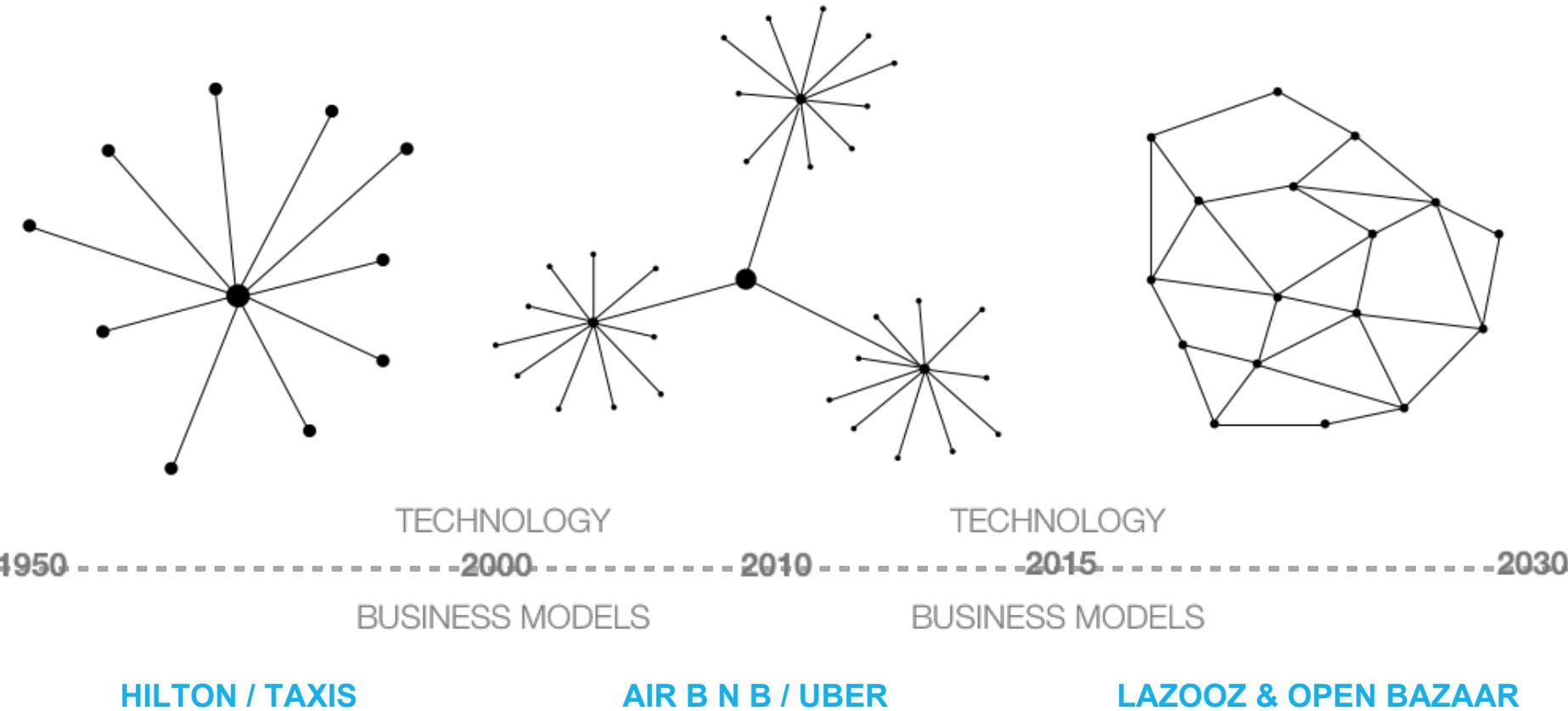


DECENTRALIZATION  
THE CLOUD



DISTRIBUTION  
BLOCKCHAINS

# THE EVOLUTION OF EVERYTHING



# BLOCKCHAINS ARE SIMPLY A NETWORK OF NODES

- Each member of the network runs their own node and all nodes are equal
- The blockchain becomes more secure as more nodes join the network
- All transactions across the entire network are tracked by each node
- There are no actual coins - there is only a ledger of who owns what
- On the blockchain - no one knows you're a fridge

ON THE BLOCKCHAINS EVERY ACCOUNT IS A SET OF KEYS



AND EACH “ADDRESS” REQUIRES A PRIVATE KEY TO ACCESS IT



SOME ADDRESSES EVEN REQUIRE MULTIPLE KEYS

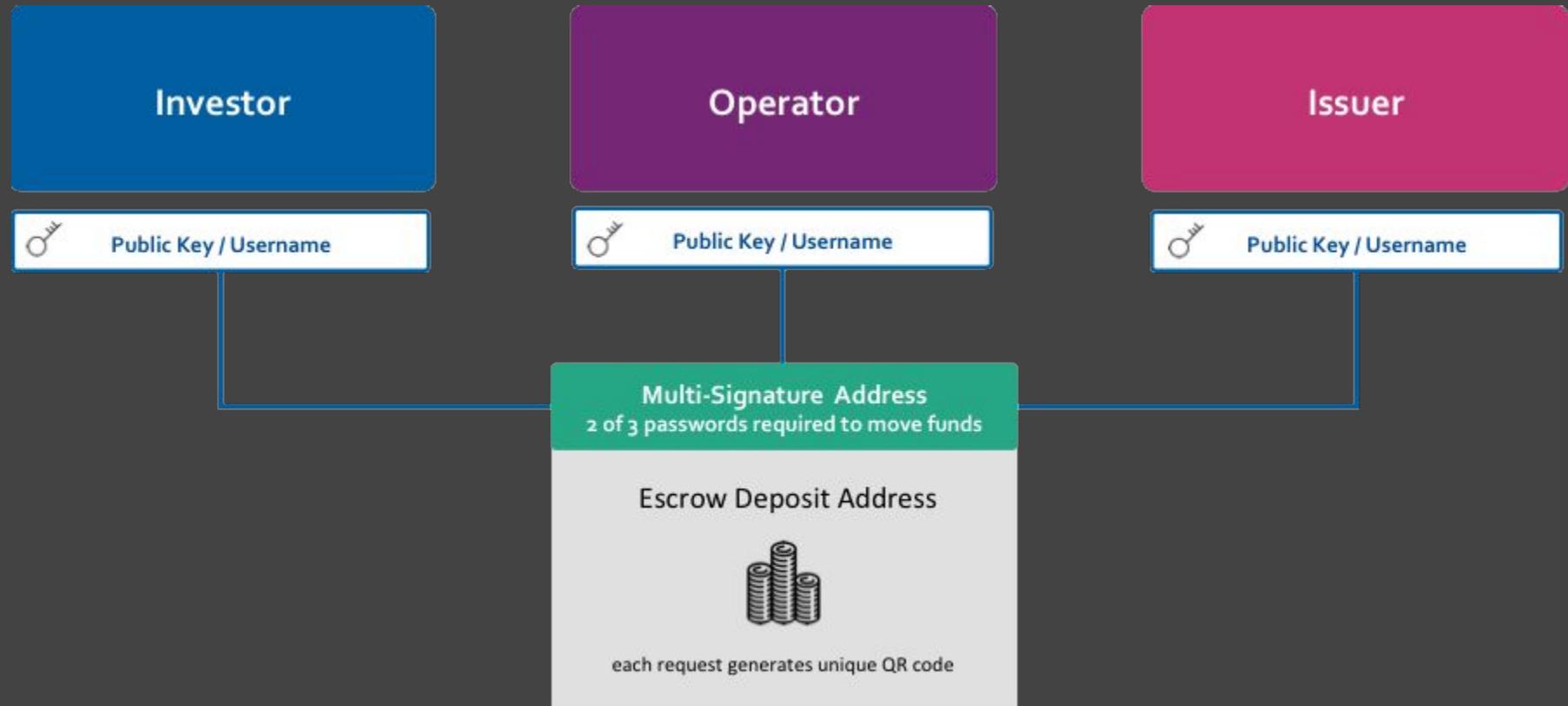


# WHO OWNS WHAT? KEYS HAVE TO BE STORED SOMEWHERE

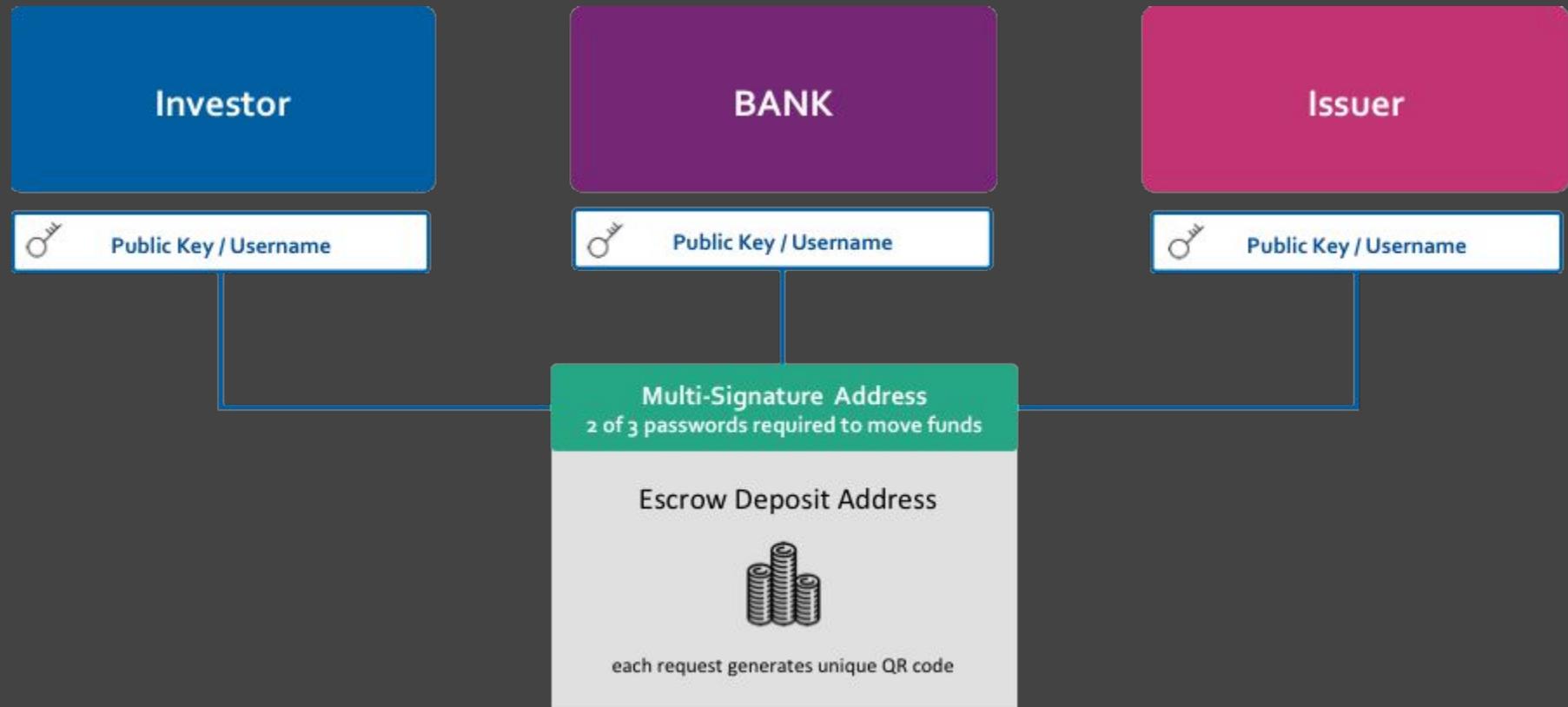
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- Paper Vs Brain
  - Hardware Vs Software
  - Hard Drive Vs Web-Service
  - Pseudo-Random Vs Deterministic
- 
- Exchanges are **NOT** wallets ...  
(1 exchange hacked every 3 months)

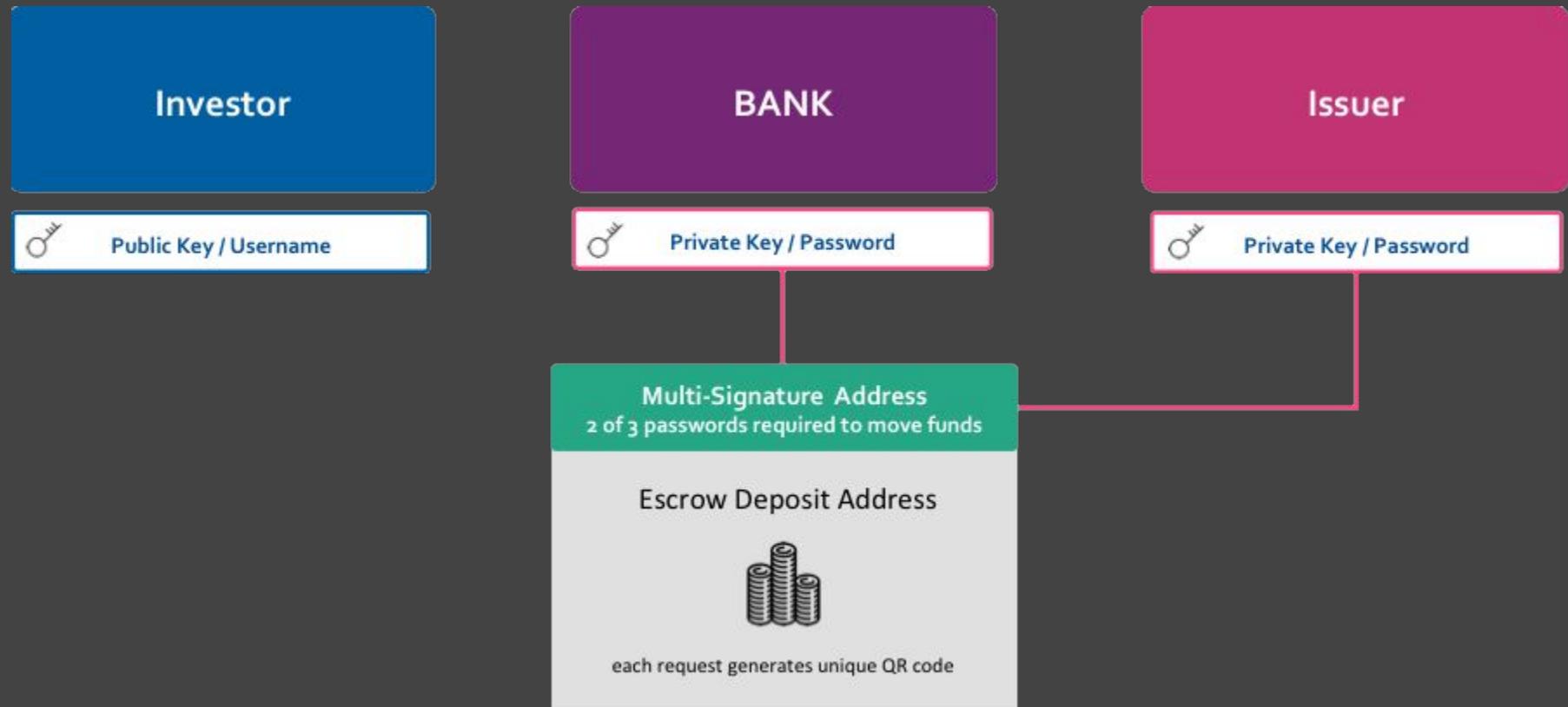
# CURRENT MULTI-SIGNATURE BITCOIN SOLUTIONS IN MALAYSIA



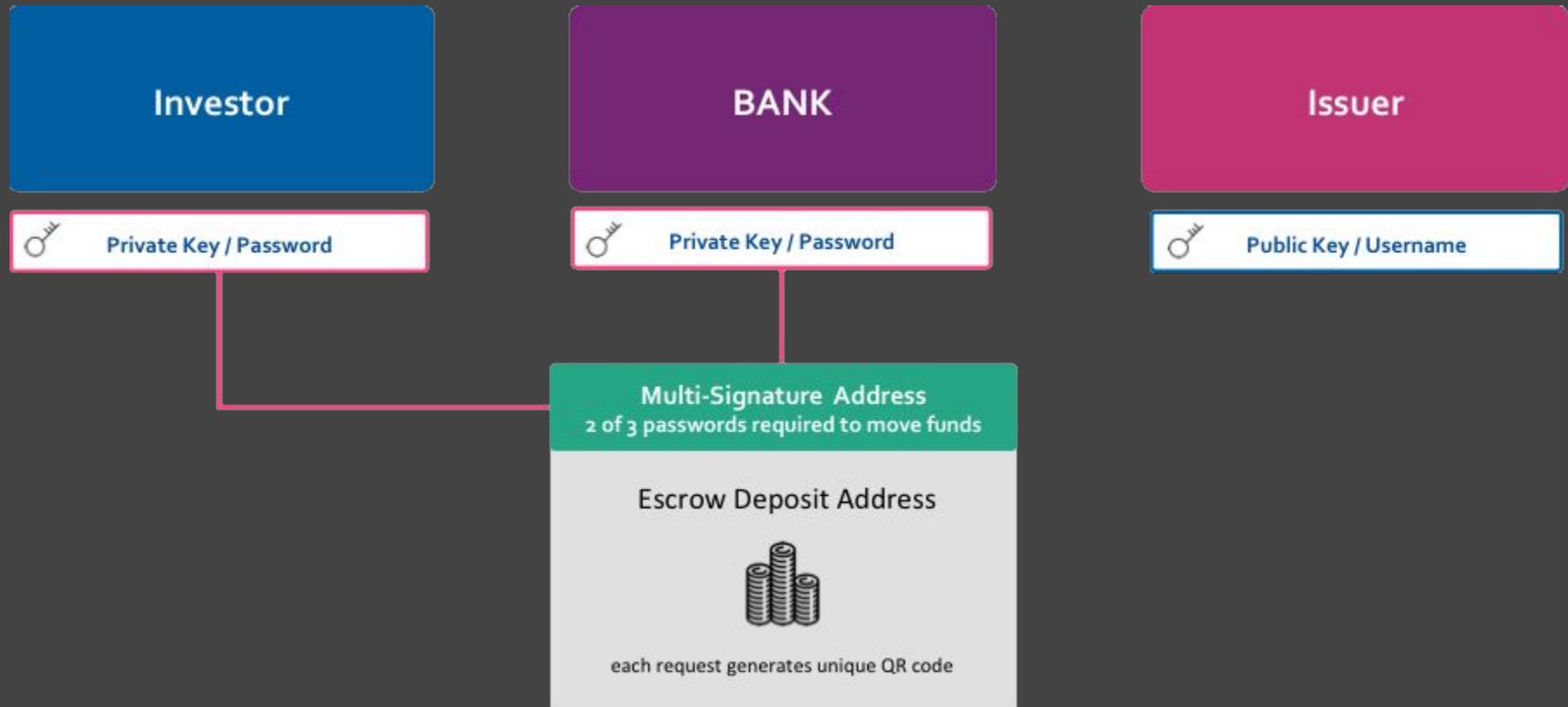
# MOVING THE ECF OPERATOR - SANCTIONED BY REGULATORS



# COMPLETING AN EQUITY CROWDFUNDED INVESTMENT PROCESS



# REJECTING INVESTMENT OR RETURNING FUNDS TO INVESTORS



# KEY PAIRS - ULTIMATELY USED TO SIGN TXs & MESSAGES



ONE PUBLIC KEY



MULTIPLY PRIVATE KEYS

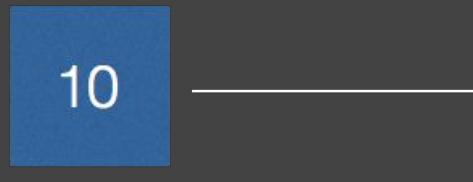
- Example of a Bitcoin public address (derived from the public key):  
`1GzBZ7eK6wzNjp1Wt6AxHo73kJL2tzoErq`
- Example of a Bitcoin private key (used to transfer funds from address):  
`L1winVkoRmxMdHKbwssx33Z9ZEuXeJ1eP9CVYvnNn4TdYA32GsWY`
- Example of a Bitcoin extended private key (used by HD protocol):  
`xprv9s21ZrQH143K2Ywhg9bhZ5nd31t3EbXsg8v28gkKjSm9PA3PiZ89dWW6YKxWZa2pgTuErQ65K46KGVu1xCRBCK3Ppd465QGtH7TmxAEiLv`

# WHAT'S IN A BITCOIN TRANSACTION?

- Multiple unspent inputs are used in order to form the total value sent
- Cannot send proportions of inputs, must use all and send the change back
- Because a single transaction can send multiple values to multiple outputs
- Fees are based upon the total size (inputs and outputs) rather than value
- Paying these fees is done by forgetting to send some value to someone
- Transaction scripts can contain complex variables (multi-sig & timed locks)
- However, they can only contain one OP\_Return (38 bytes of arbitrary data)

# ALICE CAN'T SEND WHAT SHE DOESN'T HAVE AND BOB WANTS 5

ALICE'S UNSPENT INPUTS



## TIME FOR SOME ( QT + PHP ) CODE - FIND THE UNSPENTS

---

```
$inputs = [ ];
$bitcoind = new jsonRPCClient("http://un:pw@localhost:8585/");
$unspents = $bitcoind->listunspent(1, 9999999, [$address_to_check]);

foreach($unspents as $unspent)
{
    if($balance >= ($amount_to_send + $required_fee))
    {
        $balance = $balance + intval($unspent['amount'] * 100000000);
        $inputs[ ] = $unspent;
    }
}
```

## TIME FOR SOME ( QT + PHP ) CODE - ADD INs & OUTs

```
$outputs = [ {  
    address: $address_to_send_to,  
    value: intval($amount_to_send * 100000000)  
},  
{  
    address: $address_to_send_change_to,  
    value: $total_amount_of_inputs - ($amount_to_send + $fee)  
}];  
  
foreach($outputs as $key => $output)  
{  
    $outputs[$key] = sign_tx($output, $private_key);  
}
```

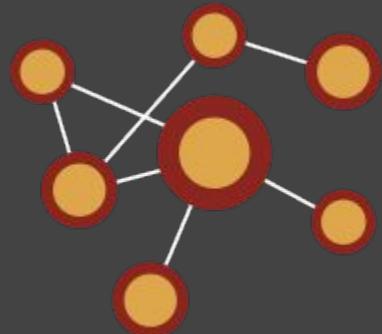
## TIME FOR SOME ( QT + PHP ) CODE - RELAY TO NETWORK

```
$raw_transaction = transaction_to_hex($inputs, $outputs);

// $raw_transaction_should_equal =
“010000001484d40d45b9ea0d652fca8
258ab7caa42541eb52975857f96fb50cd732c8b48100000008a47304402
202cb265bf10707bf49346c3515dd3d16fc454618c58ec0a0ff448a676c54ff
71302206c6624d762a1fce4618284ead8f08678ac05b13c84235f1654e6a
d168233e8201410414e301b2328f17442c0b8310d787bf3d8a404cfbd070
4f135b6ad4b2d3ee751310f981926e53a6e8c39bd7d3fefd576c543cce493
cbac06388f2651d1aacbfcdfffffff0162640100000000001976a914c8e9099
6c7c6080ee06284600c684ed904d14c5c88ac00000000”;

$txid = relay_raw_transaction($raw_transaction);
```

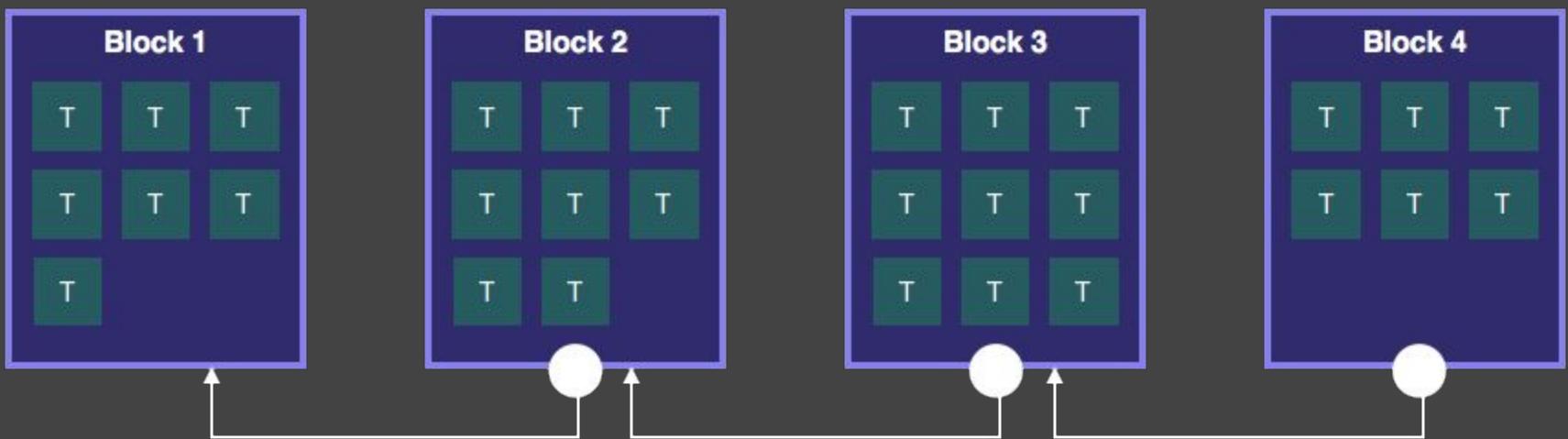
# WHAT MAKES A NETWORK DISTRIBUTED ...?



