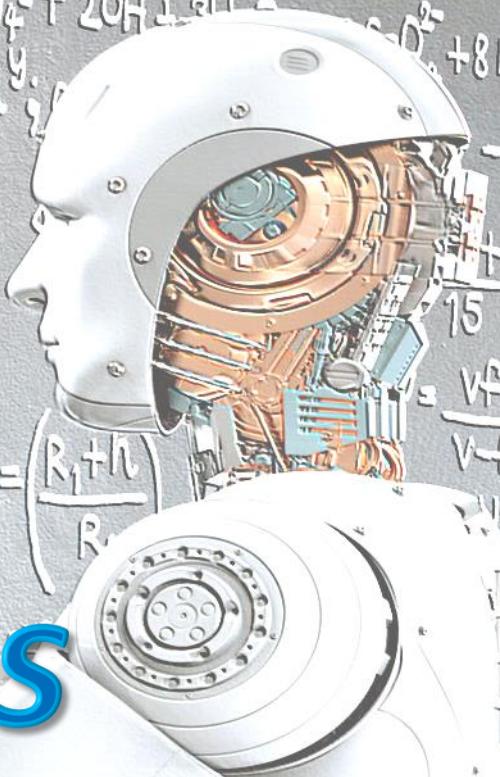