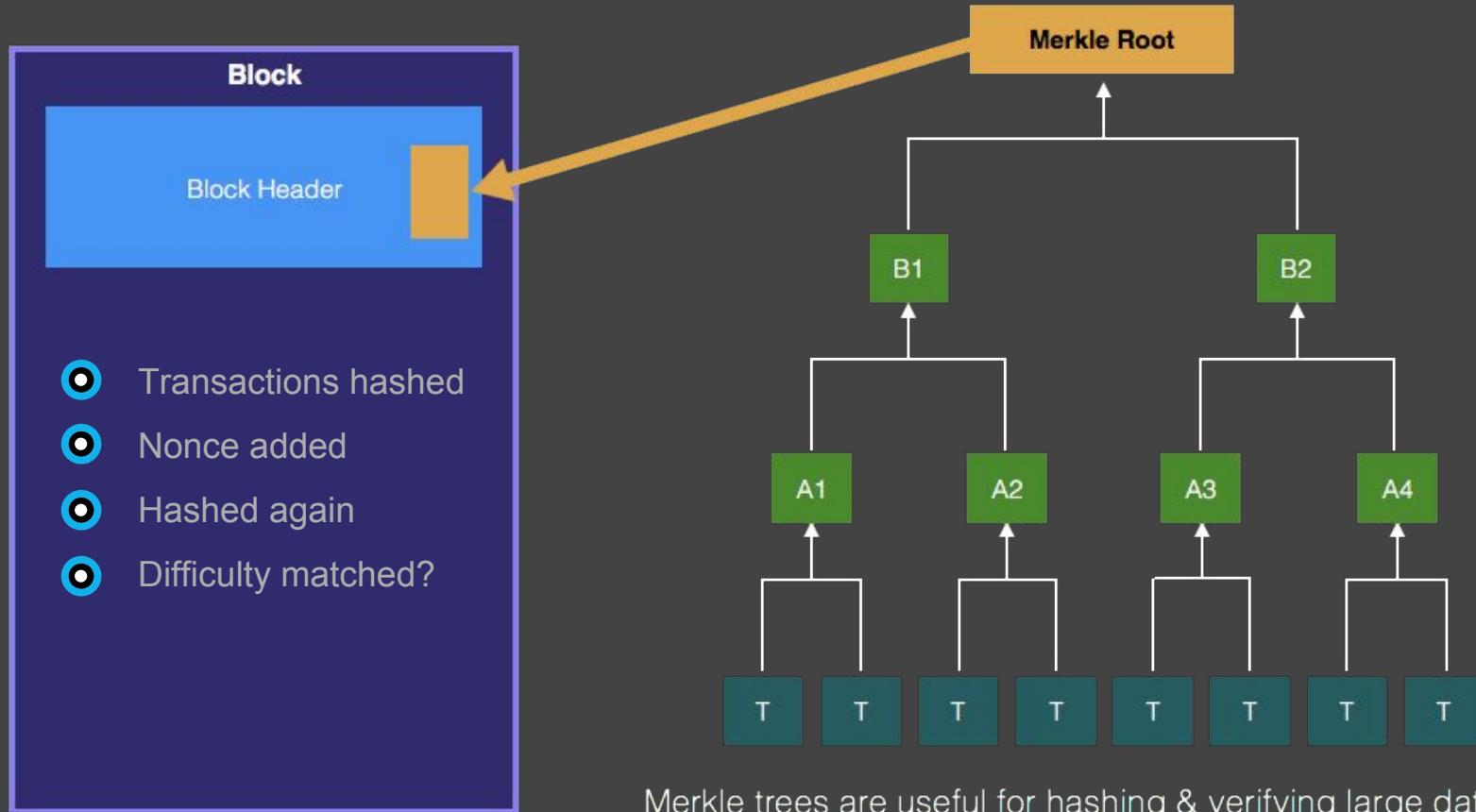
- **Decentralized data (resistant to failure)**
  - Everybody has a copy, every copy is consistent
  - No central authority to control any of the nodes
  - Highly resilient but not real-time (trade-off)
- **Peer to peer connection (direct communication)**
  - Each node connects directly to its peers
  - Updates propagated through a gossip protocol
  - Peers have a discovery mechanisms
- **Has a known consensus algorithm**
  - Consensus algorithm used to ensure consistency
  - Nodes that are not consistent are rejected

# BUT WHERE DO THE TRANSACTIONS GO ...?

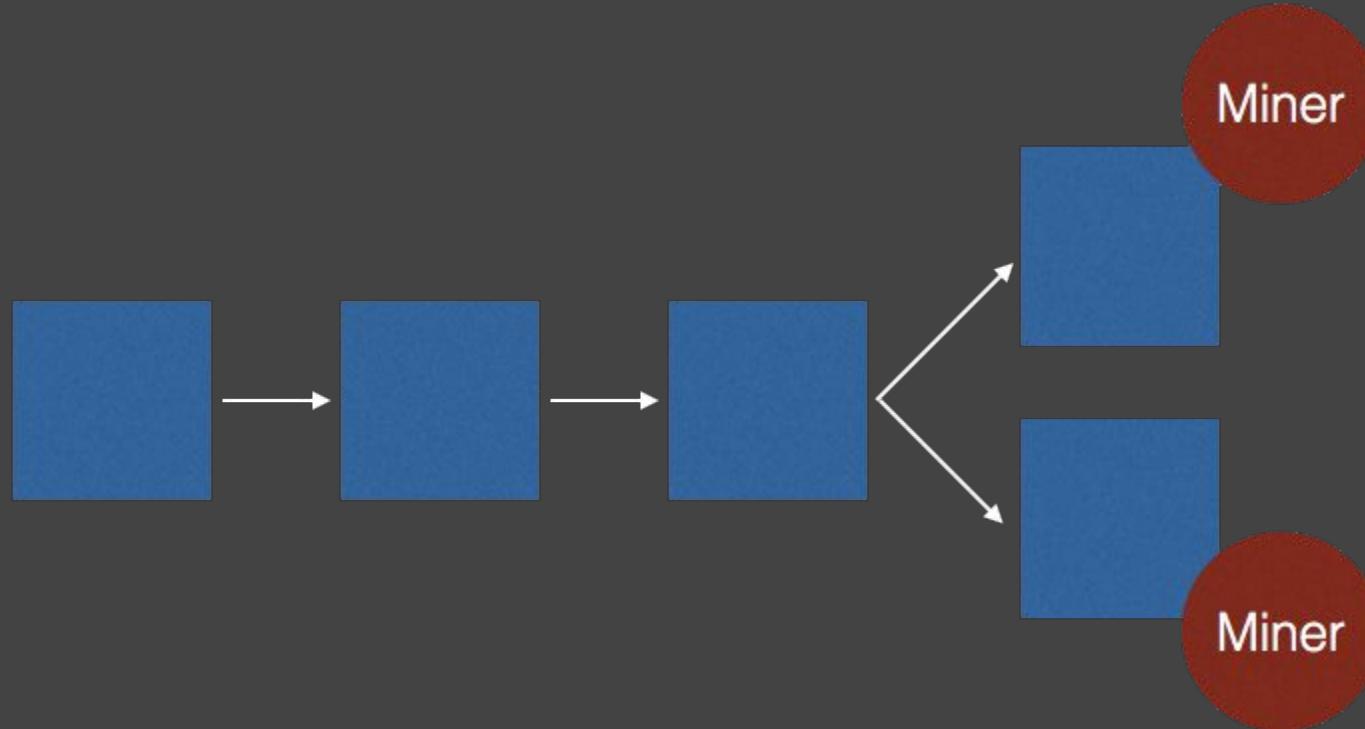
- Transactions are batched into blocks every ten minutes (with Bitcoin)
- The block is added to the chain with a link to the previous block
- With the block added to the chain, its transactions are then **confirmed**



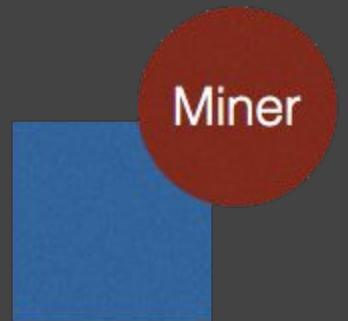
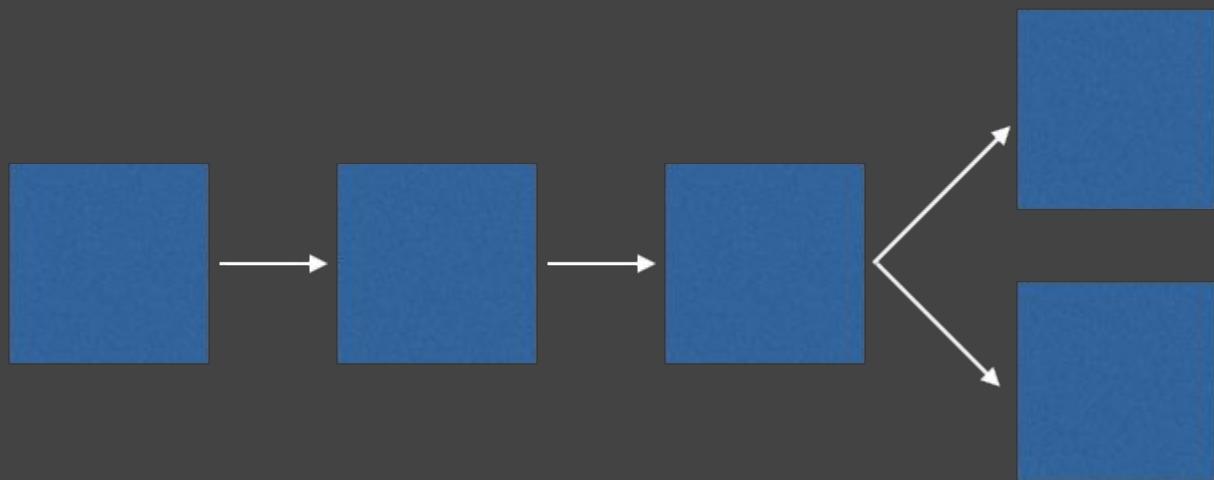
# BUT WHO HAS THE RIGHT TO ADD THE NEXT BLOCK ...?



# FORKS IN THE ROAD - WHICH IS WHY WE HAVE CONFIRMATIONS

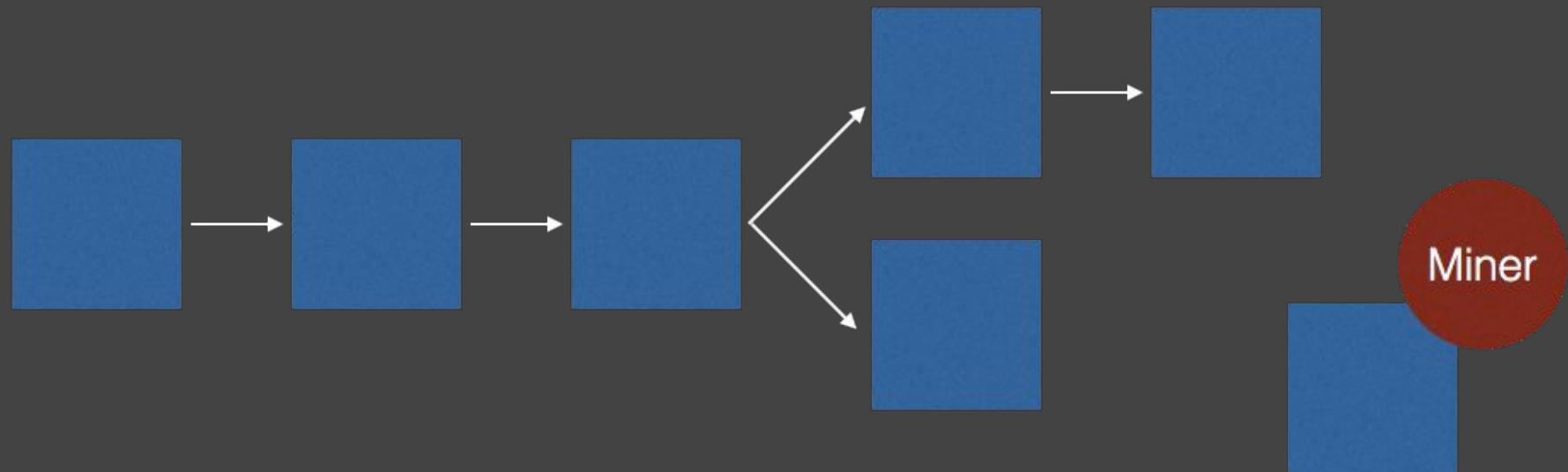


# ALWAYS RESOLVED - EVENTUALLY



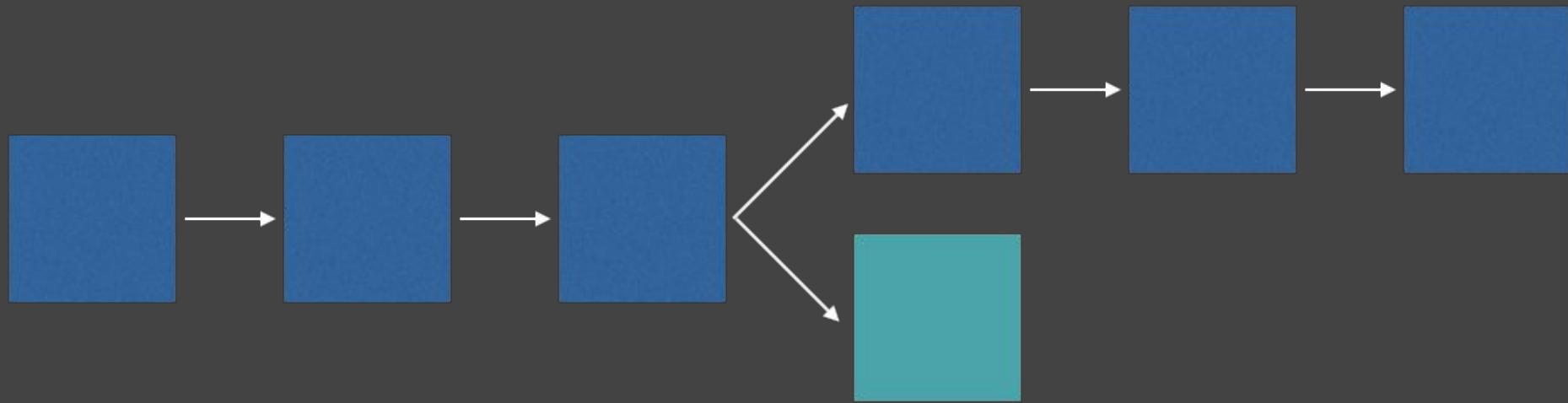
Randomly picks one  
chain if both forks are  
the same length

# LONGEST CHAIN RULES



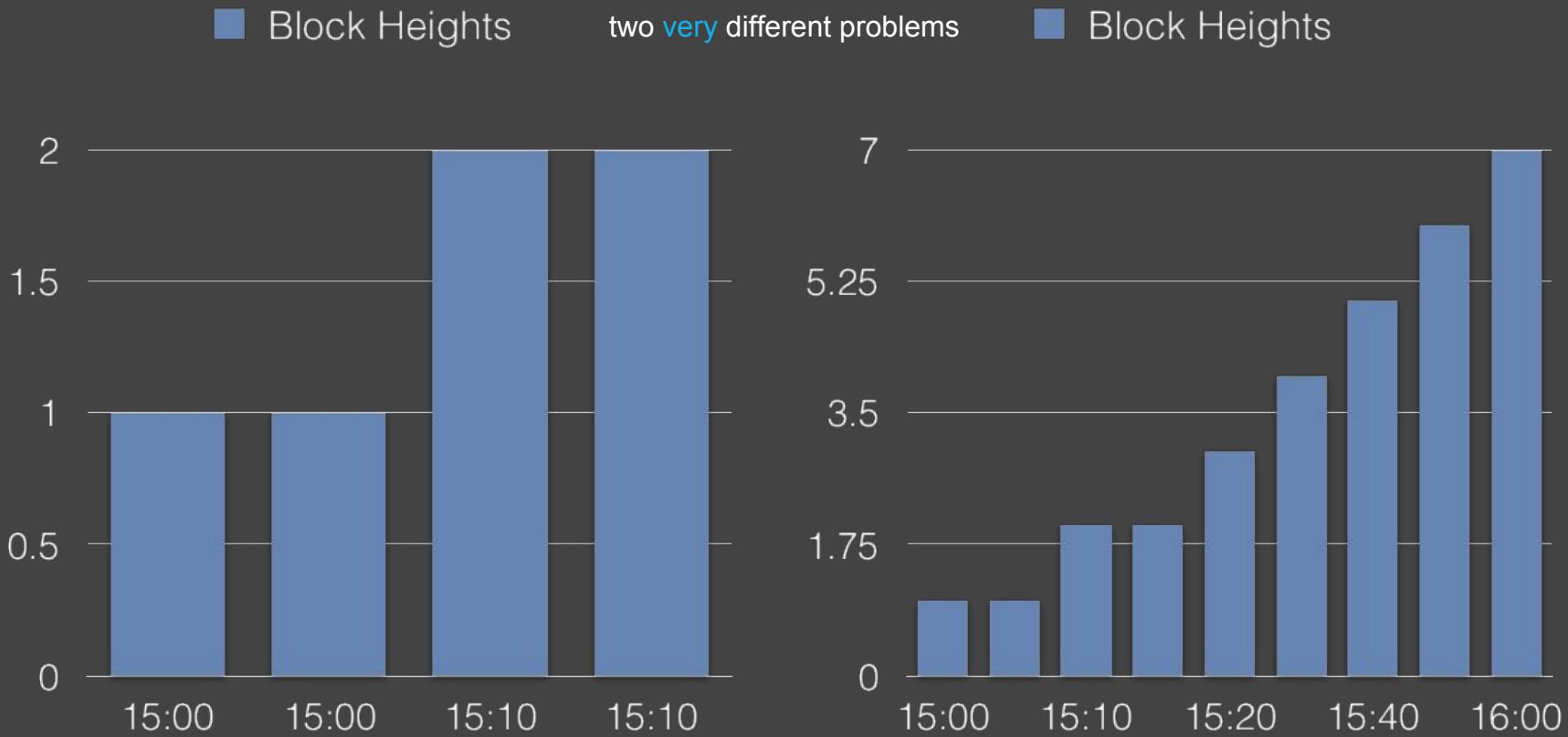
If one fork is longer than the other,  
pick the longest fork

# ONCE CONFIRMED TRANSACTIONS NOW UNCONFIRMED AGAIN



This block is now orphaned!  
After a while, all transactions  
within are returned to the  
memory pool

# REAL TIME Vs TRUTH

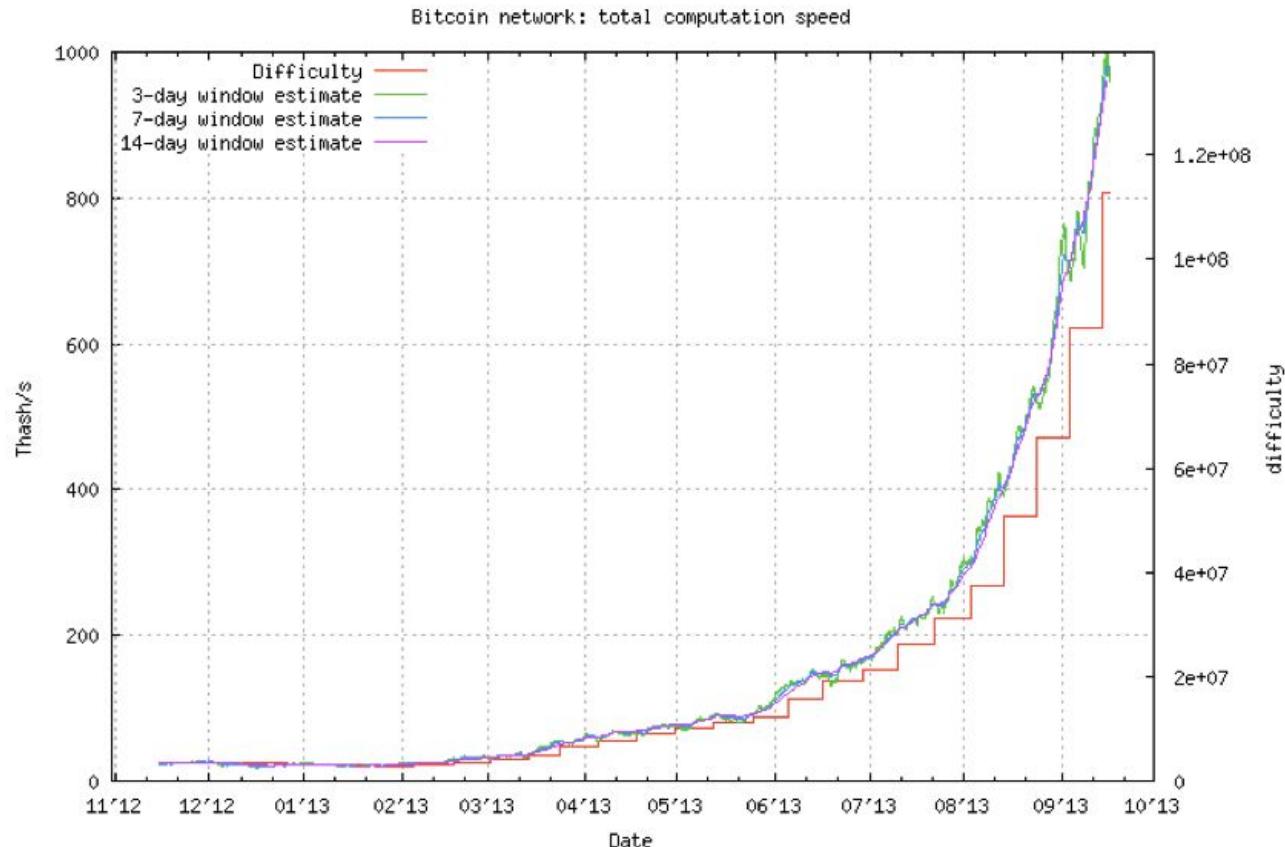


## MINING FOR NUMBERS - NOT GOLD

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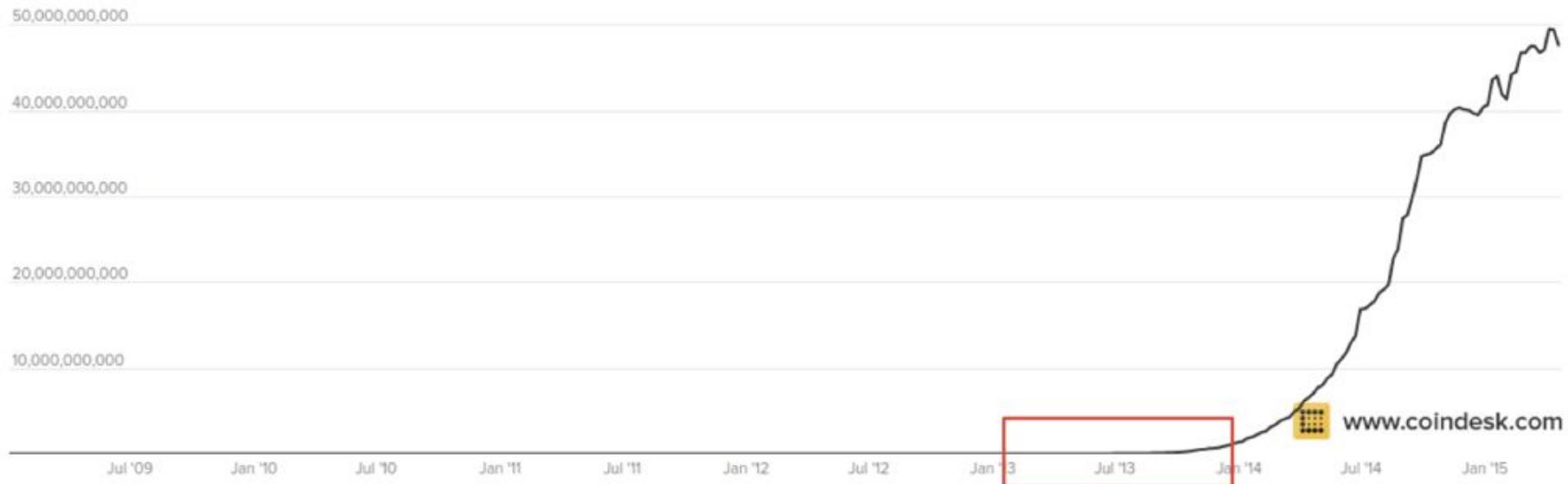
- To reach consensus as to which node has the right to add the next block to the chain, miners compete in a race to solve cryptographic equations
- Miners gather and in-turn verify unconfirmed transactions into blocks
- They then add a nonce (one use number) to the block and hash it
- If the hash has X number of zeros at the beginning it becomes a valid block
- Otherwise the miners increase the nonce and they hash the block again
- Solving these cryptographic equations is becoming increasingly difficult

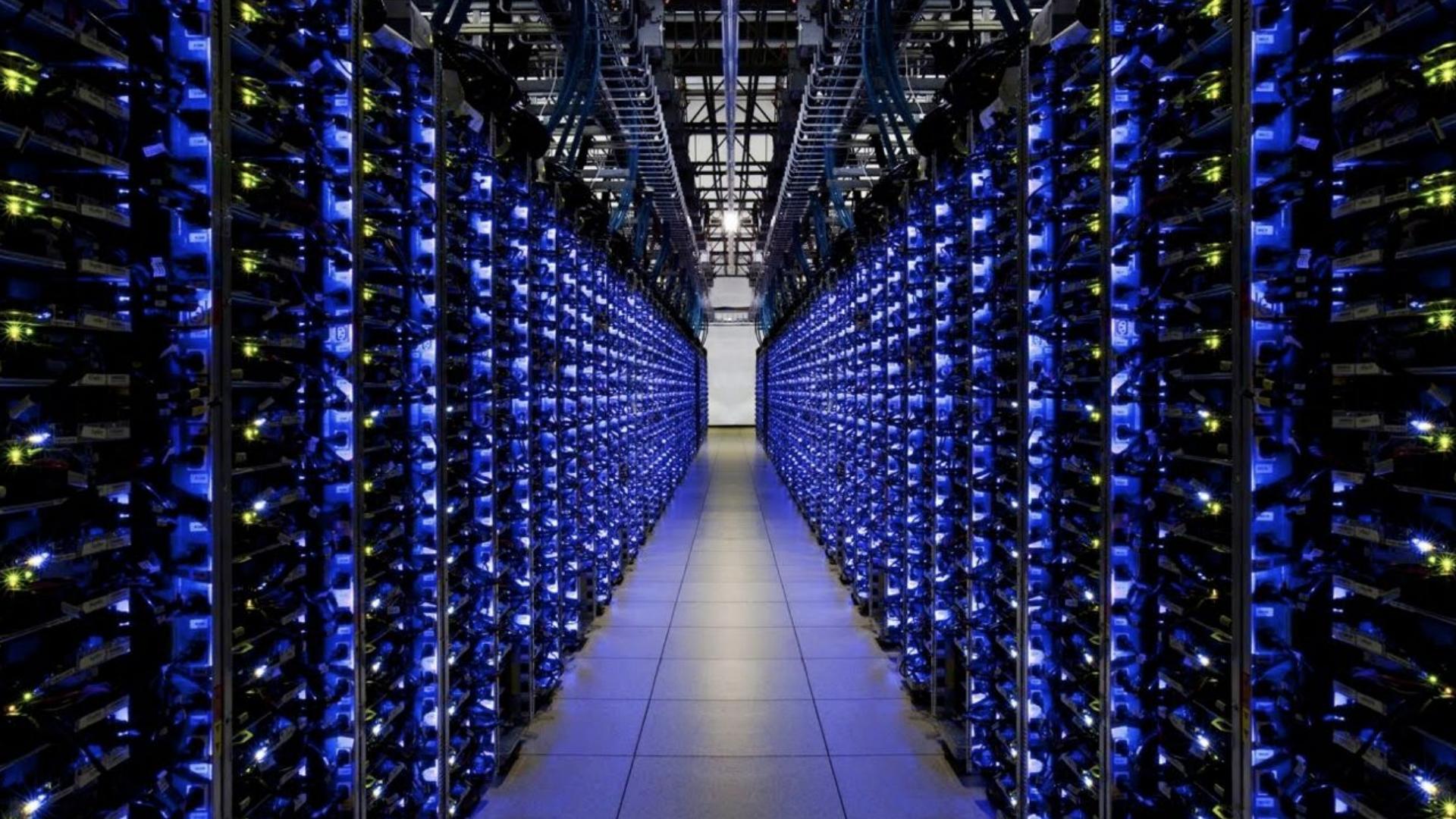
# THIS IS THE HASHING POWER OF THE NETWORK IN 2013



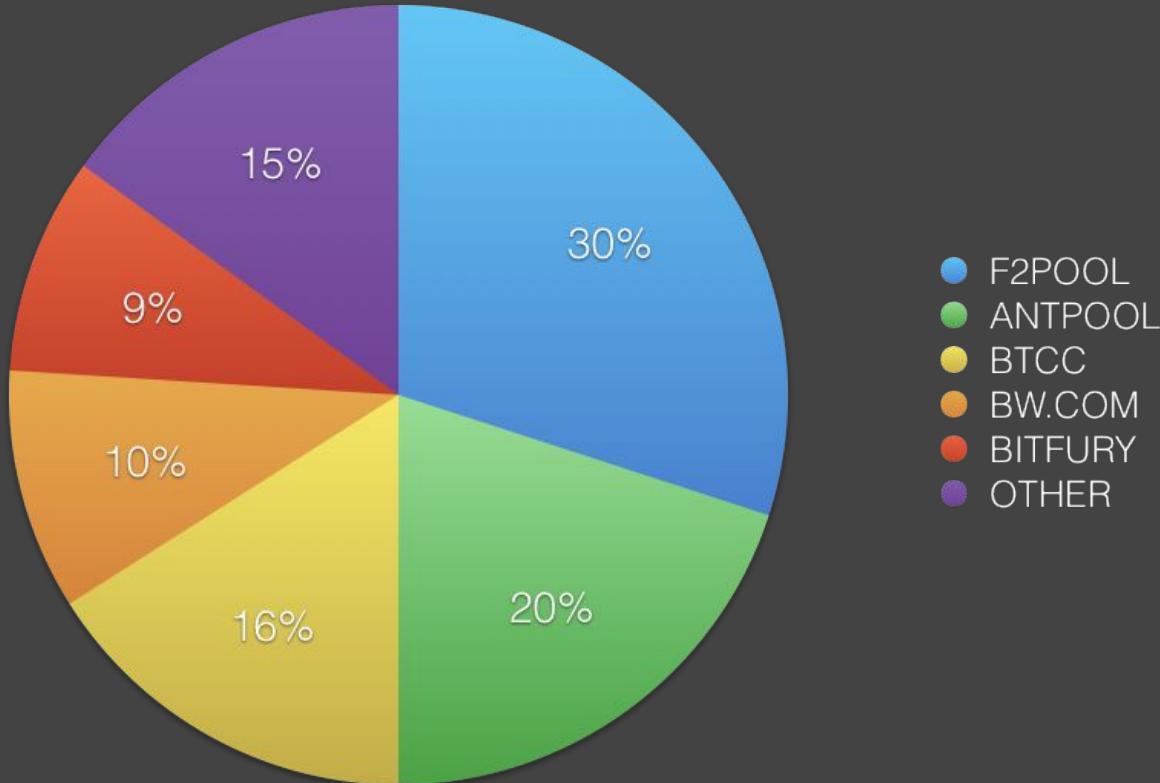


# 2013 to 2015 - MINING IS NOW A BILLION DOLLAR BUSINESS



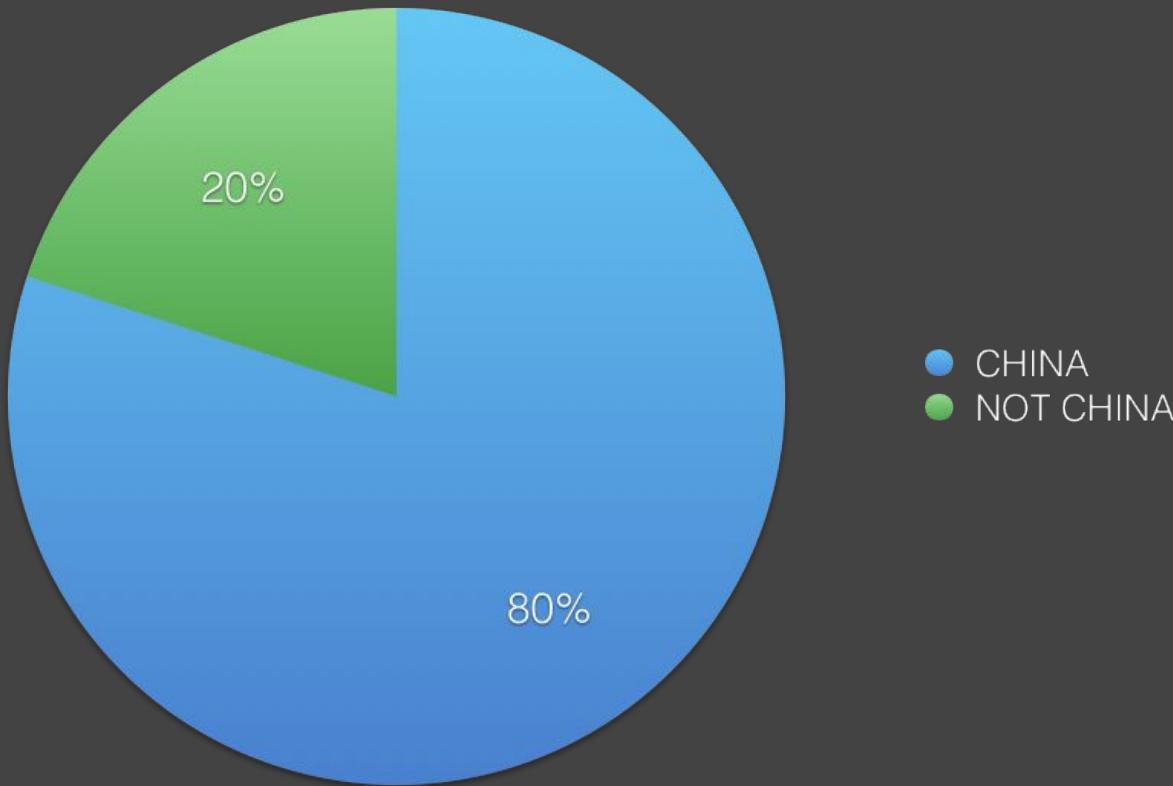


# THE NOT SO DISTRIBUTED ECONOMICS OF MINING



# AS OPPOSED TO THE GEOGRAPHICAL DISTRIBUTION

---



# THE OTHER SIDE OF MINING - WHAT CAN THEY DO ?

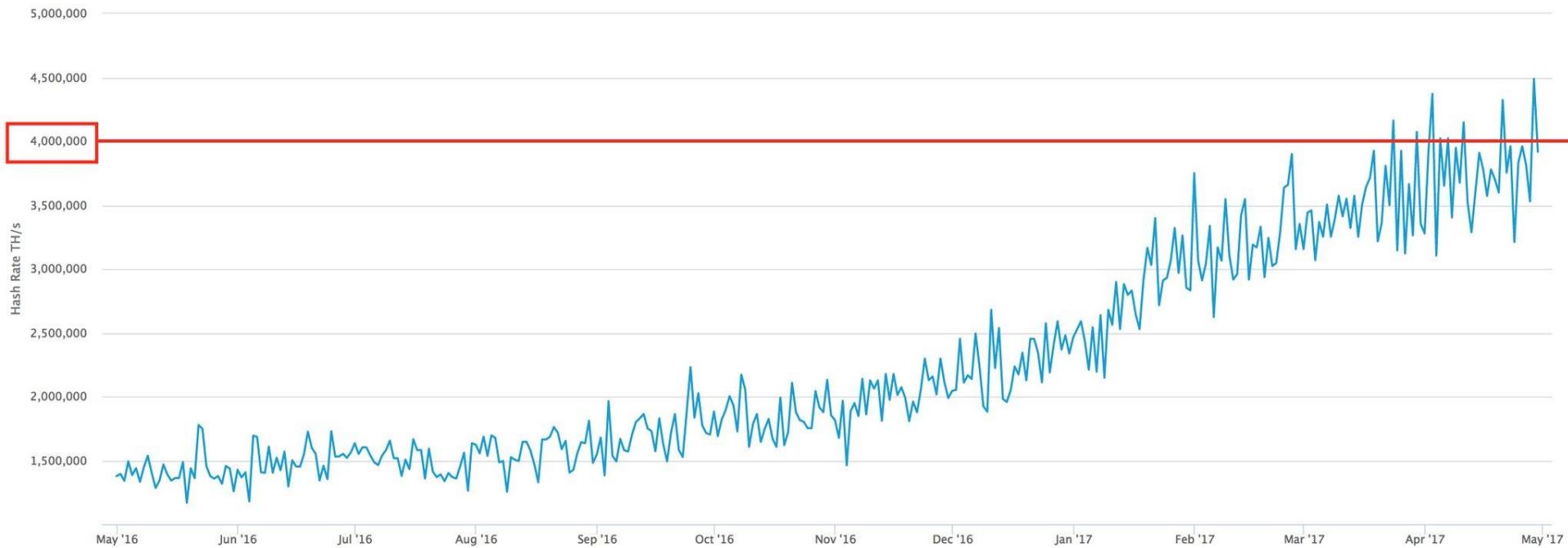


# 4,000,000 TH/s = US\$500,000+ IN MINING EQUIPMENT ALONE

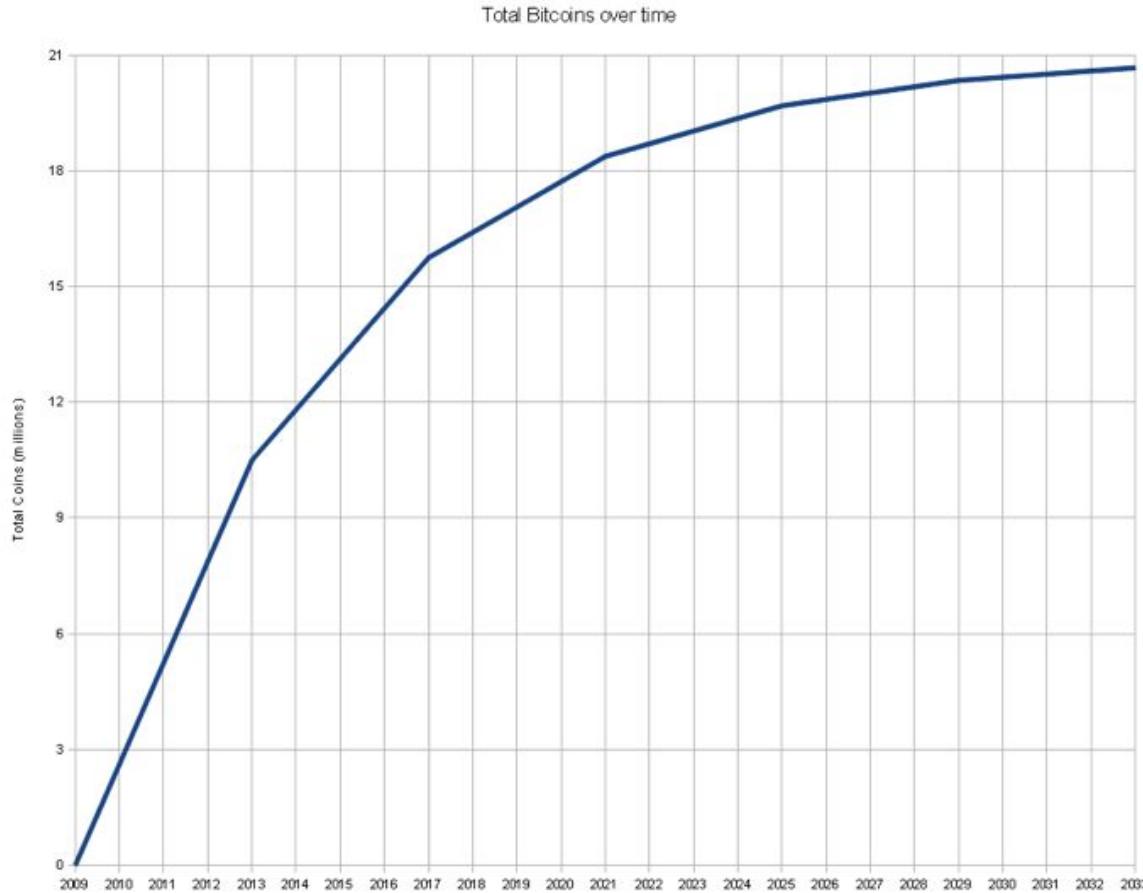
## Hash Rate

The estimated number of tera hashes per second (trillions of hashes per second) the Bitcoin network is performing.

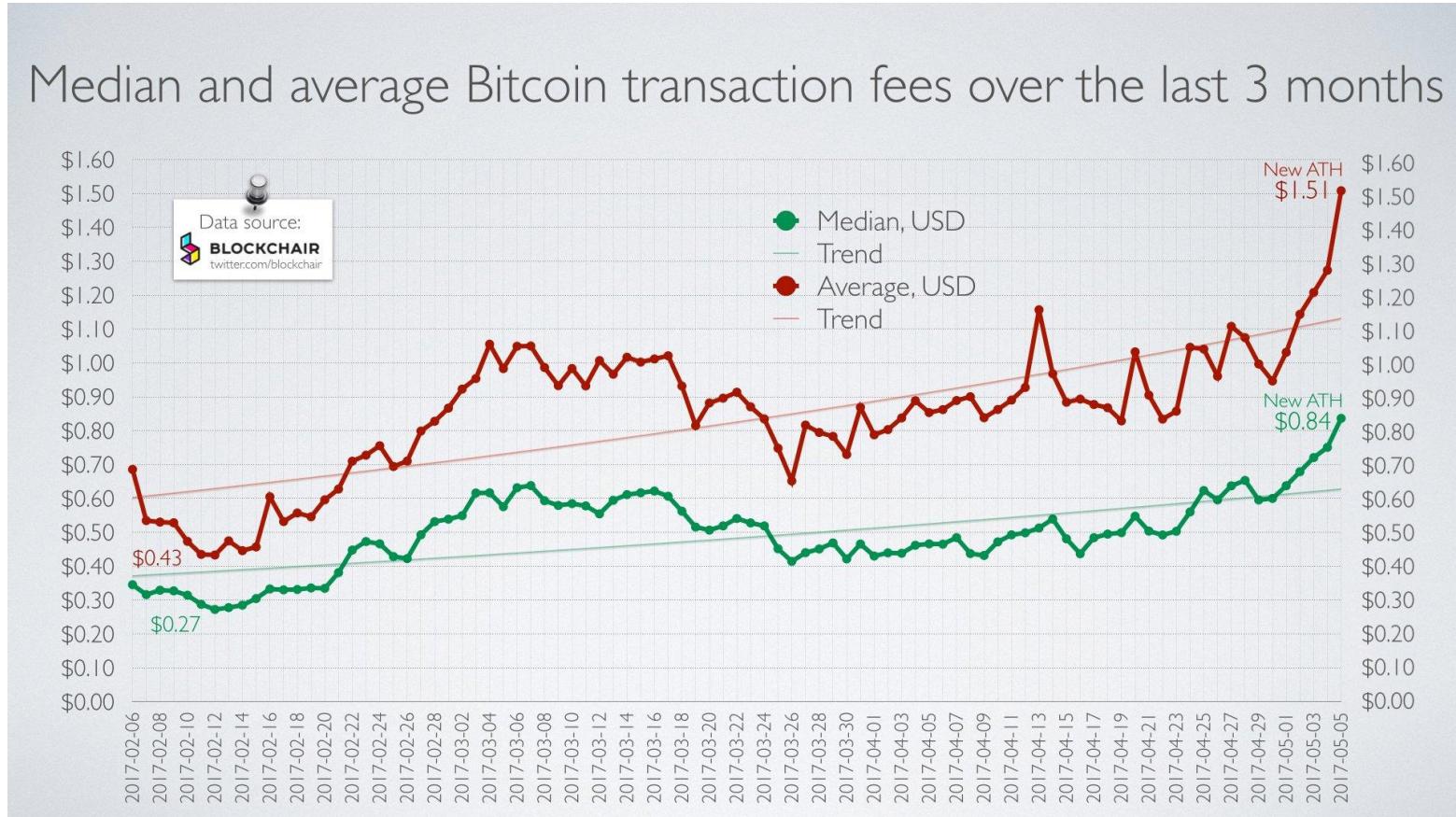
Source: blockchain.info



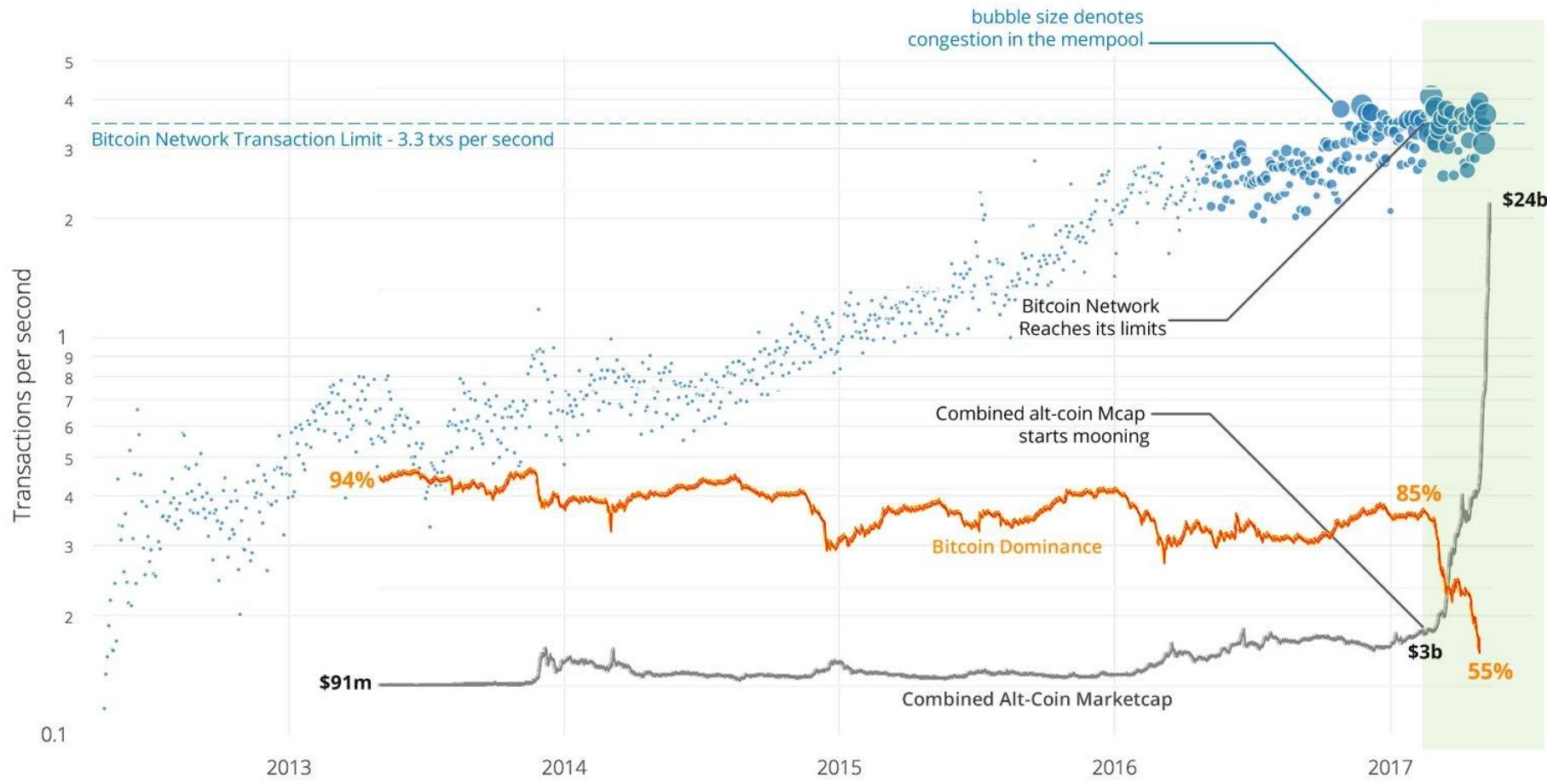
# LONG TERM FUNCTION OF MINERS IS NOT TO MINE



# SINCE THERE IS NO DEFINED FEE - CLEARING IS A FREE MARKET



# AS BLOCKS CONTINUE TO FILL - THE MARKET SPREADS



## SECTION SUMMARY

# WHAT MAKES THE BITCOIN BLOCKCHAIN SPECIAL?

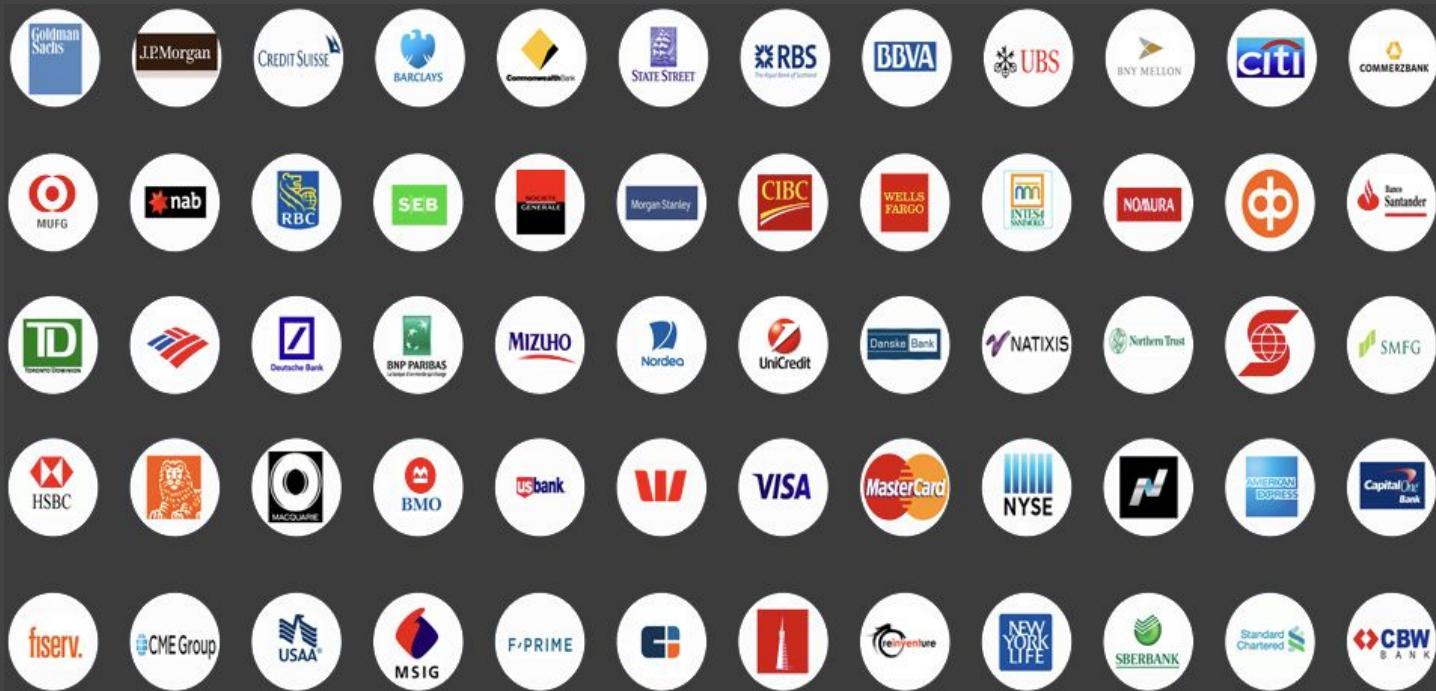
- No one is in control
- No new technology
- Uses lots of energy
- Is extremely valuable

**BITCOIN ISN'T EVERYTHING**

**BILLIONS INVESTED IN BLOCKCHAINS**

# BANKS ARE MOVING FASTER THAN USUAL

In 2016, over 100 banks and leading financial institutions started blockchain projects, with more than US\$1 billion dollars being invested into the ecosystem - in just one year!

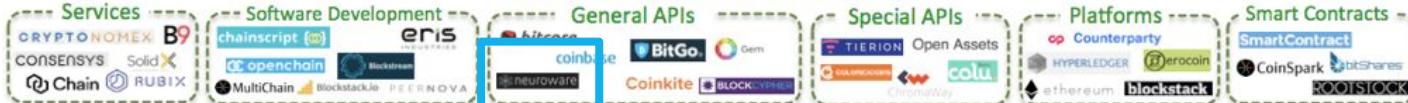


# BLOCKTECH in FINANCIAL SERVICES Landscape

## APPLICATIONS & SOLUTIONS



## MIDDLEWARE & SERVICES



## INFRASTRUCTURE & BASE PROTOCOLS



# SOME OF THE INSTITUTIONS LEADING THE WAY



Custom blockchain  
for settlements



Standard  
Chartered



Blockchain based  
trade finance platform

Blockchain based  
loyalty platform

Blockchain based  
remittance platform



multiple blockchains for cross-  
border payments and loyalty



1st Bank in ASEAN to join an  
Asian Blockchain Consortium



Patented a blockchain  
based wire transfer system



## BIG EXPECTATIONS NOW SET

---

- Accenture claim investment banks can save US\$12 billion a year
- McKinsey believes financial services will save US\$110 billion in 3 years
- White & Case say banks can reduce infrastructure by \$20 billion a year
- Bank of England says DLT could add 3% to a country's economic output
- 80% of top banks to launch DLT projects by 2017 - World Economic Forum
- IBM reports that 15% of big banks will be using blockchains by 2017
- IBM also reported that 65% of top banks will have blockchain trials by 2020

## R3 - WORLD'S LARGEST BLOCKCHAIN CONSORTIUM

---

- Founded by ex-banking CEOs with their CTO as ex-CIO of IBM
- Over 100 financial institutions joined R3 (with large annual fees)
- Members are then able to engage R3 consultants for pilot projects
- Originally utilizing privately forked Ethereum & Eris solutions
- 15 members trial distributed ledgers for trade finance in 2015
- 10 banks trial blockchain (KYC) identity registry in 2016
- Now heavily promoting Corda (in-house permissioned ledger)
- Opened a lab in Singapore and started working with MAS
- Currently in the process of raising US\$200 Million in funding

# NOW OVER 35 BLOCKCHAIN CONSORTIUMS WORLDWIDE

- Accounting Consortium
- B3i
- BlockRx Project
- Blockchain Study Group
- CULedger
- ChinaLedger Alliance
- Digital Asset Holdings
- Dutch Logistics Group
- FCA Sandbox Project
- Financial Blockchain Shenzhen Consortium
- Fundchain
- Global Blockchain Council
- Hashed Health
- Hyperledger
- Hyperledger Healthcare Working Group
- ISITC Blockchain Working Group
- ISO/TC 307
- Kinakuta
- Post-Trade Distributed Ledger Group
- Project Jasper
- Other / No data



# IMITATION IS THE BEST FORM OF FLATTERY

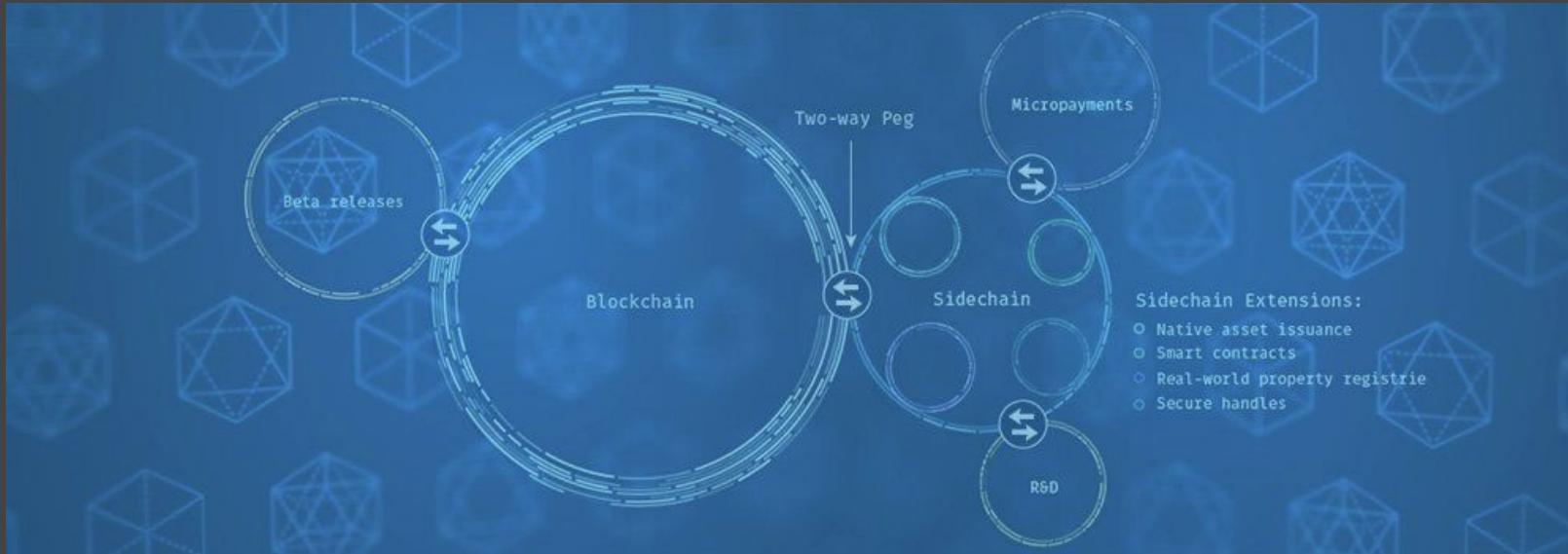


- Coins forked each other with minor tweaks
- Basic breakout alt-coin successes included Litecoin and Dogecoin
- Dash (previously known as DarkCoin) worth noting due to governance

# COMPARING OUR 4 FAVOURITE PUBLIC BLOCKCHAINS

Data Collected from CoinGecko on May 7th, 2017	Bitcoin	Litecoin	Dogecoin	Dash
Coin Limit	21 Million	84 Million	UNLIMITED	22 Million
Current Supply	16 Million	51 Million	100 Billion	7 Million
Mining Algorithm	SHA-256	Scrypt	Scrypt	X11
Hash-Rate	1,110 PH/s	5.2 TH/s	5.6 TH/s	3.3 TH/s
Average Block Time	10 Minutes	2.5 Minutes	1 Minute	2.5 Minutes
Launched	03 / JAN / 2009	07 / OCT / 2011	08 / DEC / 2013	19 / JAN / 2014
US\$ Price per Coin	US\$1,500+	US\$28	US\$0.0012	US\$98
<b>Current Market Cap</b>	<b>US\$25+ Billion</b>	<b>US\$1+ Billion</b>	<b>US\$100+ Million</b>	<b>US\$700+ Million</b>
Size of Raw Blockchain	135 GB	8 GB	21 GB	3 GB
Hardware Cost of 51% Attack	US\$2+ Billion	US\$170+ Million	US\$180+ Million	US\$400+ Million

# EXPANDING THE SCOPE OF EXISTING BLOCKCHAINS



- Funded by LinkedIn founder, sidechains work towards two-way pegging
- Funded by Cornell University, Bitcoin-NG introduces multiple block types
- Funded by Google, Ripple are working on interledger protocols

WE'VE SPENT TWO YEARS DEVELOPING OUR BASE PROTOCOLS

CORTEX

**EVERSTORE**

DISTRIBUTED  
STRUCTURED DATA

blockauth

DECENTRALIZED ID &  
AUTHENTICATION

dnkey

KEY LOGISTICS &  
BROADCASTING

NEUROWARE'S AGNOSTIC PROTOCOLS - DESIGNED TO WORK WITH ANY BLOCKCHAIN

# IPFS = INTERPLANETARY FILE SYSTEM = HTTP REPLACEMENT



## IPFS is the Distributed Web

A peer-to-peer hypermedia protocol  
to make the web faster, safer, and more open.

[Try it](#) [Watch demo](#)

# NOW FEATURING AN UNCENSORABLE TURKISH WIKIPEDIA

Sat Apr 29 2017 08:02:55 GMT+0300 (+03)  
<https://en.wikipedia.org> 5005 DOWN  
<https://tr.wikipedia.org> 5009 DOWN  
<https://az.wikipedia.org> 5009 DOWN  
<https://fr.wikipedia.org> 5007 DOWN  
<https://www.wikipedia.org> 5007 DOWN



Turkey Blocks

@TurkeyBlocks



Follow

Confirmed: All editions of the #Wikipedia online encyclopedia blocked in #Turkey as of 8:00AM local time

[turkeyblocks.org/2017/04/29/wik...](http://turkeyblocks.org/2017/04/29/wik...)

1:22 PM - 29 Apr 2017



2,889

1,016

## BLOCKCHAIN 2.0 - BUILT FROM SCRATCH



**RIPPLE\***



NXT GENERATION  
OF CRYPTOCURRENCY

**NXT**



**BITSHARES**

- Ripple has most interest from banks due to their pre-mined walled-garden
- NXT is the most realized (fully-featured) of all the ambitious projects
- Bitshares coined the phrase DACs (distributed autonomous corporations)
- We now have a blockchain for everything from songs to logistics & coffee

\* not an actual blockchain

# US\$7B PRE-MINED COINS - “BECAUSE IT USES LESS ELECTRICITY”

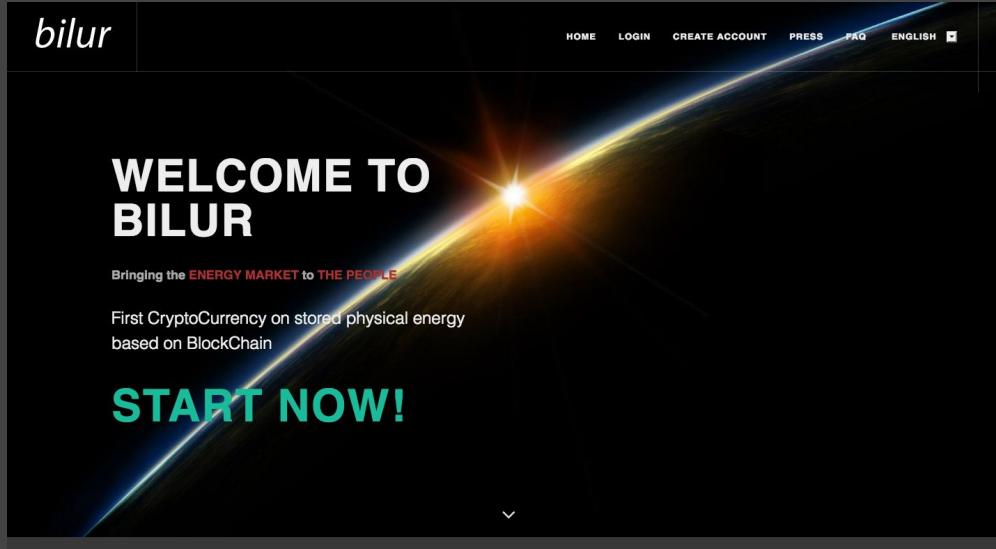


**STELLAR**



- **Ripple & Stellar** - Massive Founder Dispute / Drama
- Founders of premined crypto-currencies distribute wealth
- The process of adding blocks then becomes permission based
- Offering open ledgers that “represent” value is taking a step backward

# PHYSICALLY BACKED CRYPTO ALSO REQUIRES TRUST



- Crude oil backed crypto
- Gold backed crypto
- Transferring land titles
- Ledgers for diamonds

# FRED EHRSAM'S D-APP STACK - 2014 (20%) TO 2017 (70%)

	<b>Web 2.0</b>	<b>Web 3.0 (dApps)</b>	<b>Status</b>
<b>Scalable computation</b>	<a href="#">Amazon EC2</a>	?	Not started
<b>File storage</b>	<a href="#">Amazon S3</a>	?	Not started
<b>External data</b>	3rd party APIs	?	Not started
<b>Monetization</b>	Ads, selling goods	?	Not started
<b>Payments</b>	<a href="#">Credit Cards, Paypal</a>	Bitcoin	Ready

	<b>Web 2.0</b>	<b>Web 3.0 (dApps)</b>	<b>Status</b>
<b>Scalable computation</b>	Amazon EC2	Ethereum, Truebit	In progress
<b>File storage</b>	Amazon S3	IPFS/Filecoin, Storj	In progress
<b>External data</b>	3rd party APIs	Oracles (Augur)	In progress
<b>Monetization</b>	Ads, selling goods	Token model	Ready
<b>Payments</b>	<a href="#">Credit Cards, Paypal</a>	Ethereum, Bitcoin, state channels, 0x	Ready

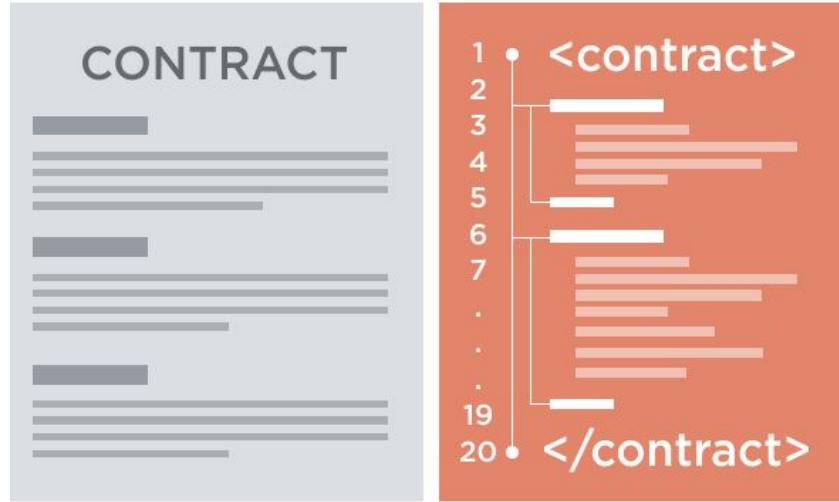
# ETHEREUM TOOK THINGS SEVERAL STEPS FURTHER



**THE WORLD'S SUPER COMPUTER...?**

- Raised US\$15 Million in **token-sales** when launching their Ether currency
- Aiming to be the first turing complete blockchain, they have almost achieved it
- Heavily supported by Microsoft and also used by IBM for their IoT platform
- Unlike BTC, we know who built it - currently uses PoW, plans to switch to PoS
- However, the more moving parts a system has - the more likely it is to break

# SMART CONTRACTS ARE EVERYWHERE



- Even Bitcoin utilizes basic smart contracts (with over 100 script functions)
- Smart contracts are snippets of code stored and executed by the network
- They can perform transactional based events if defined conditions are met

# US\$15M++ DEPOSITED IN 5 DAYS FOR .ETH DOMAINS



## Ethereum Name Service (ENS)

25,657

Auctions started

11,915 (5,289)

Bids (revealed)

1,607

Bidders

170,432

ETH deposited for bids

0.035

ETH median deposit

29,500

ETH maximum deposit

15.29243

% of names released

1,031

Names registered

8,207

ETH locked for names

# SOMEONE PAID OVER US\$1M FOR EXCHANGE.ETH

Featured names / top bid / time left
rothschild / 23.00 / ended
freemarket / 14500.00 / 0:03:29:13
rentacar / 31.10 / 0:04:33:45
ticketmaster / 300.00 / 0:08:40:14
bitfinex / 505.00 / 0:10:40:25
fashion / 310.01 / 0:14:50:41
winklevoss / 6.00 / 0:15:34:43
linkedin / 2500.00 / 1:00:48:36
britain / 210.01 / 1:08:13:21
flights / 1358.00 / 1:08:29:39
ethereumclassic / 3.00 / 1:23:20:32
siliconvalley / 0.00 / 2:04:26:26
citicbank / 0.00 / 2:04:33:08
oliverwyman / 0.00 / 2:13:51:19
vircurex / 0.00 / 3:00:49:56

Most expensive names / top bid / paid
exchange / 12888.88 / 6660.00
foundation / 510.01 / 300.00
weather / 250.00 / 101.01
cbsnews / 287.00 / 100.00
zhifubao / 150.00 / 50.00
credits / 152.01 / 42.42
bitfury / 200.00 / 42.10
coindash / 200.00 / 30.00

# THE ONLY PROBLEM IS THAT THESE 7 PEOPLE CONTROL IT ALL

ENS

HOME GET STARTED NAME REGISTRATION THE ENS ROOT GET INVOLVED

## MANAGING THE ENS ROOT

To facilitate the possibility of upgrades and maintenance, and in exceptional circumstances to handle problems with ENS, the ENS root will initially be owned by a multisig, with members of the Ethereum dev community as keyholders. In the long term, we would like to see the root multisig replaced by some form of distributed decision making process, but developing such a process will require time, thought, and care, which we anticipate will be a longer term effort than the development of the permanent .eth registrar.

The current root keyholders are:

- Aron Fischer
- Dan Finlay
- Nick Johnson
- Juan Benet
- Piper Merriam
- Taylor Monahan
- Vlad Zamfir

A majority of at least 4 of the 7 keyholders is required to effect any change to ENS.

All keyholders agree to act with the consensus of the community in facilitating the following ENS development activities:

- Migrating the interim registrar to the permanent registrar once the evaluation period is over and consensus for how to build the permanent registrar has been reached using the standardisation process.
- Making changes to the ENS registry, primarily through additions of new TLDs when the community and the keyholders agree that such change is necessary.



# WHAT'S REALLY IN A TRANSACTION?

```
{
  "block_hash": "00000000009f30c59abf2f8556c0949c79b54764f4cbb223ca43527394d3ee2",
  "block_height": 847281,
  "block_index": 24,
  "hash": "235a88e9853c1c116ef47f795f13ce200c2elbf37667e99973e1c829f95b95f7",
  "addresses": [
    "mpNENnsFcL85hpXwfPrYpkZqAkbbFpxLF",
    "mq7tNFrbi3E3fsuUbsTsA7keoeYL6gYzv2"
  ],
  "total": 86124000,
  "fees": 10000,
  "size": 339,
  "preference": "medium",
  "relayed_by": "",
  "confirmed": "2016-05-16T07:51:20Z",
  "received": "2016-05-16T07:51:20Z",
  "ver": 1,
  "lock_time": 0,
  "double_spend": false,
  "vin_sz": 2,
  "vout_sz": 1,
  "confirmations": 19557,
  "confidence": 1,
  "inputs": [
    {
      "prev_hash": "bb4cef4d48dba1916c73552342b660be00535c43ad47462abf43a402cc2a61a1",
      "sequence": 4294967295,
      "addresses": [
        "mpNENnsFcL8a5hpXwfPrYpkZqAkbbFpxLF"
      ],
      "script": "4294967295\nOP_DUP OP_HASH16D\nOP_RETURN\n",
      "script_type": "pay-to-pubkey-hash"
    },
    {
      "prev_hash": "42662b2544a7f59alabd004a8e15c714f108f553f1dd3f0617982eb5b8ac468c",
      "sequence": 4294967295,
      "addresses": [
        "mpNENnsFcL8a5hpXwfPrYpkZqAkbbFpxLF"
      ],
      "script": "4294967295\nOP_DUP OP_HASH16D\nOP_RETURN\n",
      "script_type": "pay-to-pubkey-hash"
    }
  ],
  "outputs": [
    {
      "value": 86124000,
      "script": "76a914695469844938fd58ecf59987f4cc063d4d657a788ac",
      "addresses": [
        "mq7tNFrbi3E3fsuUbsTsA7keoeYL6gYzv2"
      ]
    }
  ]
}
```

# DECODING SCRIPT HEXES

- 80% of transactions are known as standard transactions

OP\_DUP OP\_HASH160 <pubKeyHash>

OP\_EQUALVERIFY OP\_CHECKSIG

- Approximately 1% of transactions contain OP\_Returns

OP\_RETURN <hexedData>

- There are even a few hidden puzzles on the blockchain...

OP\_HASH256

6fe28c0ab6f1b372c1a6a246ae63f74f931e8365e15a089c68d6190000000000

OP\_EQUAL

# ETHEREUM TAKES THINGS ONE STEP FURTHER

---

```
contract MyToken {  
  
    string public standard = 'Token 0.1';  
    string public name;  
    string public symbol;  
    uint8 public decimals;  
    uint256 public totalSupply;  
  
    function MyToken( ... )  
    function transfer( ... )  
    function approveAndCall( ... )  
    function transferFrom( ... )  
  
}
```

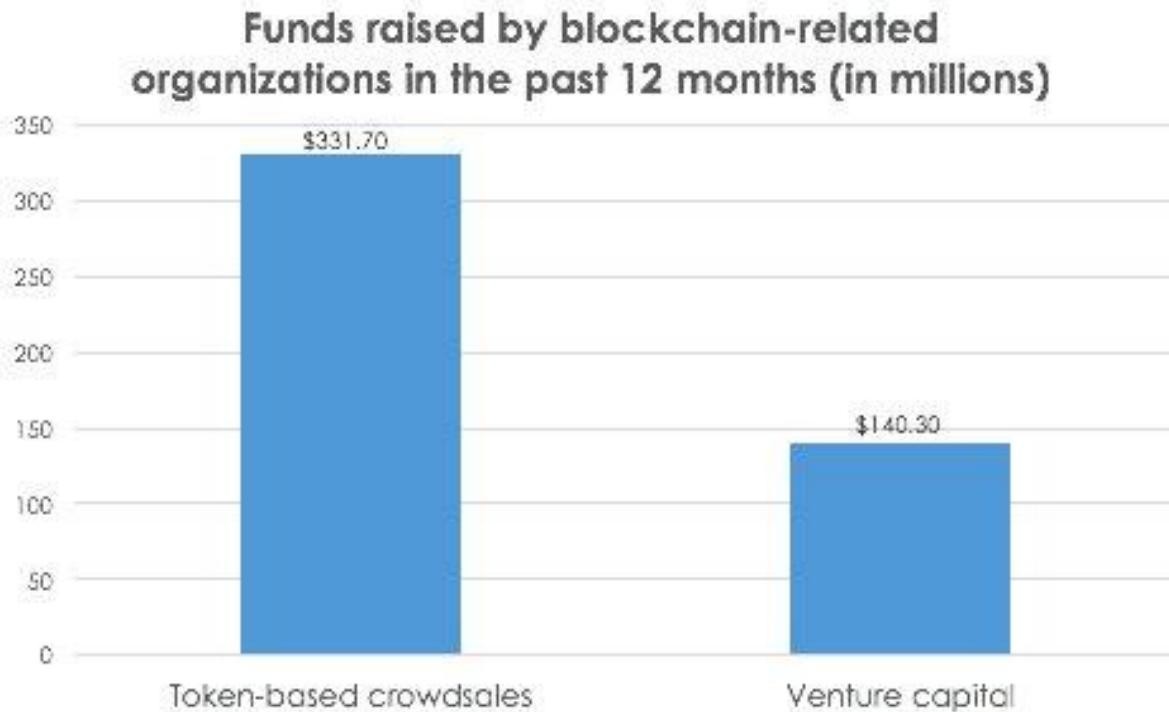
# CURRENCIES CAN BE MANY THINGS - EVEN EQUITY OR RIGHTS

---

- Symbol = %
- Decimals = 2
- Name = Equity

Contracts can also be linked, which allows governance contracts (DAOs) to then be able to vote and control upon custom currency transfers...

# TOKEN SALES - ICOs ARE THE NEW IPOs OF CRYPTO-LAND



LARGEST CROWDFUNDED PROJECT EVER - US\$150M

# THE DAO IS AUTONOMOUS. |

1071.36 M

DAO TOKENS CREATED

10.73 M

TOTAL ETH

116.81 M

USD EQUIVALENT

1.10

CURRENT RATE  
ETH / 100 DAO TOKENS

15 hours

NEXT PRICE PHASE

11 days

LEFT  
ENDS 28 MAY 09:00 GMT



# COSMOS - RAISED US\$16M+ IN 28 MINUTES

CØSMOS

Blog Plan FAQ Whitepaper About GitHub 

 Fundraiser



INTERNET OF BLOCKCHAINS

The Cosmos fundraiser raised **\$16.8 million USD** and finished on April 6, 2017 6:28AM PDT.

Subscribe

 Open Fundraiser

 Fundraiser Results

 Contribution Terms

 Discuss on Slack



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Digital Currency Insights

 COINALERT  
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 LINUX.COM



 ONMSFT

 siliconANGLE

 THE  
WALL  
STREET  
JOURNAL

 ME



QTUM - SINGAPORE - RAISED OVER US\$15 MILLION IN 5 DAYS

# QTUM CrowdSale

## CROWDSALE RESULTS

QTUM SOLD

51,000,000 QTUM

TIME SPENT

117 HOURS

100.00 %



11,156.766

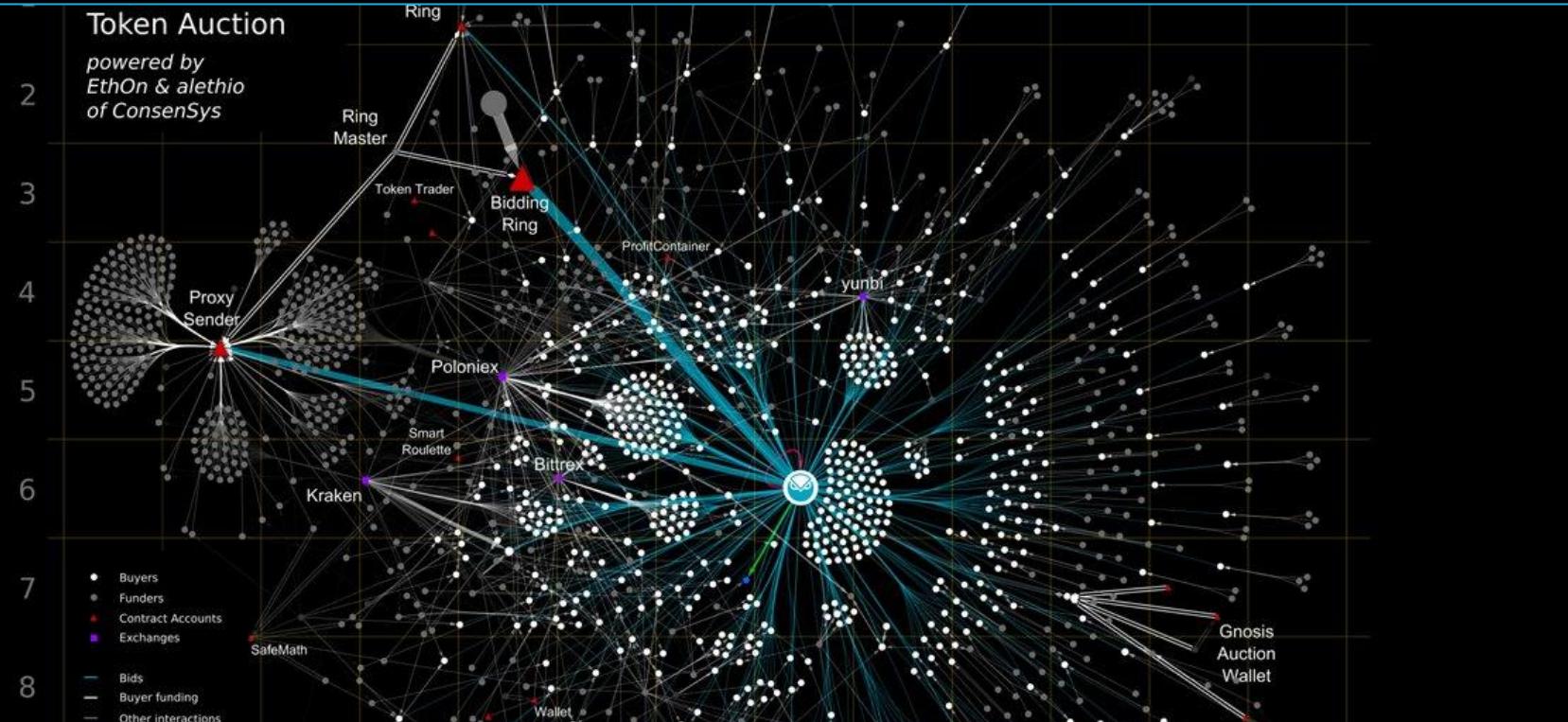
BTC



77,081.031

ETH

# MOST RECENT - GNOSIS - US\$12+ MILLION IN UNDER 10 MINUTES



NOW WITH MARKET-CAP OF OVER US\$750 MILLION  
(pre-product - let alone pre revenue)

# MALAYSIA'S FIRST ICO - US\$1.6M AND COUNTING

 EcoBit

HOME ECOBIT ECOLOGY TEAM NEWS FAQ **CONTACT US** ICO LOGIN

**ECOBIT ICO : WORLD'S FIRST-EVER GREEN PROJECT ICO**  
NOW YOU CAN PARTICIPATE FOR A GREENER FUTURE



**37 Days** **18 Hrs** **12 Mins** **15 Secs**

ICO Ends on June 8, 2017 23:59 UTC

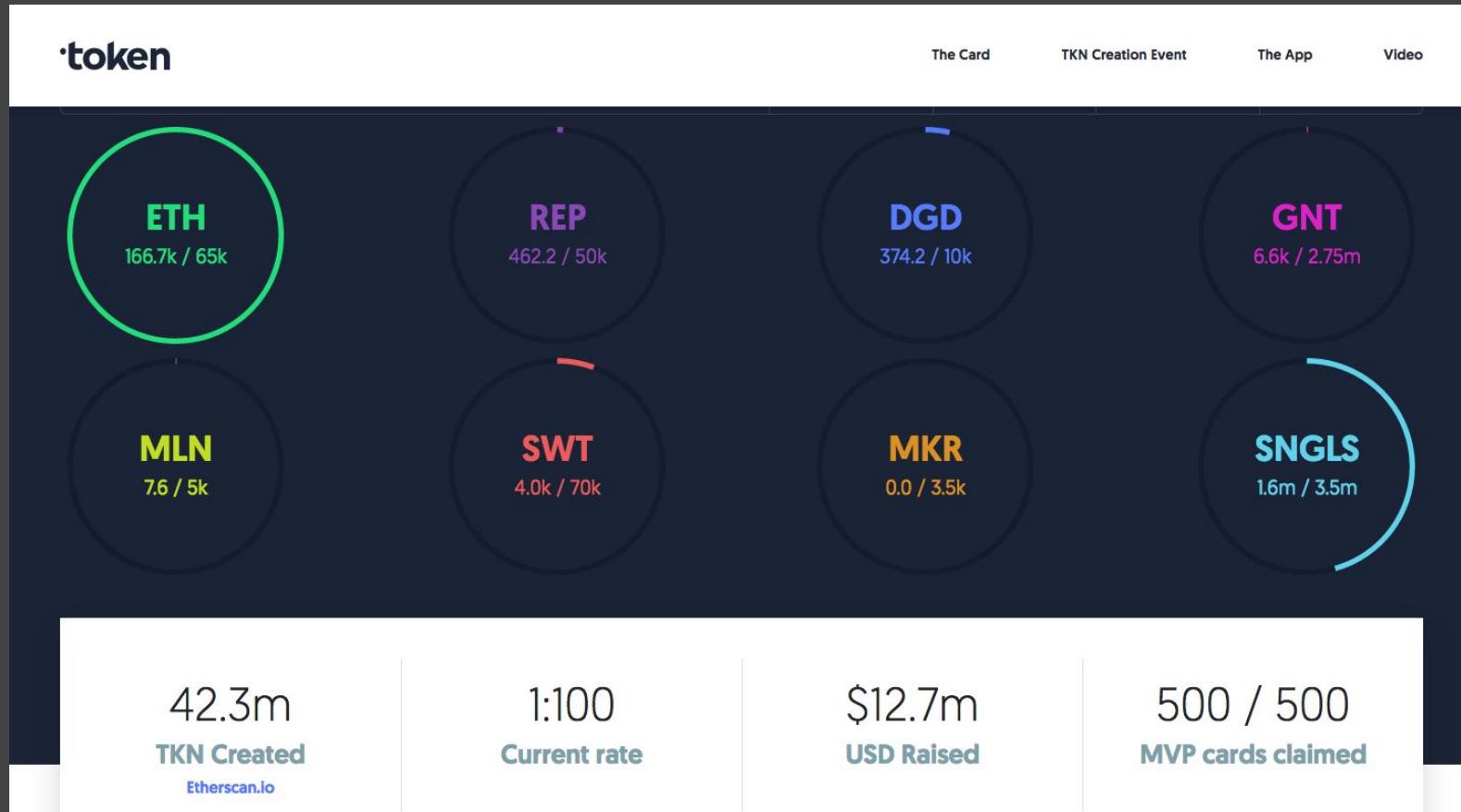
<b>TOTAL ETH</b> <b>321.6737</b>	<b>PRICE US\$ PER ECOBIT</b> <b>0.0339</b>	<b>PRICE CHANGE IN</b> <b>0.79 DAY</b>
<b>TOTAL BTC</b> <b>685.5079</b>	<b>BACKERS</b> <b>569</b> Participants	<b>PRICE INCREMENTAL CHART</b> <a href="#">VIEW MORE</a>

  
Start, Aquaponic Farm 2,000 BTC, Spirulina Farm 2,000 BTC, Carbon Credit/Offset 5,000 BTC, EcoBit Hotel & Eco Tourism 5,000 BTC, Free Range Farm 2,000 BTC, EcoBit Blockchain Bank 7,000 BTC, Coconut Plantation 2,000 BTC

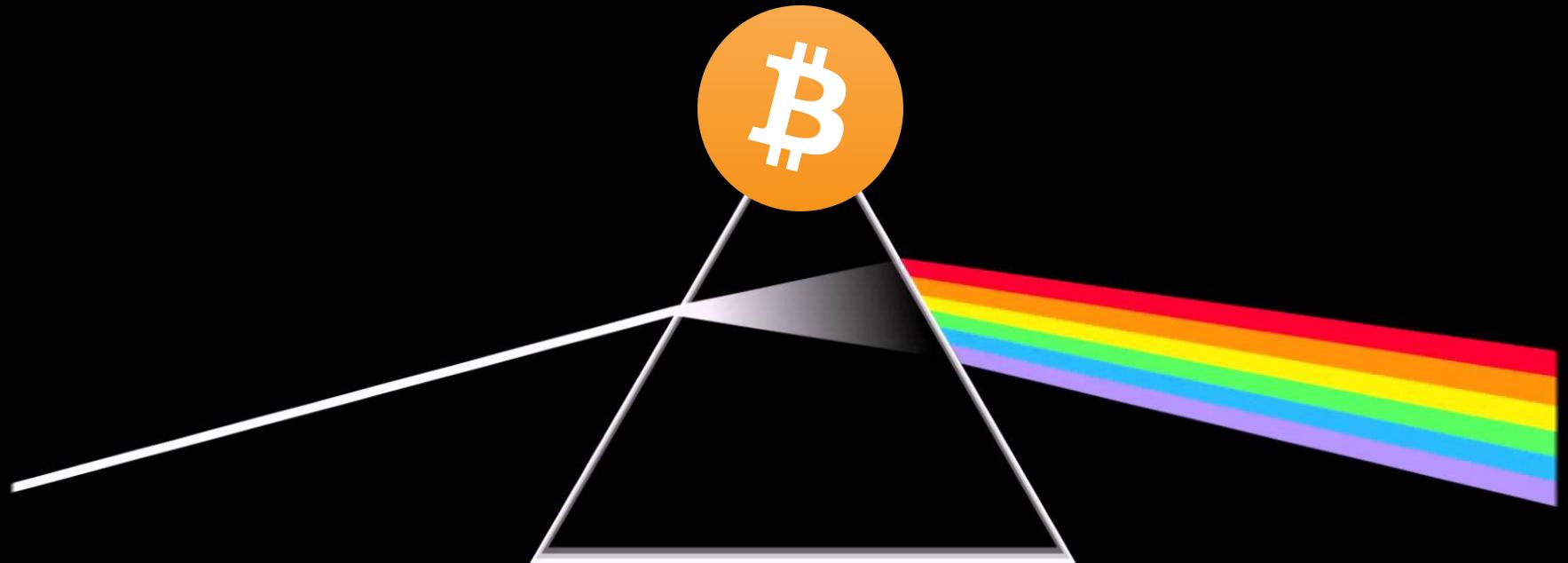
© EcoBit 2017



# CHECK THE FACTS - ICOs ARE UNREGULATED - ANYTHING GOES



# THE DARK SIDE OF THE CRYPTO



ICO SCAMS = PENNY STOCKS & RAILWAY BONDS | PONZIS FOREVER | DRUGS = CASH REMAINS KING

JOINT-INVESTIGATION INVOLVING 5 COUNTRIES & US\$400M++



OneCoin



JOIN THE  
FINANCIAL  
REVOLUTION

# RANSOMWARE WAS NOT INVENTED FOR BITCOIN

**Wana DecryptOr 2.0**

**Ooops, your files have been encrypted!** English

**What Happened to My Computer?**  
Your important files are encrypted.  
Many of your documents, photos, videos, databases and other files are no longer accessible because they have been encrypted. Maybe you are busy looking for a way to recover your files, but do not waste your time. Nobody can recover your files without our decryption service.

**Payment will be raised on**  
5/15/2017 18:47:17   
**Time Left**  
02:23:59:28

**Your files will be lost on**  
5/19/2017 18:47:17   
**Time Left**  
06:23:59:28

**Can I Recover My Files?**  
Sure. We guarantee that you can recover all your files safely and easily. But you have not so enough time.  
You can decrypt some of your files for free. Try now by clicking <Decrypt>. But if you want to decrypt all your files, you need to pay.  
You only have 3 days to submit the payment. After that the price will be doubled. Also, if you don't pay in 7 days, you won't be able to recover your files forever. We will have free events for users who are so poor that they couldn't pay in 6 months.

**How Do I Pay?**  
Payment is accepted in Bitcoin only. For more information, click <About bitcoin>. Please check the current price of Bitcoin and buy some bitcoins. For more information, click <How to buy bitcoins>. And send the correct amount to the address specified in this window. After your payment, click <Check Payment>. Best time to check: 9:00am - 11:00am

**Send \$300 worth of bitcoin to this address:**

 **115p7UMMngeoj1pMvkpHijcRdfJNXj6LrLn** Copy

[About bitcoin](#) [How to buy bitcoins?](#)

[Contact Us](#) Check Payment Decrypt

## SECTION SUMMARY

# BEYOND BITCOIN - WHAT ELSE IS IMPORTANT?

- Thousands of alternatives
- Very few bring anything new
- Ethereum has given birth to ICOs
- What's most important is interoperability

BLOCKCHAINS  
AND ASIA

# SINGAPORE - LEADING THE PACK

DBS - First bank (globally) to launch a public blockchain competition

DBS & Standard Chartered - first banks (regionally) to use blockchains

OCBC first bank (regionally) to settle intrabank cross border payments

MAS - First regulator (regionally) to issue digital currency on blockchains

QTUM - 1st new blockchain in region to receive over US\$1 million



# SINGAPORE - MAKING INTERNATIONAL HEADLINES



Otonomos  
@Otonomos

Follow

@Otonomos is serving clients from 26 countries as of July! Can't wait to see how many more by the end of the year!



Incorporate online in Singapore, HK, UK, Cayman Islands via blockchains  
(in discussions with Delaware)

China

South Korea  
Japan

Tropic of Cancer

Philippine Sea

20°

Myanmar

Laos

Vietnam

Philippines

Bengal

Thailand

Cambodia

Brunei

Andaman Sea

Gulf of Thailand

South China Sea

Maritime Silk Road

Malaysia

Singapore

Papua New Guinea

Indonesia

Brunei

Philippines

Indonesia

0°

# CHINA - MOST INFLUENTIAL NATION

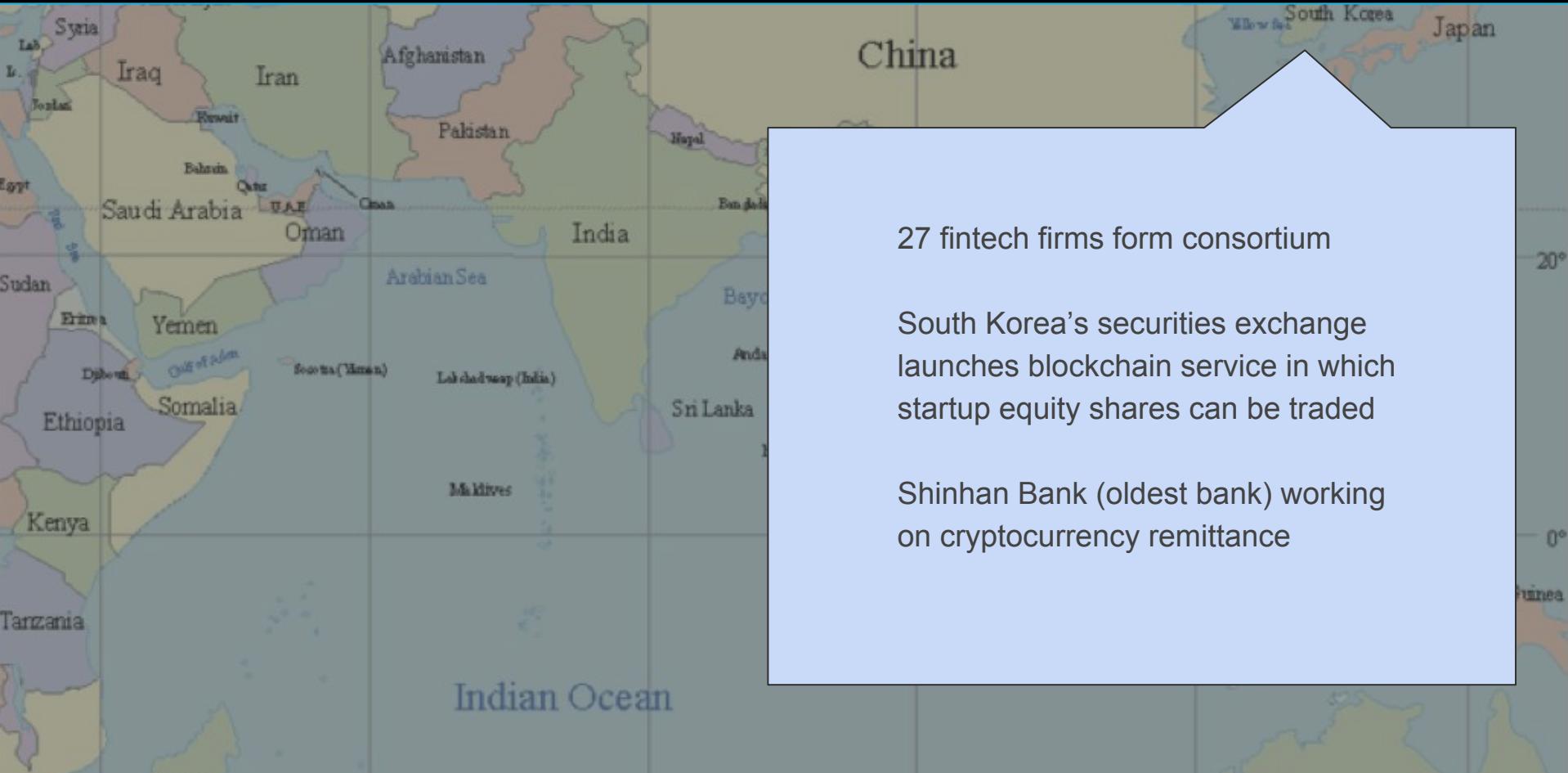
Over 60% of Bitcoins mined in China

10 banks hiring 30 blockchain  
developers at a 50% salary premium

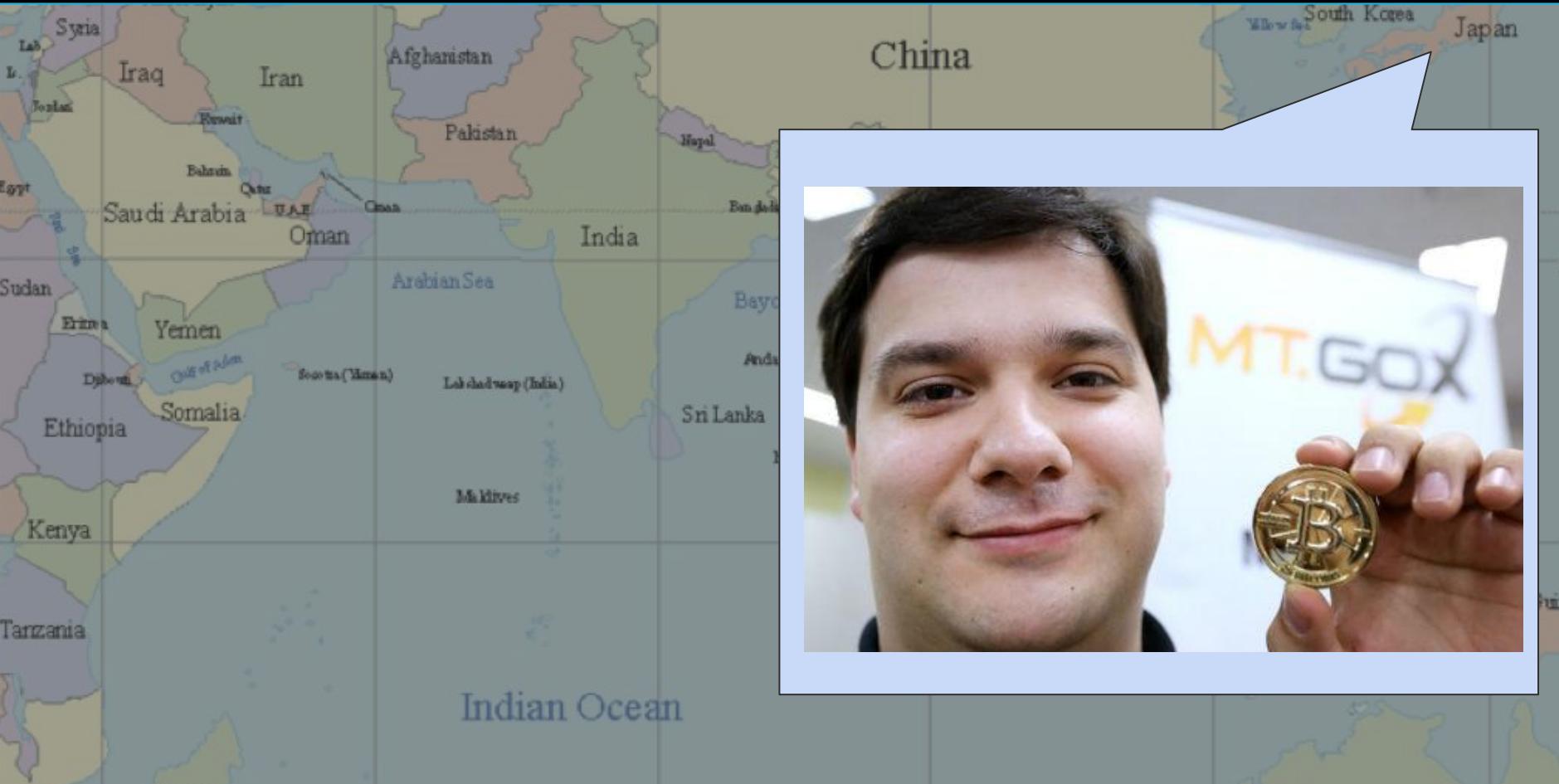
Postal Savings Bank of China sent  
100 asset TXs on its own Blockchain

US\$1.44 billion fund for blockchains

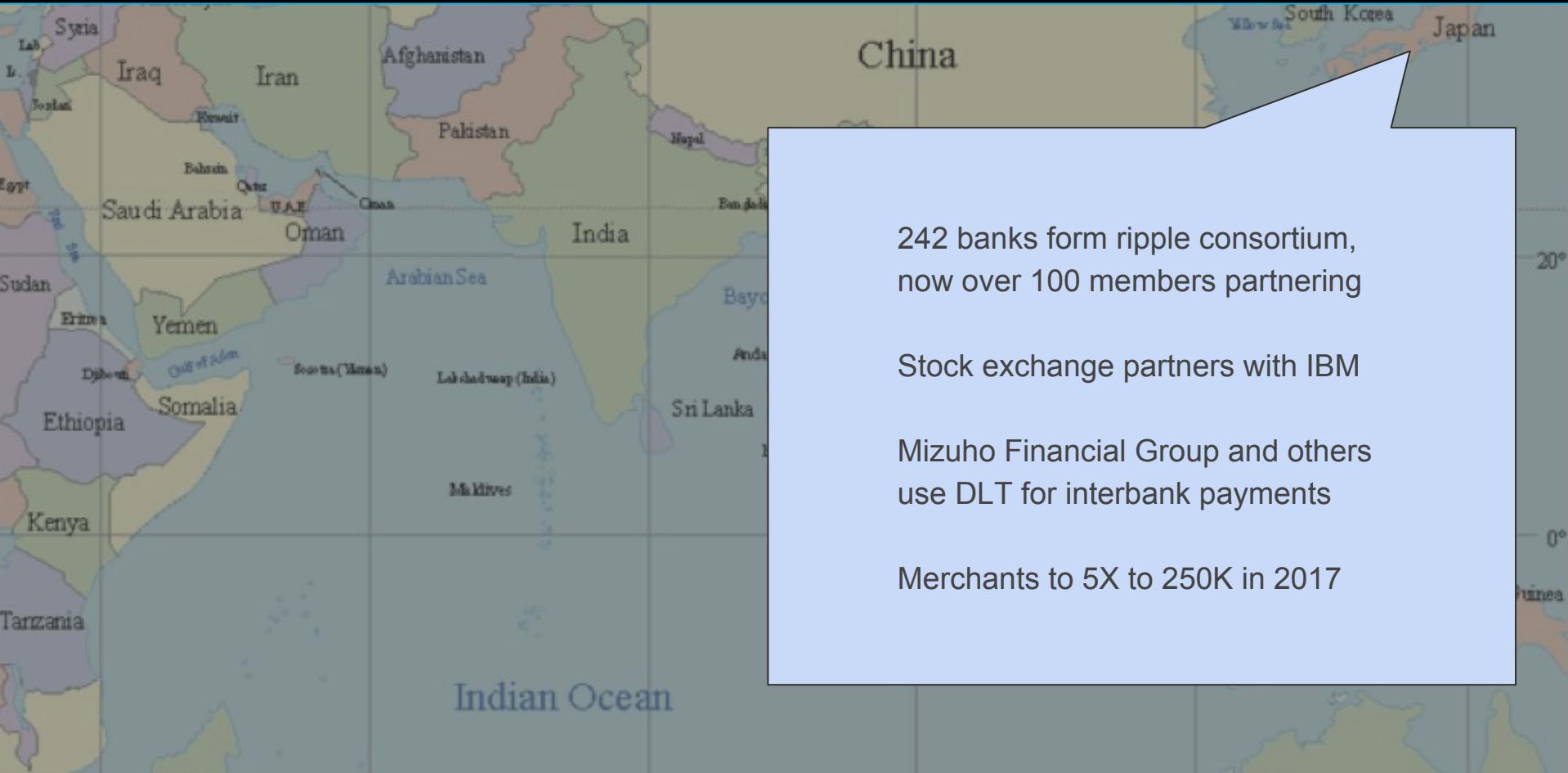
# KOREA - SLOW TO START BUT QUICK TO ACTION



# JAPAN - FIRST TO GET GOXXED - CONSUMERS LOST US\$450M++



# JAPAN - FIRST TO LEGALIZE THINGS



242 banks form ripple consortium,  
now over 100 members partnering

Stock exchange partners with IBM

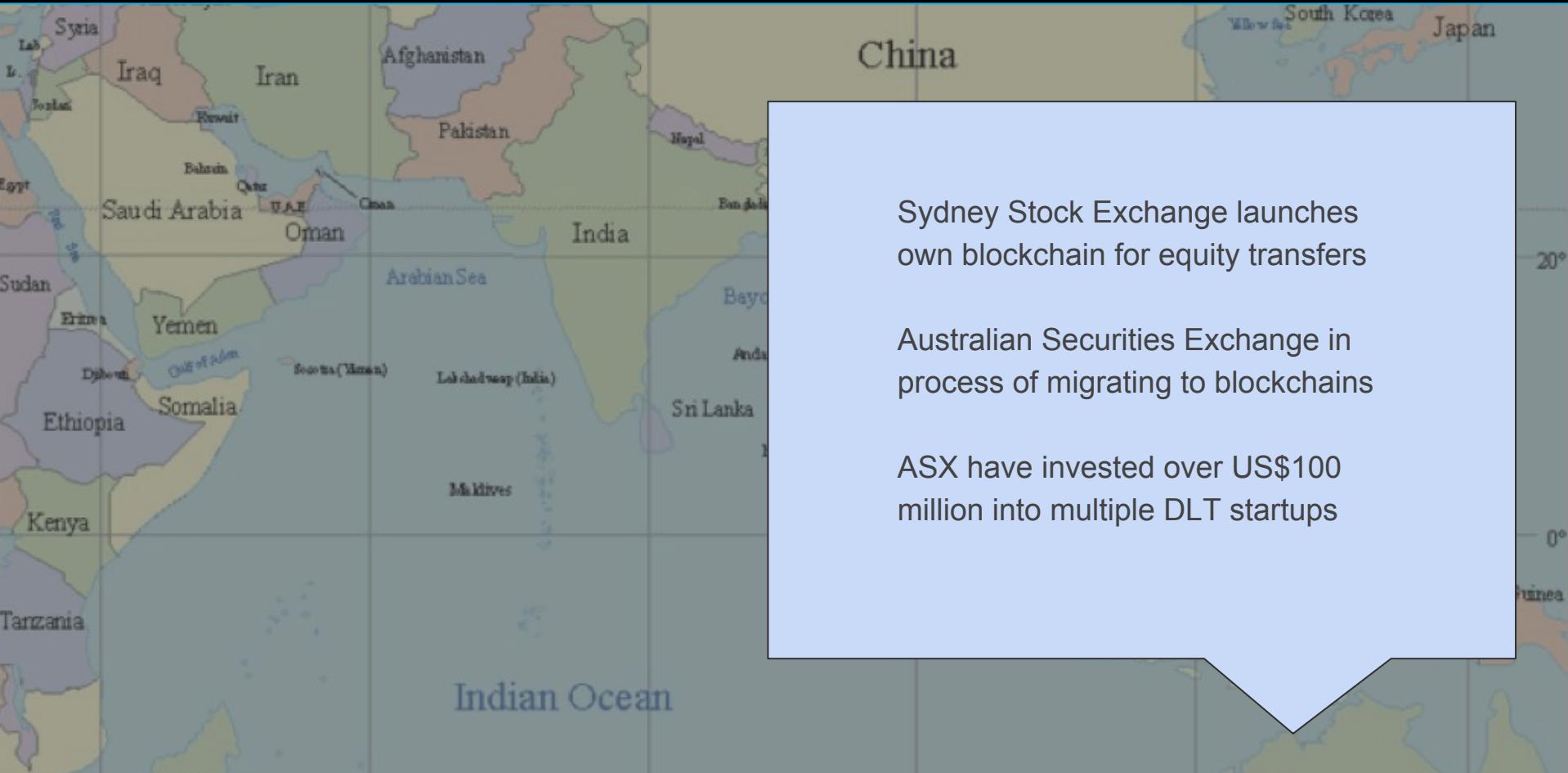
Mizuho Financial Group and others  
use DLT for interbank payments

Merchants to 5X to 250K in 2017

# BITCOIN NOW ACCEPTED BY LARGEST RETAILER IN TOKYO



# AUSTRALIA - FIRST TO ACT - LAST TO ACTION



Sydney Stock Exchange launches own blockchain for equity transfers

Australian Securities Exchange in process of migrating to blockchains

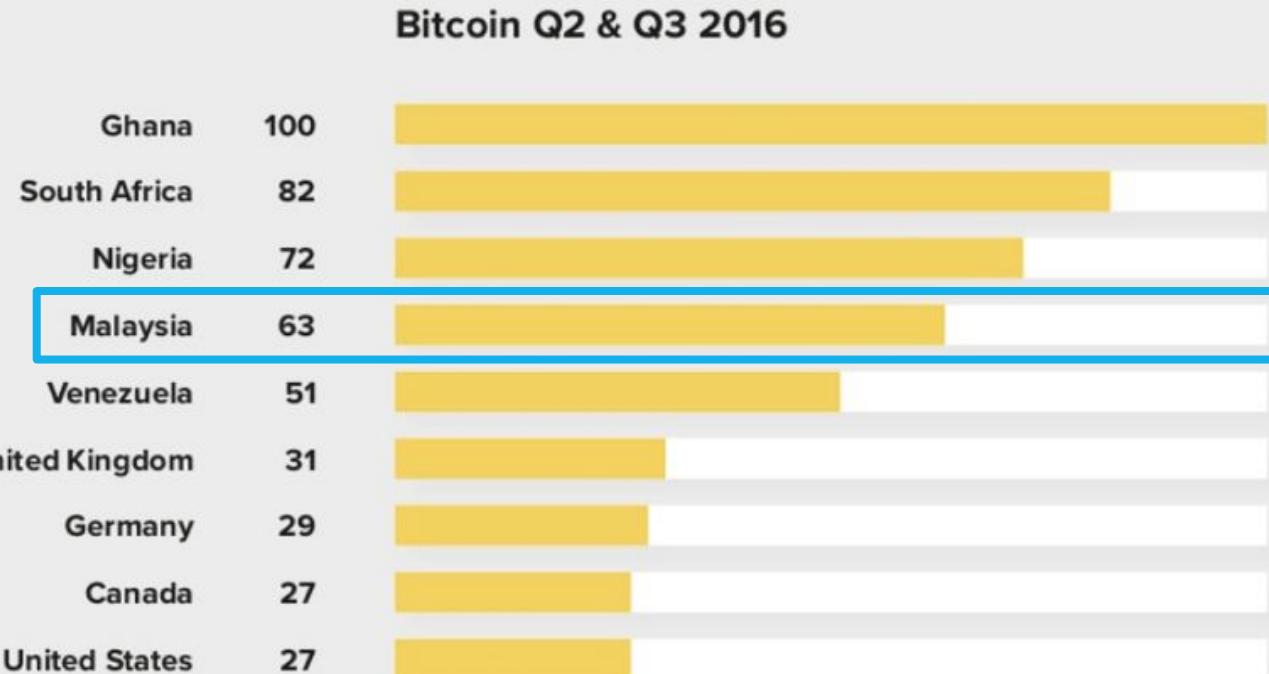
ASX have invested over US\$100 million into multiple DLT startups

BLOCKCHAINS  
**IN MALAYSIA**

# BLOCKCHAINS BOLEH - INTERESTING FACTS

- In 2012 - Malaysia was LEADING the Bitcoin mining race in Asia
- Malaysia is the LEADING manufacturer of ASIIC (used by miners)
- First petrol station in Asia accepting Bitcoin was in Malaysia
- First co-working space in Asia accepting Bitcoin was in Malaysia
- First global VPN service accepting Bitcoin was also in Malaysia

# WHERE DO WE (MALAYSIA) STAND ...?



# THE BLOCKCHAIN EMBASSY OF ASIA - MADE IN MALAYSIA



BlockChain Embassy Asia

AMBASSADORS

USE CASES

CONTACT EMBASSY

TOOLBOX

NEWS

our mission is to educate organizations throughout asia in both  
the legal and technical implications of distributed ledgers

We are a non-profit digitally distributed organization that is using and promoting blockchain governance as a method for  
collaboration between various business entities and existing community efforts across Asia

REQUEST MEMBERSHIP

# 9 FOUNDING MEMBERS FORM THE STEERING COMMITTEE



banking ambassador

LIM JOYAN & CO.  
ADVOCATES | SOLICITORS

legal ambassador



banking ambassador



education ambassador



media ambassador



IoT ambassador



fintech ambassador

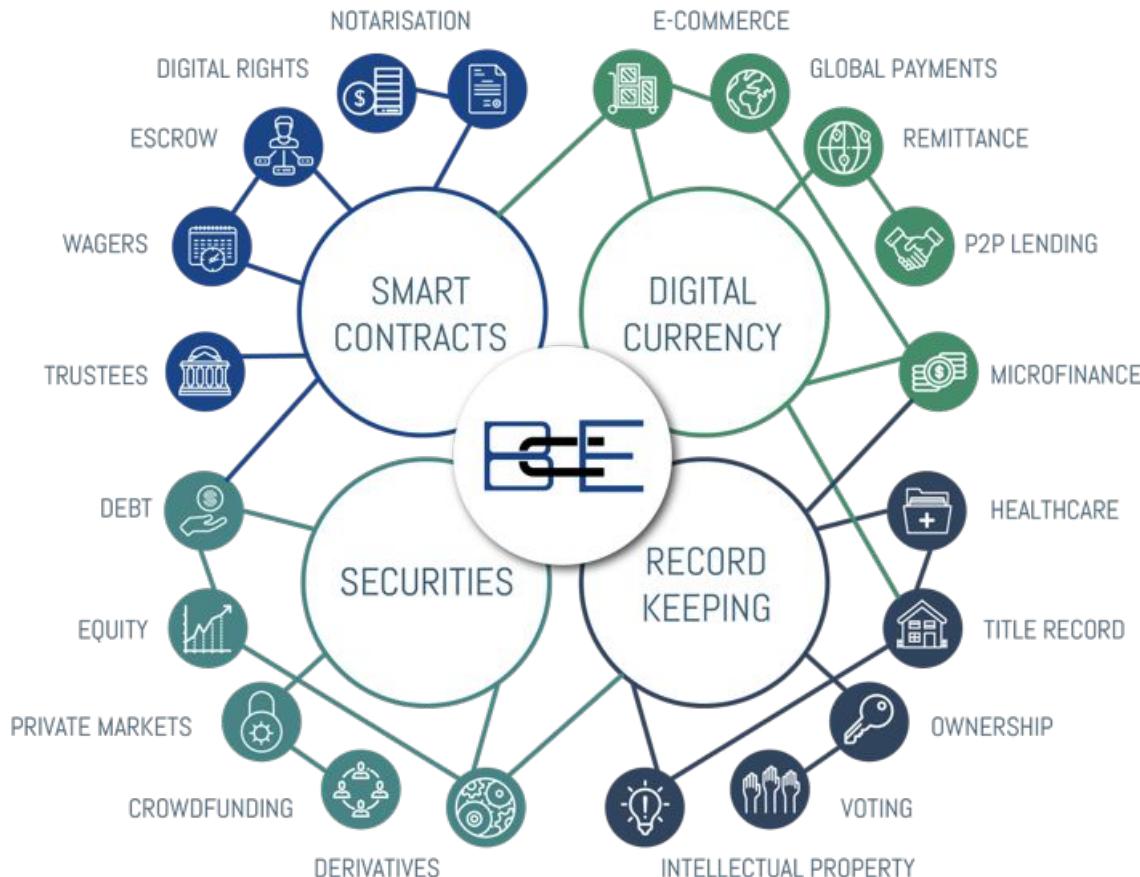
CapitalBay

invoice ambassador

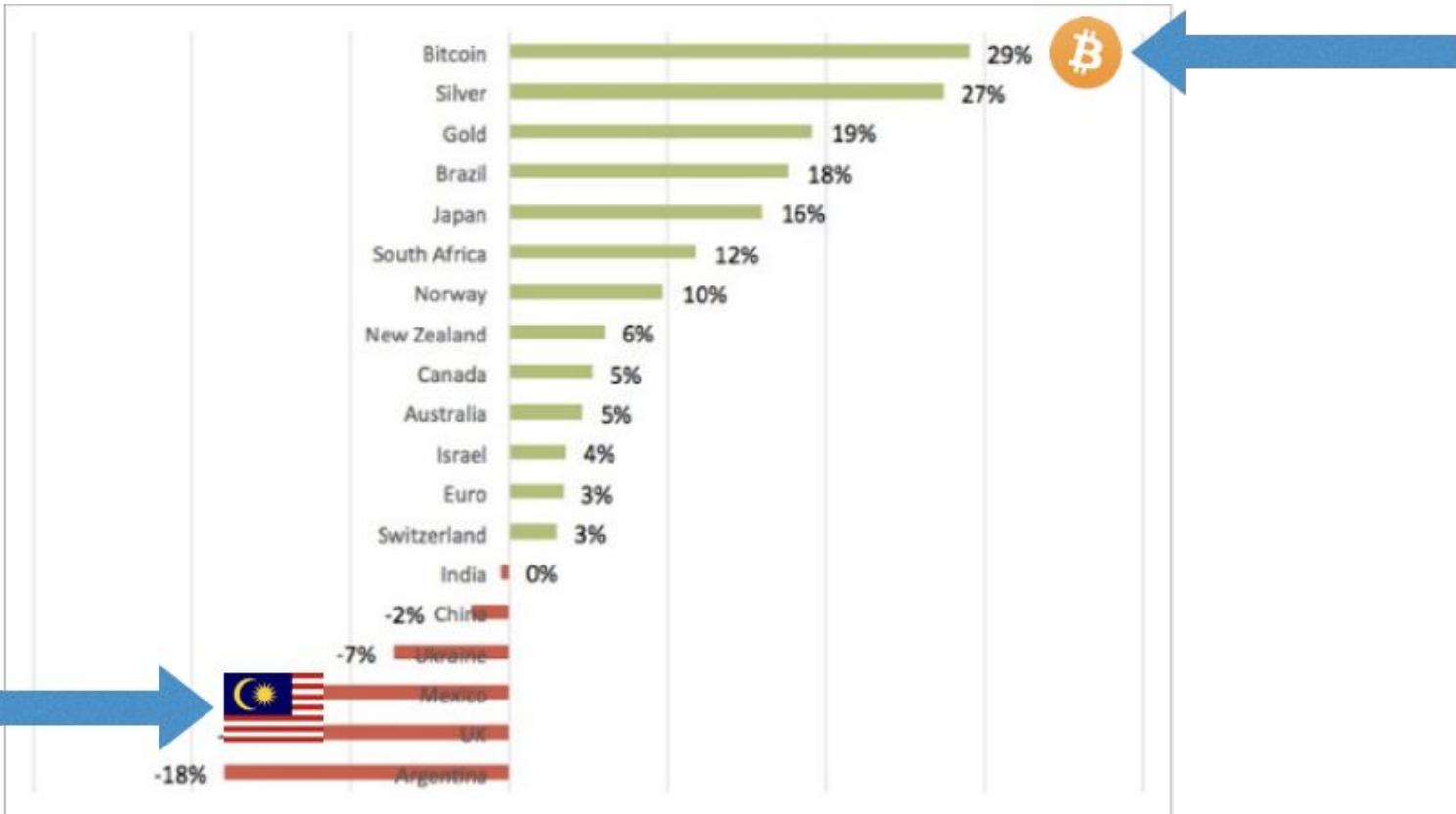


tech ambassador

# BIG PROBLEMS INVOLVE MULTIPLE PARTNERS & MOVING PARTS



# WHERE DO WE (MALAYSIA) STAND ...?



# OUR FIRST CLIENT WAS ONE OF SIX LICENSED ECF OPERATORS

The screenshot shows the ataplus platform interface. On the left, a sidebar menu includes 'COMMITS', 'DATASTORES' (with sub-options: ISSUERS, COMPANIES, INVESTORS, INVESTMENTS, SECTORS), and 'ADD NEW'. Below that are 'SCHEMA' and 'DOCUMENTATION'. The main area features a bar chart titled '6 Months Sitewide Total Investments' comparing January and March. A large speech bubble contains the quote: "For ECF to flourish, there must be a deep depository of trust and transparency that is frictionless & inclusive. Neuroware's tech enables us to provide all that and more!" At the bottom right, a logo for 'ataplus' is displayed next to the name 'Kyri - Co-Founder & Director of Licensed ECF Platform'.

ataplus

Dogecoin (Testnet) Blockchain / ATA-Plus V0.0.1 / Datastores / Investments

Credits: 254.00000000 FLUSH LOGOUT

COMMITS

DATASTORES

- ISSUERS
- COMPANIES
- INVESTORS
- INVESTMENTS**
- SECTORS
- ADD NEW

SCHEMA

DOCUMENTATION

6 Months Sitewide Total Investments

RM Invested (Millions)

Month	Investment (Millions)
January	0.40
March	0.35

sort by  search investments

f2583c4bbbc1d7f70fe776ef8de24e3e9131884de2be5ed3365fe72e53fa2177

EDIT DELETE SCHEMA

Key	Value
Index: Investment ID [ auto ]	bf28617205e695439c0dd2285a76d7c1

powered by neuroware

ADD NEW RECORD

74c87dfa57a94dc86666209cd87a01b<sup>c</sup>

Date of Investment

“For ECF to flourish, there must be a deep depository of trust and transparency that is frictionless & inclusive. Neuroware’s tech enables us to provide all that and more!”

ataplus

Kyri - Co-Founder & Director of Licensed ECF Platform

# OUR OTHER CLIENTS & PARTNERS ARE MOSTLY MALAYSIAN



BANK NEGARA MALAYSIA  
CENTRAL BANK OF MALAYSIA



Suruhanjaya Sekuriti  
Securities Commission  
Malaysia



MINISTRY OF FINANCE MALAYSIA

500startups  
coinsilium

FINNOVASIA

TEDx BFM<sup>89.9</sup>  
The Business Station

Asia 8th Annual Premier Banking Technology Event

BankTechAsia '16  
Where banking meets technology...

CyberSecurity  
MALAYSIA



DBS

axiata

ataplus

THE MALAYSIAN  
INSURANCE INSTITUTE



Maybank

# COINGECKO - PROFITABLE MALAYSIAN BUSINESS - TRACKS TOP 500

CoinGecko Beta Follow @coingecko Follow 853 Like Chart Commodities Buzz ... Sign In Sign Up English -

Search Coins

Rank	Coin	Total	MktCap	Liquidity	Developer	Community	Public Interest	Last 7 Days	
1	Bitcoin	96	\$16,248,112 + 2.54%	116139.30	98 11974 1759 1364 3072 2606	94 4375 2.23 132	213664 501 28627 169012	87 9,380,000 10539	 Buy Sell
2	Ethereum	85	\$4,181,995 - 1.98%	76444.15	93 3579 463 1954 1705	72 751 2.28 29.9	32579 164 30038 61075	56 392,000 24497	 Buy Sell
3	Litecoin	75	\$315,383 + 0.80%	52212.93	85 1199 866 249 148 144	62 68 27 1.17 24.5	22437 59 42749 23327	42 409,000 174781	 Buy Sell
4	Ripple	74	\$753,065 + 37.27%	70260.68	87 1269 397 251 247 199	49 252 21 1.1 12.9	2234 20 4394 23406	54 122,000 63256	 Buy Sell
5	Dash	71	\$473,649 + 0.42%	18547.61	82 410 228 119 206 159	53 1003 31 1.1 14.8	4220 31 10764 18935	47 255,000 46914	 Buy Sell
6	Monero	70	\$265,592 + 1.46%	4601.69	85 514 307 143 558 387	54 1214 52 0.9 26.0	9793 322 11648	44 318,000 96176	 Buy Sell

**Social Media Icons:** f 660, r 13, in 3, tw 1, em 1, c 1

# NEM - MALAYSIAN BASED BLOCKCHAIN

		Total	MktCap	Liquidity	Developer	Community	Public Interest	Last 7 Days					
Rank	Coin	%	Value	Value	%	★	Value	%	Value	%	Value	Value	
16	LBRY Credits	53 + 0.6	\$1,477 + 3.310%	139.65	77	208 ↑ 30 ↓ 34 ↑ 107 ↓ 5 ↑ 69	252 ↑ 11 ↓ 278	41	1157 ↑ 2 ↓ 0.02 ↑ 0	8842 ↓ 3394	35	↳ 48,800 ↑ 378400 \$0.00003348	
17	Storjcoin X	52 + 0.6	\$7,572 + 1.319%	19.06	81	137 ↑ 54 ↓ 31 ↑ 443 ↓ 421	180 ↑ 25 ↓ 29	41	1200 ↑ 4 ↓ 0.06 ↑ 0.2	2688 ↓ 10386	35	↳ 37,900 ↑ 201256 \$0.00015004	
18	BitShares	52 + 0.8	\$10,626 + 1.088%	65.70	71	133 ↑ 58 ↓ 75 ↑ 199 ↓ 58	186 ↑ 30 ↓ 30 ↑ 16 ↓ 0	41	1133 ↑ 3 ↓ 0.02 ↑ 0	7979 ↓ 5833	36	↳ 75,100 ↑ 529201 \$0.00000412	
19	NEM	52 + 0.3	\$49,606 + 2.678%	115.28	62	40 ↑ 36 ↓ 30 ↑ 316 ↓ 215	82 ↑ 16 ↓ 16 ↑ 0	33	171 ↑ 2 ↓ 0 ↑ 0	2371 ↓ 3083	38	↳ 318,000 ↑ 253353 \$0.00000551	
20	Lumens	51 + 1	\$16,603 + 1.524%	78.61	60	271 ↑ 49 ↓ 64 ↑ 112 ↓ 50	68 ↑ 14 ↓ 14 ↑ 0	40	789 ↑ 3 ↓ 0.06 ↑ 0.2	4970 ↓ 8358	41	↳ 379,000 ↑ 316512 \$0.00000240	
21	Namecoin	51 + 0.8	\$3,526 + 2.630%	29.90	74	132 ↑ 43 ↓ 33 ↑ 31 ↓ 34	133 ↑ 28 ↓ 28 ↑ 0	41	2571 ↑ 2 ↓ 0 ↑ 0	1442 ↓ 3318	42	↳ 106,000 ↑ 1632993 \$0.00023929	
22	Vertcoin	50 + 0.1	\$1,528 + 11.306%	27.91	63	81 ↑ 49 ↓ 31 ↑ 40 ↓ 36	25 ↑ 16 ↓ 16 ↑ 0	46	4070 ↑ 3 ↓ 0.06 ↑ 0.6	2612 ↓ 25801	43	↳ 78,600 ↑ 1269033 \$0.00004637	

# DOES MARKET CAP REPRESENT SECURITY TOO ...?

## 10 CRYPTOCURRENCIES HAVE A MARKET CAP OVER \$100M



# 5 DLTs WITH OVER US\$1 BILLION MARKET CAP - 13th of May, 2017

BTC Price  
**\$1637.94** Nodes 6,905 Average Fee \$5.12 Last Block 11:25 (99.80% full)

Capitalization  
**\$49.90b** Bitcoin \$26.74b Altcoins \$23.16b Dom Index 53.6%

Exchange Vol  
**\$1483.11m** Bitcoin \$782.06m Altcoins \$701.05m Dom Index 52.7%



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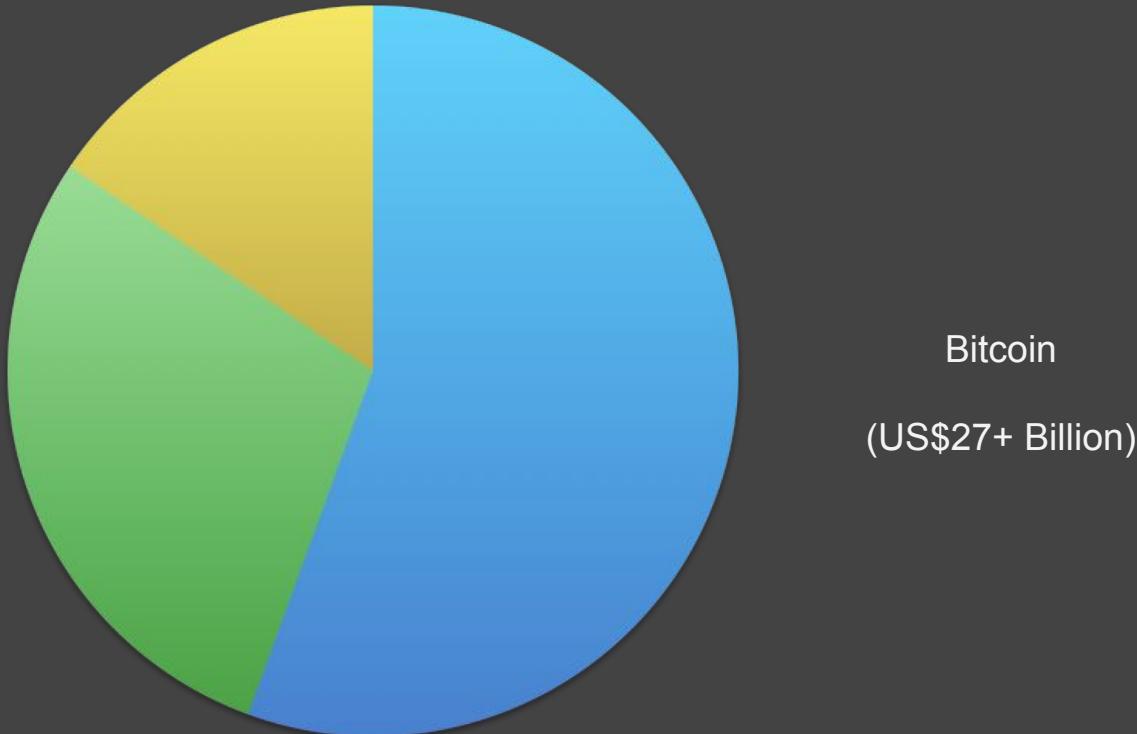


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Google play

Download on the  
App Store

#	Name	Market Cap ▾	Price	24hour VWAP	Available Supply	24 Hour Volume	%24hr	Trade
1	Bitcoin BTC	\$26,742,154,998	\$1637.94000000	\$1727.5670	16,326,700	\$782,057,000	-7.57%	Buy / Sell
2	Ripple XRP	\$7,785,117,074	\$0.20323560	\$0.2002	38,305,873,865	\$135,462,000	9.20%	Buy / Sell
3	Ethereum ETH	\$7,619,604,774	\$83.22079949	\$88.2440	91,558,899	\$153,054,000	-3.18%	Buy / Sell
4	Litecoin LTC	\$1,355,274,885	\$26.53462800	\$28.8346	51,075,707	\$123,242,000	-12.81%	Buy / Sell
5	NEM XEM	\$1,058,436,827	\$0.11760409	\$0.1224	8,999,999,999	\$14,235,900	6.16%	
6	Dash DASH	\$609,817,723	\$83.61991633	\$88.4880	7,292,733	\$15,460,900	-6.58%	Buy / Sell
7	Ethereum Classic ETC	\$527,377,753	\$5.75934101	\$6.2274	91,569,114	\$20,486,100	-5.90%	Buy / Sell
8	Monero XMR	\$391,414,387	\$27.08515601	\$29.4704	14,451,251	\$8,845,130	-6.53%	Buy / Sell
9	Stellar Lumens XLM	\$364,969.826	\$0.03825770	\$0.0382	9,539,774,383	\$78,143,800	-2.01%	

# BITCOIN ACCOUNTS FOR MORE THAN EVERYTHING ELSE



Other billion dollar markets:  
Ethereum, Ripple, NEM  
& Litecoin

(US\$17+ Billion)

Everything Else

(US\$7+ Billion)

Bitcoin

(US\$27+ Billion)

# ONLY 6 MONTHS AGO

Everything Else

Bitcoin



# ETHERSCAN FOUNDED BY A MALAYSIAN - FUNDED BY DCG

**Etherscan**  
The Ethereum Block Explorer

HOME BLOCKCHAIN ACCOUNT TOKEN CHART MISC

TOTAL SUPPLY OF 88,464,230.97 ETHER  
\$10.56 @ 0.01085 BTC/ETH

LAST BLOCK 3104622 (14.40s Avg)

Hash Rate 7,786.31 GH/s

TRANSACTIONS 16160931

Network Difficulty 111.68 TH

14 day Ethereum Transaction History

Blocks

View All

Block 3104622 Mined By Ethpool\_2 > 15 secs ago

3 txns IN 12 secs

Block Reward 5.00015 Ether

Block 3104621 Mined By Ethermine > 27 secs ago

5 txns IN 13 secs

Block Reward 5.00409 Ether

Block 3104620 Mined By 0x96338149e9f6c26... > 40 secs ago

4 txns IN 4 secs

Block Reward 5.000187 Ether

Block 3104619 Mined By DwarfPool > 44 secs ago

0 txns IN 20 secs

Block Reward 5 Ether

Transactions

View All

TX# 0X8C82912A90EB24422A0DD89... > 15 secs ago

From 0xea874fdde714fd9... To 0xdc17d353b01285...

Amount 1.0045803417014828 Ether

TX# 0X30803DA432AD0EC50B674EB... > 15 secs ago

From 0xf34a762291e2578... To 0x6fc82a5fe25a5cd...

Amount 0.09972424738776952 Ether

TX# 0X9F3AEC03CD8978780C11C59... > 15 secs ago

From 0x2e67179261a34b... To 0x44e9bfd5eb0651...

Amount 1.506161 Ether

TX# 0X69429B51113744361D7EF7D... > 27 secs ago

From 0xea874fdde714fd9... To 0xb2db64a2574811...

Amount 1.0055965023717969 Ether

# MONEY MATCH FIRST IN MALAYSIA TO USE RIPPLE

Malaysia: MoneyMatch raises \$150k seed from Australia's Kosciuszko for forex platform



Enter Your Email

Subscribe to our newsletter



(L-R) Naysan Munusamy, Damien Santer and Fazil Fuad

# USE CASES WE HAVE BEEN EXPLORING IN MALAYSIA

## BANKING

From AML & KYC cost reductions to reward schemes & reaching the unbanked or general key-signing

## HEALTHCARE

Complete and immutable family histories of every related diagnosis and condition available from 1 key

## ACCOUNTING

Creation of programmable processes & automated auditing trails increase transparency & efficiency

## LEGAL

Cryptographically secure document notarization, copyright protection, and dispute settlement

## GOVERNANCE

Increase the accountability of public officials and offer total transparency in voting & elections

## LOGISTICS

Tracking of shipping cycles and provenance systems that autonomously verify actions

## GAMING

Share digital assets between an entire network of games, or use the blockchains to create immutable persistent open-worlds

## ASSETS

Track possession of your property in the digital economy by creating, managing, storing, or sharing multiple asset classes

## INSURANCE

Integrated insurance and medical services can be intelligently designed to quickly and contractually settle claims with cryptographically

## SECTION SUMMARY

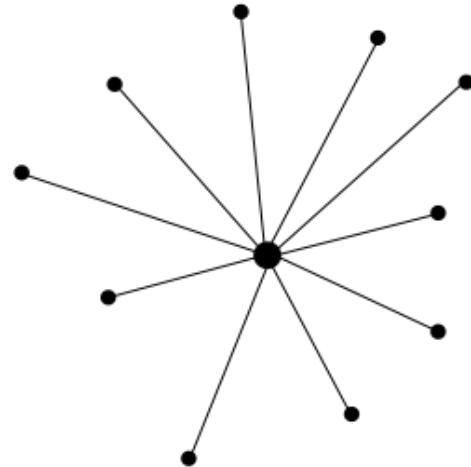
### WHAT IS HAPPENING REGIONALLY?

- Malaysia was at one time leading the way in Asia
- Singapore & China are now leading their own ways
- Malaysia has LOTS of blockchain knowledge & talent
- FinTech is no longer the only active use-case

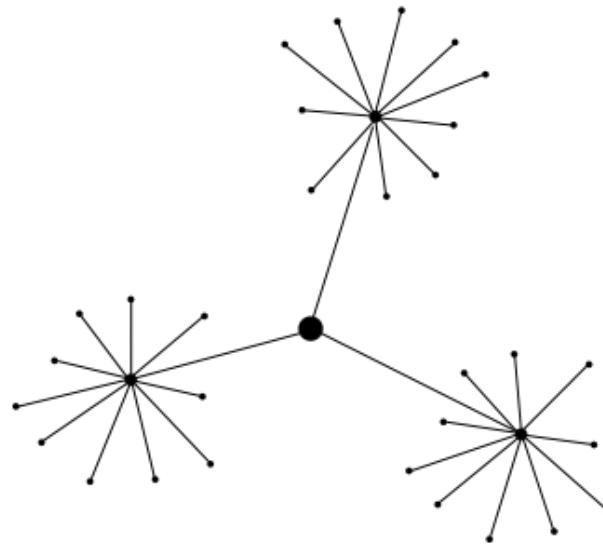
USE CASE 01

# DATA STORAGE

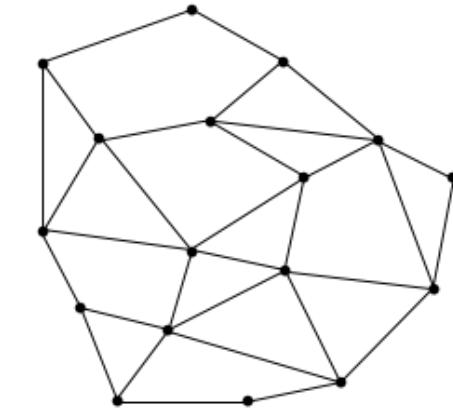
# THREE PLACES TO STORE DATA - SOMETIMES ALL ARE REQUIRED



CENTRALIZATION  
DATABASE



DECENTRALIZATION  
THE CLOUD



DISTRIBUTION  
BLOCKCHAINS

# DIFFERENT WAYS DATA CAN BE STORED ON BLOCKCHAINS

---

- Blockchains can provide a tamper proof audit trail for structured data
  - Useful for public data (births, deaths, marriages and education)
  - Ideal for sharing data (identity, loyalty, supply chains and healthcare)
- Alternatively, blockchains can also be used to timestamp data hashes
  - Useful for large data sets (such as data lake authenticity checks)
  - Ideal for compliance (independently verify data timelines)
- Simple applications that require limited data can run autonomously without the need to pay for and (or) service ongoing hosting or server requirements
  - Useful for operating censor resistant applications

# WHAT IS A DATA LAKE...?

- An intelligent repository for storing large quantities and varieties of data
- With a constant stream of data being fed to it from different sources
  - There is an expectation to preserve the original data
  - As well as the precise lineage of data transformation
- Requires unstructured data & structured data with embedded schema
- Leads to a stockpile of archived anonymous yet actionable events
- **However**, the more routes that lead to and from this lake of data, the more susceptible it becomes to presenting misleading information...

# THE PROBLEMS FACED BY DATA LAKES

- **How can we trust the data coming into the lake?**

- Is it going to the right place & is it coming from who it says it is?
- If the application is independent - how to change schemas?

- **Can we trust the data does not get altered once in the lake?**

- Risks associated with centralized truth for distributed workloads

- **How can we trust the data coming out of the lake?**

- Do the right team members have the data specific privileges?

# HOW OUR DISTRIBUTED PROTOCOLS CAN HELP

---



Our DNKey protocol could be used to manage hierarchical public key abstraction so that external input routes could be controlled remotely

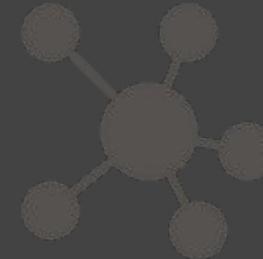


Our BlockAuth protocol could be used to manage network-wide, inter-internal hierarchical authentication and administrative privileges



Our Everstore protocol could be used to track and publicize data archives with hashed payloads and other important meta information

# HOW IT ALL FITS TOGETHER



## COLLECT DATA

Collect RAW schema-less data  
using MongoDB - can use GridFS  
for file storage

Document-Driven Design

This allows you to store and  
query anything

## ARCHIVE DATA

Hash batches of data prior to  
archiving and publicize the meta  
data to the blockchains

Relational and Replicated

Mixing some of the oldest  
technologies with the latest

## ANALYZE DATA

Use APIs to get data from the  
archives and prove its validity by  
checking the blockchains

Polyglot Persistance Prevails

Use the right database for the right  
job at the right time!

# EVERSTORE - THE FIRST BLOCKCHAIN POWERED DATABASE

- Everstore is the first protocol capable of storing large amounts of structured data directly on a blockchain - bypassing singular transaction limitations
- Replicates full CRUD-like functionality with schemas, indexes & relationships
- Data encoded via an Everstore instance is available for the life of the ledger



# CURRENT BLOCKCHAIN DATA STORAGE ATTEMPTS

---

- Most well known in the ecosystem are Factom.org and Tierion.com
- Both store checksums or ‘receipts’ on a blockchain in an OP\_RETURN
- Records notarized on the blockchain must fit within Bitcoin’s 38 byte limit
- References then link to the actual data which is stored somewhere off-chain
- Other solutions such as StoreJ and Filecoin are attempting to build dedicated blockchains from the ground up specifically for just storing data and files
- The concern from the technical community is that without an underlying token of value or properly incentivized network security will suffer

# WHAT MAKES EVERSTORE SO SPECIAL

---

- Using a ‘master key’ Everstore can map transaction-outputs intelligently
- This allows Everstore to bypass the 38 byte limit with structured linking
- Data can be directly encoded on a blockchain - making it the database itself
- Each Everstore instance can hold up to 999,999,999 tables each with up-to 999,999,999 fields, with unlimited records, indexes and relationships
- Already supports over 20 field types from simple strings and numbers to more complex arrays and objects such as dates and geo-coordinates
- Private keys allow updates whilst public keys provide read-only access

USE CASE 02

**IDENTITY**

# THE BLOCKCHAIN EMBASSY'S CHANCERY PROJECT



# INCLUDES A DIGITAL BLOCKCHAIN-BASED PASSPORT



- Allows users to create and host their identity on the blockchains
- Uses endorsements and referrals to validate certain events occurred
- Allows users to login and sign-up for partnering services with 1 click

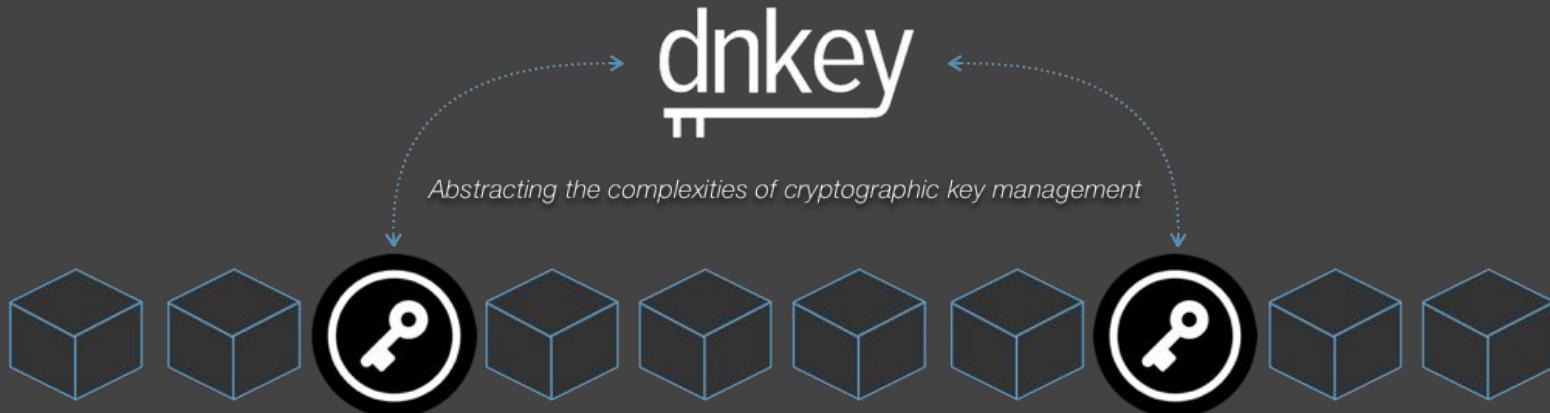
# BLOCKAUTH - IDENTITY MANAGEMENT & AUTHENTICATION

- Enables intelligent account authentication via cryptographic keys
- Private keys replace passwords whilst the public keys becomes an identity
- Applications and organizations can independently authenticate credentials



# SIMPLIFIED CRYPTOGRAPHIC IDENTITIES WITH DNKEY

- Scalable key logistics across multiple platforms, applications, and processes
- Enables DNS style abstraction for key retirement, replacement, and rotation
- Decodes memorable, trustworthy domain names to public cryptographic keys



# HOW WE ABSTRACT THE COMPLEXITIES OF KEY MANAGEMENT

---

- Transform wallet addresses from complicated public keys such as:  
`13aaehx6p4QrTHMvQUZy3dTEevXr4Wrap` into something much more  
memorable and manageable - such as [mark.neuroware.io](https://mark.neuroware.io)
- Services configured to read DNKeys (rather than direct public keys)  
can programmatically control keys remotely
- Ensures organizations have total control over key management and  
are not locked-in to any one vendor or blockchain
- High-level domains can be used as a way to control your distributed  
on-chain presence across multiple applications

USE CASE 03

# **TRUST**

# IN BANKS WE TRUST

---

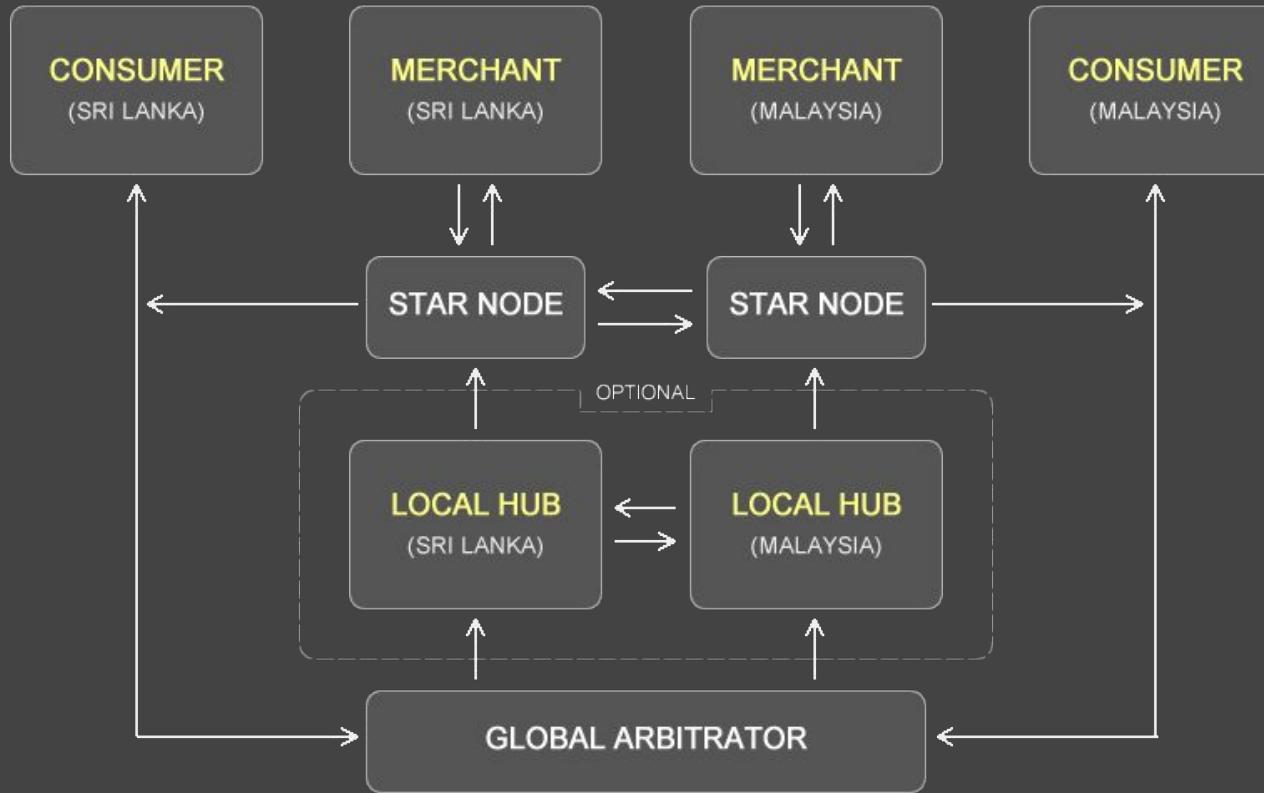
- Banks traditionally play three fundamental roles:
  - **STORE DEPOSITS** (can now be done with any e-Wallet)
  - **MAKE PAYMENTS** (can now be done with crypto-currency)
  - **PROVIDE CREDIT** (can now be done by P2P operators)
  
- Perhaps more importantly, banks are also the custodians of trust:
  - **TRUSTEE SERVICES** (trust can now be provided by blockchains)
  - **ESCROW PAYMENTS** (can now be programmed with multi-sig addresses)
  - **LETTERS OF GUARANTEE** (can now be issued with smart contracts)

# BANKING ON THE FUTURE OF BLOCKCHAINS

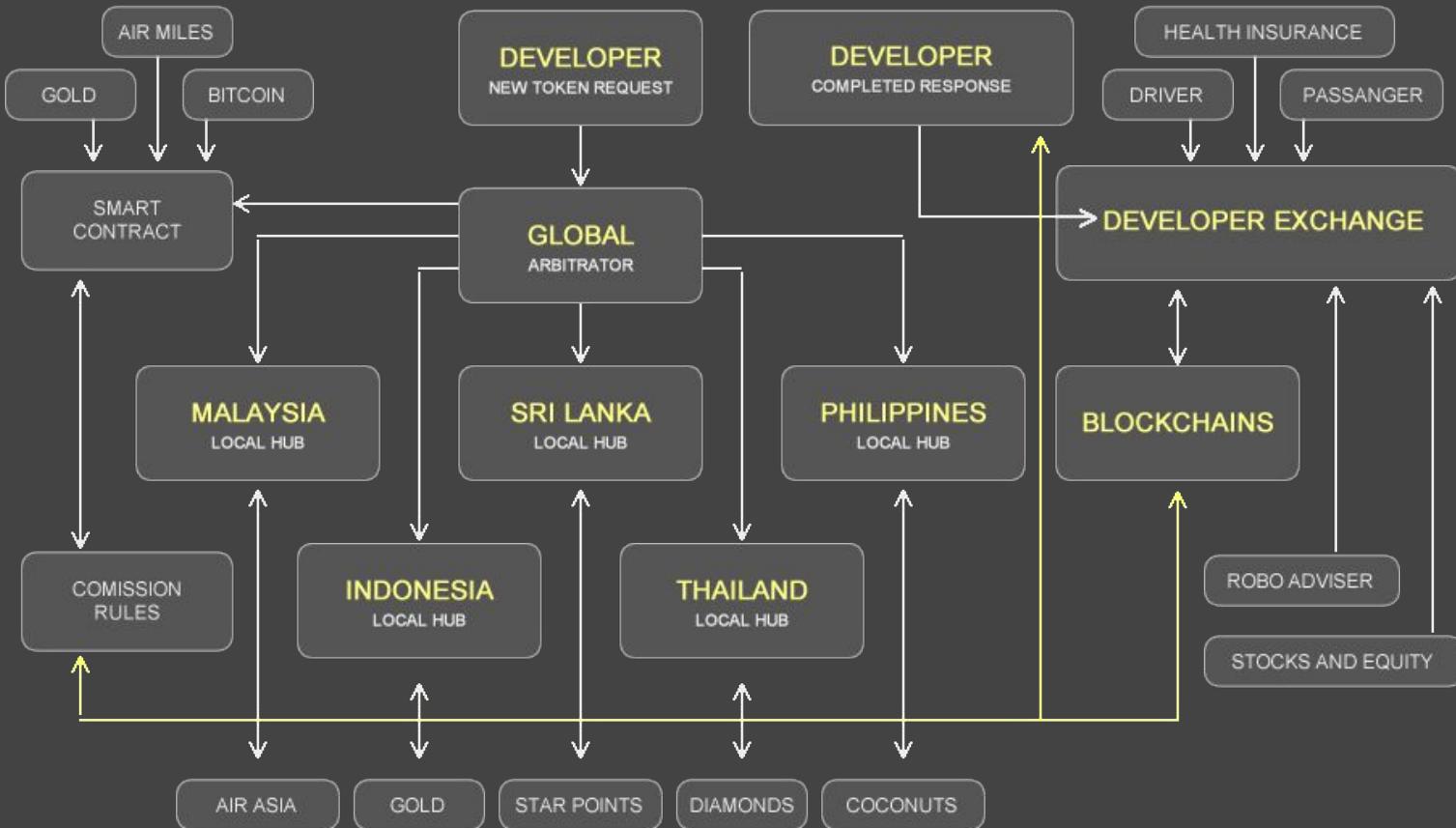
---

- With banks already KYC and AML compliant, there are no entities more suited to be offering digital currency brokerage and key management
- With the advent of smart-contracts, banking becomes a sequence of code
- Regulation and compliance would be designed as part of the protocol
- If retail and commercial banking processes were 100% based upon blockchains, staffing requirements could be reduced by at least 90%
- Existing internal infrastructure can be replaced by distributed protocols

# LOYALTY REWARDS PROVIDE AN IDEAL TESTING GROUND

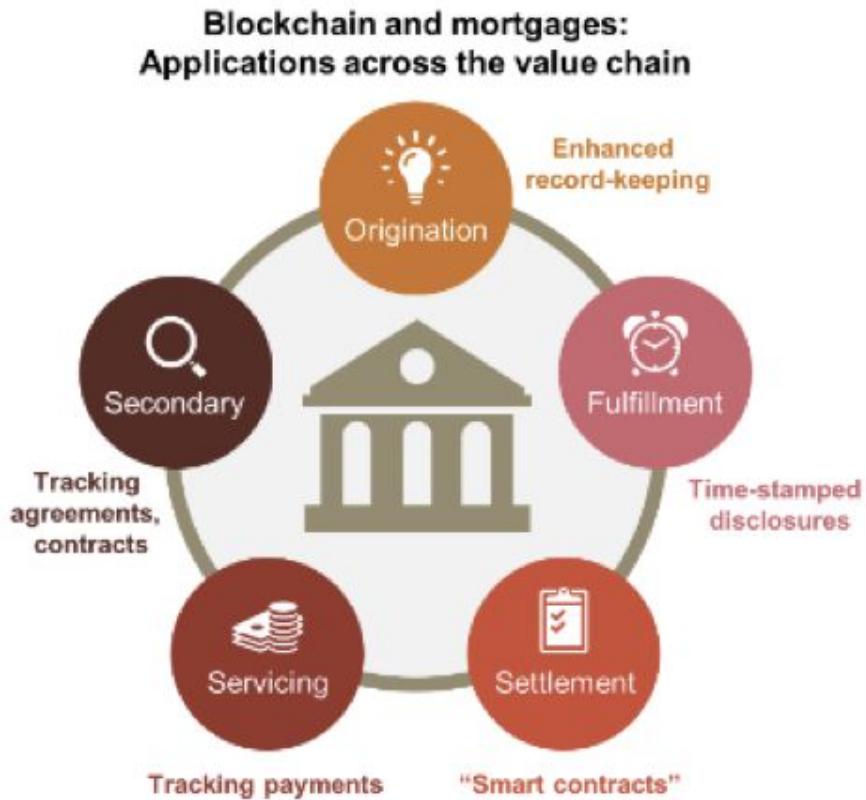


# WITH LOTS OF LONG TERM POTENTIAL

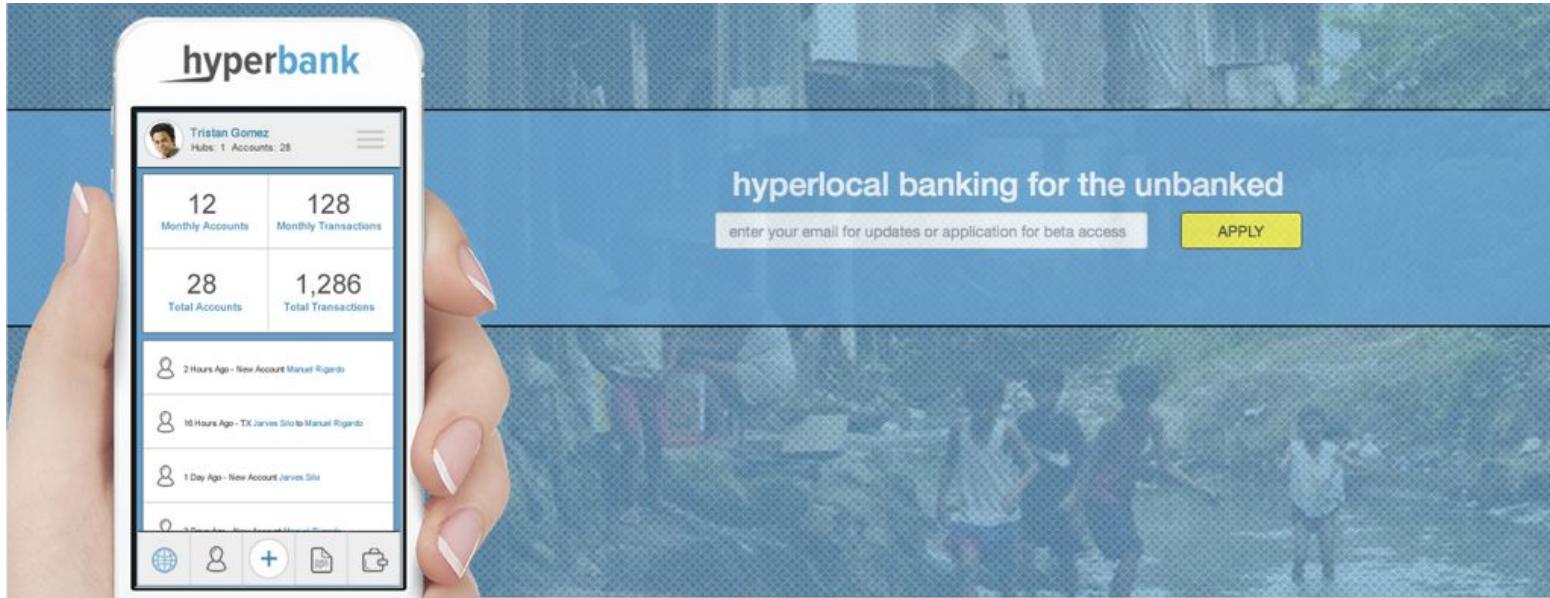


# PWC AND MORTGAGES - AUTOMATING TRUST

- At origination, blockchain could help establish more accurate record keeping
- At fulfillment, it could provide immutable proof that loan estimates were sent and received on time
- Smart contracts would speed up settlement flows throughout
- In the servicing process, blockchain could track the movement of payments
- And in the secondary markets, it might also provide transparency about the ownership of underlying assets



# 2ND PLACE WINNER OF THE DBS BLOCKCHAIN HACKATHON



The application that was previously known as NuBank won 2nd place at the recent [DBS Hackathon](#) in Singapore and is now HyperBank.

We utilize the blockchains in order to provide a secure and fully auditable digital trail of transactions but avoid volatility by keeping transfers at fixed local currencies with multi-signature signing from top-tier institutional financial partners.

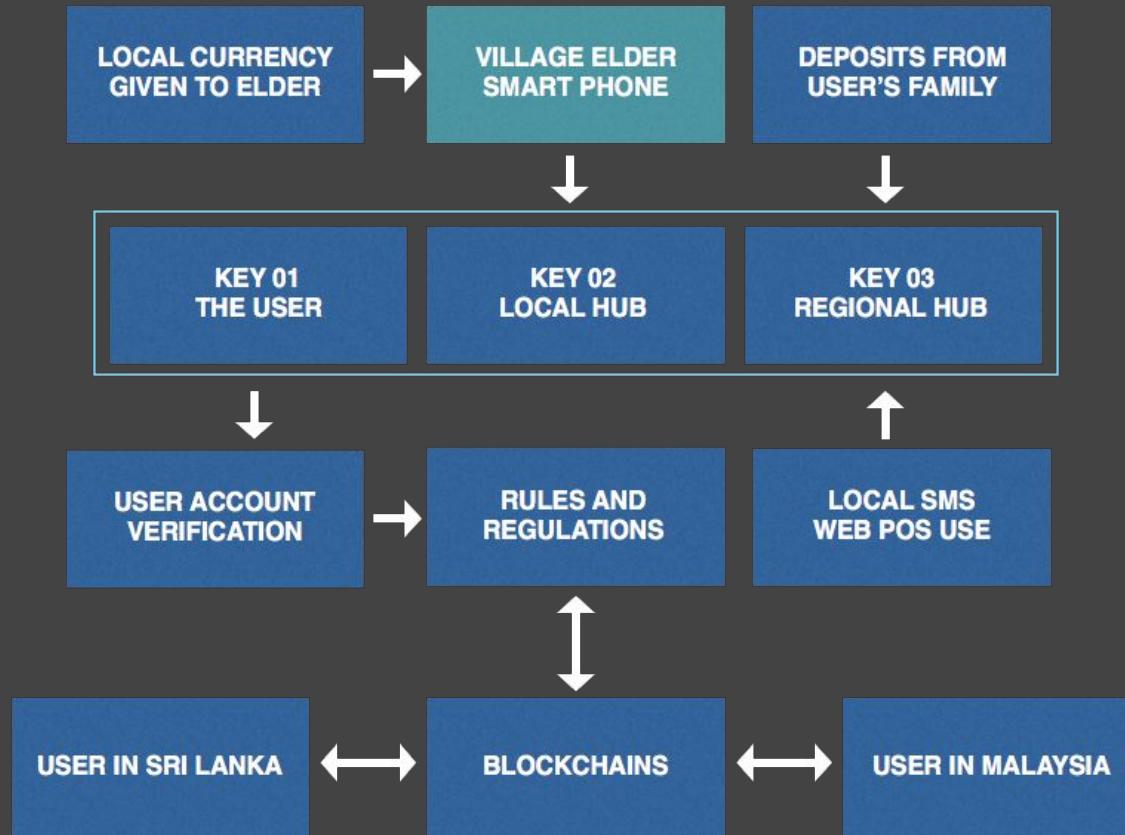
Consumers communicate using standard SMS functionality directly with their village elders who then use their smartphones to record and relay transactions to the blockchain - providing fully distributed M-Pesa functionality.

# PROVIDING HYPERLOCAL BANKING TO THE UNBANKED

---

- One village elder with smart-phone creates and verifies accounts locally
- Multi-signature keys provided to elder, account owner and regional hub
- Regional hubs could be traditional banks - acting as arbitrators for disputes
- Deposits can be made in any currency accepted both locally or regionally
- Local users transfer directly via local hubs or internationally via regional hub
- Standard SMS can be used to transfer funds and make direct payments
- Web-based technology can be utilized by other inter-network participants

# BANKING THE UNBANKED THROUGH OTHERS



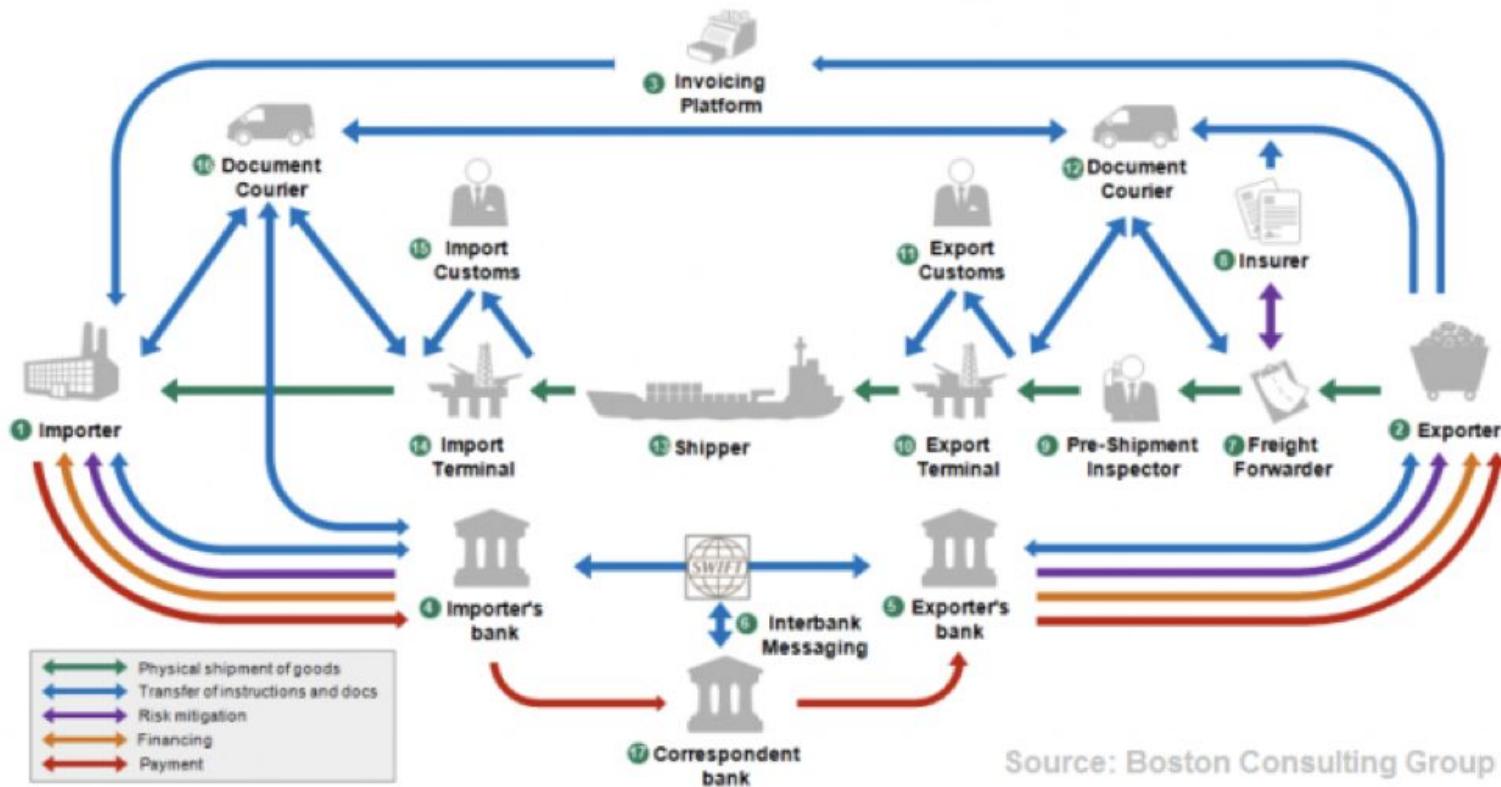
# SUPPLY CHAINS ARE NOT JUST ABOUT TRADE FINANCE

---

- Lending, letters of credit, factoring, export credit and insurance have created new trade finance products earning banks US\$50+ Billion a year
  - These bank-backed products are used by 80 to 90% of all global trade
  - Every US\$1 Million in goods has a trade-financing cost of US\$50,000
- 
- **Beyond the financials there is also the product delivery experience**
  - The history and authenticity of each and every ingredient or raw material
  - The verified processes involved in creating and transporting products

# TRADITIONAL SUPPLY CHAINS ARE COMPLICATED

The international trade “ecosystem”

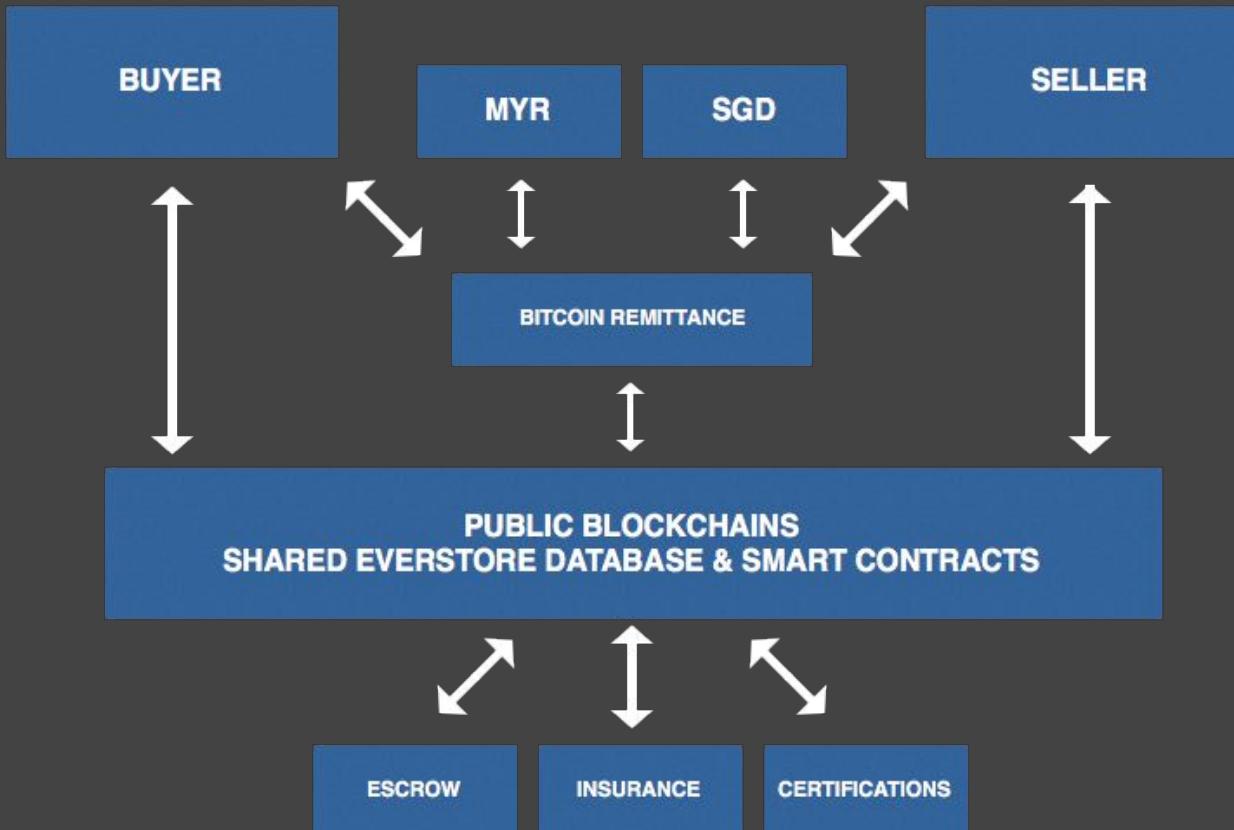


# COMMON PROBLEMS WITH THE MAJORITY OF SUPPLY CHAINS

---

- Multiple entities maintaining multiple copies of the truth within easily compromised closed silos requiring painfully slow & expensive reconciliation
  - Time consuming requirements for setting-up third-party financial trustees and physical escrow accounting processes between each transaction
  - Lack of automation between checkpoints, processes and sensory inputs
  - Excessive use and reliance upon physical paper-trails and certification
- 
- **ALL OF THESE PROBLEMS EXIST DUE TO A LACK OF TRUST**  
( if only there was a way they could all use the same source of truth )

# SIMPLIFYING SUPPLY CHAINS WITH BLOCKCHAINS



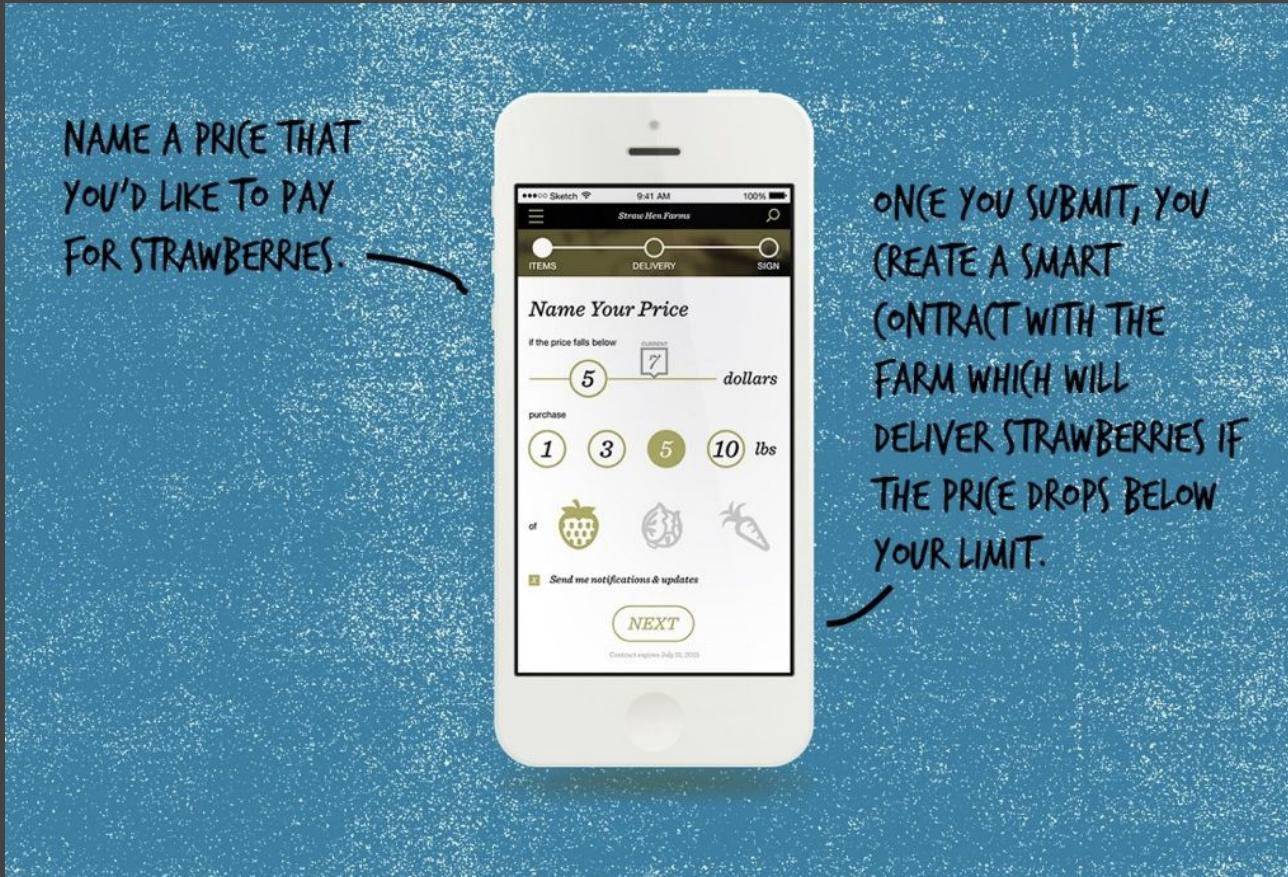
# IDEO EXAMPLE 1 - PROOF OF PROVENANCE IN SUPPLY CHAINS

YOU CAN SEE  
WHAT WENT  
INTO EACH ITEM  
THE BAKERY  
SELLS.

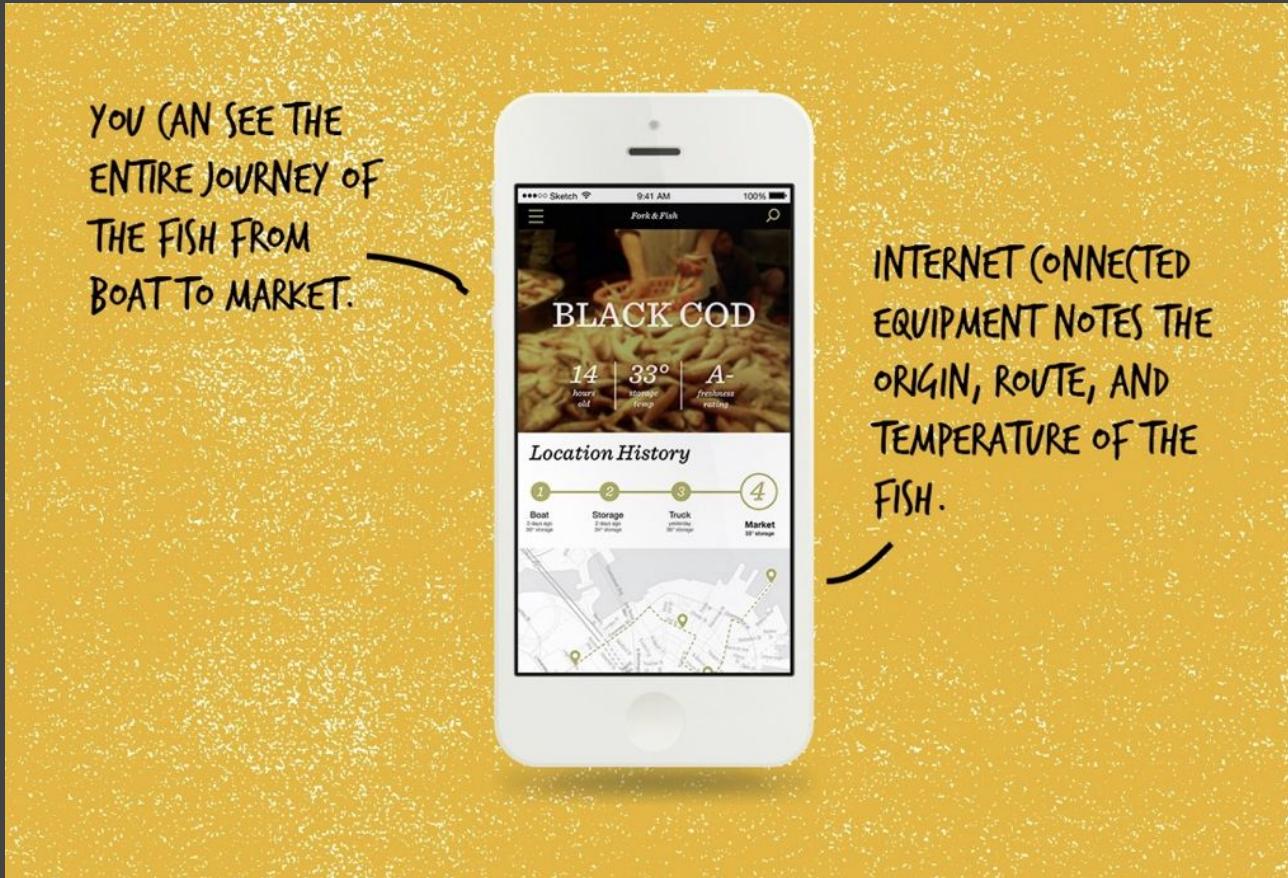


YOU CAN SEE  
WHAT CROPS  
THE FARM  
GROWS AND  
HOW THEY  
GROW THEM.

# IDEO EXAMPLE 1 - PROOF OF PROVENANCE IN SUPPLY CHAINS



# IDEO EXAMPLE 1 - PROOF OF PROVENANCE IN SUPPLY CHAINS



# HEALTHCARE WILL BE THE BIGGEST USE CASE AFTER FINANCE

---

- 4% of USA hospitals spend more than US\$10 million a year on cybersecurity, whereas 33% of hospitals couldn't estimate their cyber security costs
- Estonia is now the first country to nationalize a blockchain healthcare system
- Dubai took note of Estonia's success - now experimenting with blockchains

# OVER US\$300M ALREADY SPENT ON BLOCKCHAIN HEALTHCARE

35% of (308) healthcare and life science organizations surveyed plan to launch blockchain based products and services by first quarter of 2017

39% surveyed said they knew very little to nothing about blockchains

28% had invested US\$5M or more on blockchain R&D

**With 10% investing US\$10M or more**

The Deloitte logo, featuring the word "Deloitte" in a bold, blue, sans-serif font. A large, dark grey checkmark shape is positioned behind the letters "D", "e", "l", and "o". A small green dot is located at the bottom right of the letter "t".

# IDEO EXAMPLE 2 - BLOCKCHAINS & HEALTHCARE

EMERGENCY HEALTH RESPONDERS CAN SEE ALLERGIES AND OTHER VITAL INFORMATION THAT THEY NEED TO TREAT JANE.

Jane Miller - Medical Overview

PRIMARY CARE PROVIDER:  
DR. JANE HENDERSON  
123 Main Street, Suite 2  
Boston, MA 02101  
(617) 555-1234  
jane.henderson@md.com

EMERGENCY CONTACTS:  
FRANCIS MILLER (Mother)  
ROBERT KANNER (Father)

allergies

JANE IS ALLERGIC TO peanuts

see details

pre-existing conditions

- ASTHMA (Diagnosed July 2008)
- ANXIETY DISORDER (Diagnosed June 2011)
- BLOOD CLUT IN THE LEFT LEG (Diagnosed July 2004)

current medications

- FLUTICASTONE PROPIONATE SPRAY (Purpose: Severe seasonal allergies)
- SUMATRIPTAN, 25 MG TABLETS (Purpose: Occasional migraines)

last physical

SEEN BY PRIMARY PRACTITIONER:  
**Mary Lane**

DATE:  
**January 3, 2014**

WEIGHT:  
**122 lb.**

HEIGHT:  
**5 ft. 5 in.**

NOTES

GENERAL APPEARANCE: Well developed, well nourished, alert and cooperative, and appears to be in no acute distress.

EARS: External auditory canal and tympanic membrane appear healthy, painlessly intact.

THROAT: Oral cavity and pharynx normal. No inflammation, swelling, exudate, or lesions. Tonsils and adenoids in good general condition.

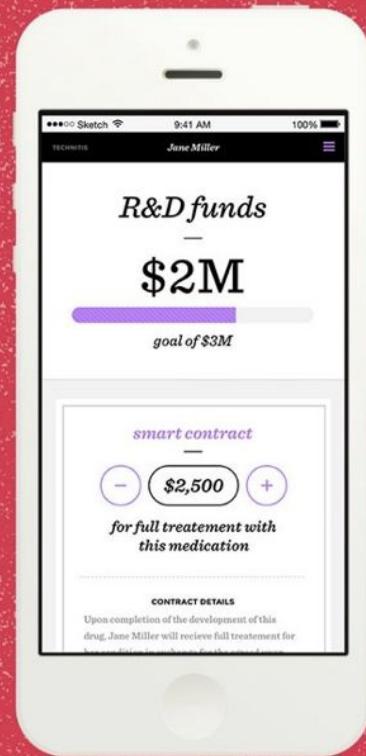
CARDIAC: Normal RR and SI. No 2nd SI or murmur. Heart rate regular. There is no peripheral edema, cyanosis or pallor. Extremities are warm and well perfused. Capillary refill is less than 2 seconds. No cervical bruits.

LUNGS: Clear to auscultation and percussion without rales, rhonchi, wheezing or diminished breath sounds.

BACK & SPINE:

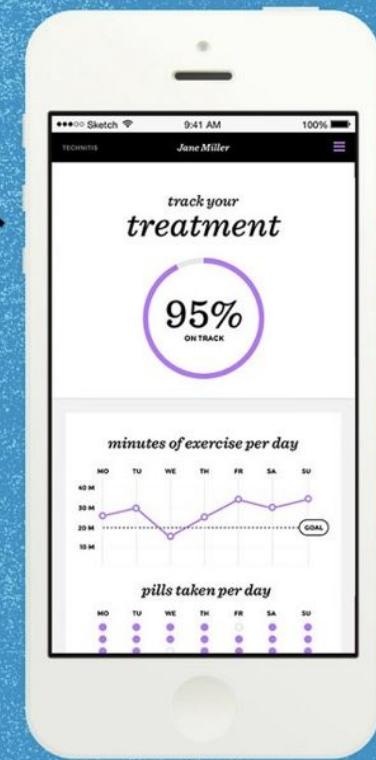
# IDEO EXAMPLE 2 - BLOCKCHAINS & HEALTHCARE

EXCITED TO SEE THE  
BOUNTY ALREADY BUILT  
UP TO \$2M, SHE ADDS  
ANOTHER \$2,500 TO  
ENCOURAGE R&D IN  
THIS AREA.



# IDEO EXAMPLE 2 - BLOCKCHAINS & HEALTHCARE

BY TRACKING  
ADHERENCE, JANE  
CAN HOLD HERSELF  
MORE ACCOUNTABLE  
AND RECEIVE  
BENEFITS FROM  
HER INSURER AT  
THE SAME TIME.

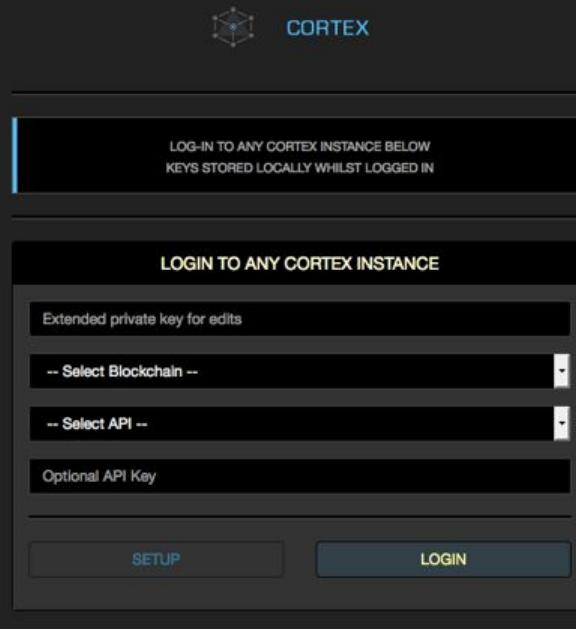


THE WEALTH OF  
ANONYMIZED  
INFORMATION THAT  
JANE IS CREATING  
THROUGH HER  
TREATMENT IS ALSO  
CAPTURED AND  
SHARED TO HELP THE  
COMMUNITY.

CORTEX

**GUIDED TOUR**

# CORTEX IS OUR BLOCKCHAIN-BASED OPERATING SYSTEM



# WORKS WITH ANY BLOCKCHAIN - SUPPORTS 10 OUT OF THE BOX

 CORTEX

[dashboard](#) add domain add user add database add api key help

credits : 11.00000000 flush logout

You are currently logged-in with your private key!  
Please remember to logout when you are done editing in order to remove the private key from localStorage.

**YOUR PROFILE** [EDIT](#)

	Name	Mark Smalley
	Title	Co-Founder & CEO
	Company	Neuroware

**RECENT ACTIVITY** [MORE](#)

-  Updated DNKey on mark.neuroware.io  
12 seconds ago by Mark Smalley
-  Added new user johnny.neuroware.io  
1 minute ago by Mark Smalley
-  New Everstore db at team.neuroware.io  
3 minutes ago by Mark Smalley
-  New wallet for mark.neuroware.io  
1 hour ago by Mark Smalley
-  Added new user johnny.neuroware.io  
2 days ago by Mark Smalley
-  New Everstore db at team.neuroware.io  
3 weeks ago by Mark Smalley
-  New DNKey on keys.neuroware.io  
3 month ago by Mark Smalley

**CURRENT USAGE** [REPORTS](#)

Domains	3 / 10
Sub-Domains	64 / 100
User Accounts	5 / 10
Databases	72 / 100
Active Modules	2 / 7
Active Protocols	3 / 8

**DASHBOARD**

**DOMAINS**

**USERS**

**DATABASES**

**API**

**EXPLORER**

**WALLET**

**SETTINGS**

# MANAGE DOMAIN NAMES FOR KEY ABSTRACTION SERVICES

The screenshot shows the CORTEX web application interface. On the left is a vertical sidebar with icons and labels: DASHBOARD, DOMAINS (selected), USERS, DATABASES, API, EXPLORER, WALLET, and SETTINGS. The main area has a header with tabs: domains (selected), new domain, help, and buttons for credits (0.0000000), flush, and logout.

A central message box states: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage."

The main content area displays a list of domain records:

Key	Value
Index: Domain ID [ md5 ]	e1f2e805608c5b56a2072e238e8b7523
Domain [ string ]	neuroware.io

Below this, there is a note: "2 of 2 : 2354d0cd9a746db9e9ebd4c00b5f3bb3504c9c516474bc2eec091b55d8c5adb1 (encoded 10 months ago)" followed by another table:

Path	Value
[ 323335346, 430636439, 613734366, 462396539, 656264346, 330306235, 663362623, 335303463, 396335313, 634373462, 633265656, 330393162, 353564386, 335616462, 31, 2, 1 ]	MD5/e1f2e805608c5b56a2072e238e8b7523

At the bottom, there is a note: "1 of 2 : bce354fb09a475c535938cb270739e30de30b68c9341d4b9990e903c6936c8 (encoded 10 months ago)" followed by another table:

Path	Value
[ 323335346, 430636439, 613734366, 462396539, 656264346, 330306235, 663362623, 335303463, 396335313, 634373462, 633265656, 330393162, 353564386, 335616462, 31, 2, 2 ]	neuroware.io

To the right, a sidebar titled "EDIT RECORD" shows the current values for the domain and its MD5 hash. A "COMMIT CHANGE" button is at the bottom.

# CREATE, AUDIT AND MANAGE DISTRIBUTED USERS

The screenshot displays the CORTEX web application interface for managing users. The left sidebar contains navigation links: DASHBOARD, DOMAINS, USERS (selected), DATABASES, API, EXPLORER, WALLET, and SETTINGS. The main header includes links for users, new user, import user, help, credits (0.0000000), flush, and logout.

A central message box states: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage."

The main content area shows a user profile for the ID 245a9ed7c9ed5f239b03df4a39a4a459bbe6c7d02f87b7b8e5b4c6c0b03d8426. The profile details are:

Key	Value
Index: User ID [ md5 ]	e8612b6ec287b942b9421a464c13ac95
Email Address [ email ]	mark@smalley.my
Name [ string ]	Mark Smalley
Title [ string ]	Co-Founder & CEO
Company [ string ]	Neuroware
Company URL [ url ]	<a href="http://neuroware.io">http://neuroware.io</a>

An "EDIT" button is available for modifying the profile.

Below the profile, an "EDIT RECORD" section is shown with a "COMMIT CHANGE" button.

The bottom section displays audit logs for the user profile:

Path	Value
[ 323435613, 965643763, 396564358, 632333962, 303364663, 461333961, 346134353, 962626536, 633764303, 266383762, 376238653, 562346336, 633062303, 364383432, 36, 3, 1 ]	MD5/e8612b6ec287b942b9421a464c13ac95

Log entries at the bottom include:

- 6 of 6 : 69bebcb991951cd9f9a8b28ca67ac9730db9d9d04a4d79d87a578b403e3b1ff (encoded 10 months ago)
- 5 of 6 : 69bebcb991951cd9f9a8b28ca67ac9730db9d9d04a4d79d87a578b403e3b1ff (encoded 10 months ago)

# CREATE AND MANAGE DISTRIBUTED BLOCKCHAIN DATABASES

The screenshot displays the CORTEX blockchain database management interface. On the left is a sidebar with navigation links: DASHBOARD, DOMAINS, USERS, DATABASES (selected), API, EXPLORER, WALLET, and SETTINGS. The main header includes links for databases, new database, import database, public data directory, help, credits (11.0000000), flush, and logout.

The central area shows two database entries:

- af1850ac00bc1c42ef6bddc9c2fd...6097**  
Key Value  
Index: ID [ ad5 ] 80c374f4d331e84b9618b8b68c4750ec  
Name [ string ] Cortex v0.0.1  
URL [ url ] http://localhost/neuroware/everstore/
- 2f9805d2f32853b9e47785225261d37f074d666fcc0f0c94c54cb9995fa4161f**  
Key Value  
Index: ID [ ad5 ] abd05c4ec8b1854d52292cffcde34e75  
Name [ string ] ATA-Plus v0.0.1  
URL [ url ] http://localhost/neuroware/everstore/?skin=ata&logout=true

To the right, there is an "ADD NEW RECORD" form with fields for ID, Name, and URL, and a COMMIT button.

# CORTEX ALSO INCLUDES ITS OWN API AND DOCUMENTATION

The screenshot shows the Cortex web application interface. On the left is a vertical sidebar with icons and labels for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, WALLET, and SETTINGS. The API section is currently selected. The main content area has a header with 'api docs' and 'console' tabs, 'credits : 11.00000000' and a 'flush' button, and a 'logout' button. A message at the top says 'You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage.' Below this are tabs for 'CortexJS', 'Raw API Requests', 'Everstore API', and 'BlockAuth API'. There is a search bar with a 'SEARCH' button. The first example is 'api.blocks.latest( <chain>, <count>, <callback> )'. It explains that it calls upon 'spinal.neuroware.io/<chain>/blocks/latest/<count>' and shows code: 'api.blocks.latest('btc', 5, function(blocks){ console.log(blocks);});'. The second example is 'api.blocks.get( <chain>, <ids>, <callback> )'. It explains that it calls upon 'spinal.neuroware.io/<chain>/block/id/<ids>' and shows code: 'var block\_ids = ['block\_heights', 'and\_block\_hashes']; api.blocks.get('btc', block\_ids, function(blocks){ console.log(blocks);});'.

**CORTEX**

api docs console

credits : 11.00000000 flush logout

You are currently logged-in with your private key!  
Please remember to logout when you are done editing in order to remove the private key from localStorage.

CortexJS Raw API Requests Everstore API BlockAuth API

Search SEARCH

**api.blocks.latest( <chain>, <count>, <callback> )**

This function calls upon `spinal.neuroware.io/<chain>/blocks/latest/<count>`

The `count` variable defines how many of the latest blocks to return.

The `callback` function is called upon completing the AJAX request.

```
api.blocks.latest('btc', 5, function(blocks){  
  console.log(blocks);  
});
```

**api.blocks.get( <chain>, <ids>, <callback> )**

This function calls upon `spinal.neuroware.io/<chain>/block/id/<ids>`

The `ids` variable defines which blocks to return and can be a string or an array.

The `callback` function is called upon completing the AJAX request.

```
var block_ids = ['block_heights', 'and_block_hashes'];  
api.blocks.get('btc', block_ids, function(blocks){  
  console.log(blocks);  
});
```

# AS WELL AS A IT'S OWN BUILT-IN BLOCK-EXPLORER

**COREX**

explorer help

credits : 11.00000000 flush logout

DASHBOARD DOMAINS USERS DATABASES API EXPLORER WALLET SETTINGS

You are currently logged-in with your private key!  
Please remember to logout when you are done editing in order to remove the private key from localStorage.

blocks transactions addresses markets graphs Search SEARCH

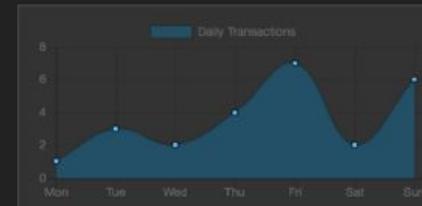
latest blocks SEE ALL BLOCKS Daily Transactions Last 7 Days

Height	Age	Transactions	Size (KB)
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714
403,716	12 seconds ago	783	399,714

latest transactions SEE ALL TRANSACTIONS currency calculator US Dollar

Hash	Inputs	Outputs	BTC Value
30e34f2ba622b31ffa93b87f0f3d60208d8ce81033b797972b564b6aa9a5945b	7	2	0.000343518
30e34f2ba622b31ffa93b87f0f3d60208d8ce81033b797972b564b6aa9a5945b	7	2	0.000343518
30e34f2ba622b31ffa93b87f0f3d60208d8ce81033b797972b564b6aa9a5945b	7	2	0.000343518

BTC = US\$ JSON FEED market conditions



# WITH GRAPH QUERIES FOR ADVANCED ANALYTICS AND TRACING

**CORTEX**

explorer help credits : 11.00000000 flush logout

DASHBOARD DOMAINS USERS DATABASES API EXPLORER WALLET SETTINGS

You are currently logged-in with your private key!  
Please remember to logout when you are done editing in order to remove the private key from localStorage.

blocks transactions addresses markets graphs Search SEARCH

Daily Transactions Last 7 Days



Daily Transactions

Day	Daily Transactions
Mon	1
Tue	3
Wed	2
Thu	4
Fri	6
Sat	1
Sun	5

currency calculator US Dollar

BTC = US\$

market conditions JSON FEED

Statistic	Value

# NOT TO MENTION INTEGRATED MULTI-CURRENCY WALLETS

The screenshot shows the CORTEX web application interface. On the left is a vertical sidebar with icons and labels for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, WALLET (highlighted in blue), and SETTINGS. The main content area has a header with 'dashboard' and other navigation links like add domain, add user, add database, add api key, and help. It also shows 'credits : 10.00000000' and buttons for 'flush' and 'logout'. A message at the top says 'You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage.' Below this is a navigation bar with tabs for DASHBOARD, ACCOUNTS, CONTACTS, SEND, and HELP, along with a search bar. The central part of the interface is divided into two main sections: 'Recent Transactions' on the left and 'BTC > USD - Market Conditions' on the right. The 'Recent Transactions' section lists several entries:

Transaction Details	Date
1.066 Bitcoin (Testnet) to My First Wallet	21 DAYS AGO
0.01066 Bitcoin (Testnet) from My First Wallet	22 DAYS AGO
0.001 Bitcoin from My First Wallet	22 DAYS AGO
0.1066 Bitcoin (Testnet) to My First Wallet	22 DAYS AGO
0.01 Bitcoin to My First Wallet	22 DAYS AGO
14 Dogecoin to My First Wallet	22 DAYS AGO
2 Dogecoin from My First Wallet	22 DAYS AGO

The 'BTC > USD - Market Conditions' section displays the following data:

Condition	Value	Details
US\$ 677.06	218,458	BTC to USD Daily TXs
1.4 Billion	2,056,343.22	Daily US\$ Sent Daily BTC Sent
15.7 Million	10.7 Billion	BTC Discovered Market Cap US\$

# ALSO ABLE TO CREATE AND MANAGE CUSTOM TOKENS

The screenshot displays the CORTEX wallet interface, specifically the 'TOKENS' section. The left sidebar includes icons for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, and SETTINGS. The main header has links for 'wallet', 'new wallet', 'import wallet', 'help', 'credits : 11.00000000', 'flush', and 'logout'. The 'TOKENS' tab is selected. A search bar at the top right says 'Search your wallet'.

**Your Tokens & Contracts**  
These are your Ethereum based token contracts and public account credentials.

CREATE TOKENS | WATCH TOKENS | CREATE ACCOUNT

Track existing custom tokens, create and manage token accounts - and even generate new custom token eco-systems from scratch.

Token Name	Contract Address	Decimals	Symbol	Total Supply	Actions
Neuroware Sdn Bhd	0x4AE75feE889d57d3229817565032bf428CB9b673	2	%	100.00 %	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

10 records per page | Showing 1 to 1 of 1 entries | Previous | 1 | Next

Account Name	Address	Tokens	TXs	Balances	Actions
My First Wallet	7c7eb521767083e5f73059fdbd06e77b87318bec	Ethereum Neuroware Sdn Bhd	1 0	1.066 ETH 0.01 %	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

10 records per page | Showing 1 to 1 of 1 entries | Previous | 1 | Next

# WITH OPTIONAL MULTI-SIGNATURE ESCROW CONTRACTS

The screenshot displays the CORTEX wallet application interface. On the left is a vertical sidebar with icons and labels for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, and two sections: WALLET and SETTINGS. The main content area has a header with 'wallet' (selected), 'new wallet', 'import wallet', 'help', 'credits : 11.00000000', 'flush', and 'logout'. Below the header is a message: 'You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage.' A navigation bar includes 'DASHBOARD', 'ACCOUNTS' (selected), 'CONTACTS', 'SEND', 'HELP', and 'TOKENS'. A search bar says 'Search your wallet' with a magnifying glass icon. The central part shows a section titled 'Your Accounts' with a note: 'These are all the different accounts you have in different blockchains. More advanced filtering coming soon!' It includes 'EXCHANGE COINS' and 'ADD NEW ACCOUNT' buttons. A message below states: 'You are currently communicating with the blockchains via BlockCypher and have 1 account and 1 contact stored on this device'. A table lists accounts with columns: Account, Blockchains, Current Addresses, Balances, and Actions. The table data is as follows:

Account	Blockchains	Current Addresses	Balances	Actions
My First Wallet	+ ADD CHAIN + ADD CONTRACT	r2C6A7MCduFwK6GsSHfIS74Yl5dCvu78Yi Bitcoin (Testnet)	Total: US\$ 5.16 0.00000000	REMOVE ALL
	+ ADD CONTRACT	1JCQyGLHsRrNy6tUMTx9NLNhVc9jmD5kv	0.00890000	
	+ ADD CONTRACT	DDkUM427ZNPXsKk5G3pw1HDk32bybXshJT	9.98765433	
	Dogecoin (2 of 3)	A3VfEyhRcXdPjRkp1BAR2d4pLRdaLJG3Ma	5.00000000	

At the bottom, there are buttons for 'records per page' (set to 10), 'Showing 1 to 1 of 1 entries', 'Previous', '1' (highlighted), and 'Next'.

# CAN BE EASILY EXTENDED WITH THEMES AND PLUGINS

The screenshot displays the Cortex web application interface, which is highly extensible with themes and plugins. The interface is organized into several sections:

- Left Sidebar:** Contains icons and labels for DASHBOARD, DOMAINS, USERS, DATABASES, API, EXPLORER, WALLET, and SETTINGS.
- Header:** Includes a "settings" button and links for export, import, reset, and help. It also shows "credits : 0.0000000" and buttons for "flush" and "logout".
- Central Content Area:** Shows a message: "You are currently logged-in with your private key! Please remember to logout when you are done editing in order to remove the private key from localStorage." Below this, it shows the path: Dogecoin (Testnet) Blockchain / Cortex V0.0.1 / Schema / Explore. It includes a "sort by" dropdown set to "Order", a search bar for "search schema", and a table for managing the "Databases" datastore.
- Datastore Management Table:** Shows two fields:
  - Field: ID (datastore index)**: Key is ID, Type is md5, Properties are public.
  - Field: Name**: Key is Name, Type is string, Properties are public.
- Right Sidebar:** Features sections for "ADD NEW DATASTORE" (with fields for name of datastore, select naming type, and define datastore index), "Index Label" (with select index type and select index properties), and "OPTIONAL DATASTORE FIELDS" (with label for Field 2, select field type, and select field properties).

At the bottom left, it says "Powered by Neuware".

## MASTERCLASS Q2 SUMMARY

### FROM PAST TO PRESENT

- Bitcoin provides the most secure data storage
- Bitcoin has outperformed every global currency
- Over US\$1.5 billion a day in crypto-transactions
- GNOSIS ICO raised US\$12.5M in 10 minutes
- US\$25B added to crypto-markets in last 30 days
- **Blockchain agnosticism is critical**



# neuroware

## THANK YOU FOR YOUR TIME

please email us for more information - [founders@neuroware.io](mailto:founders@neuroware.io)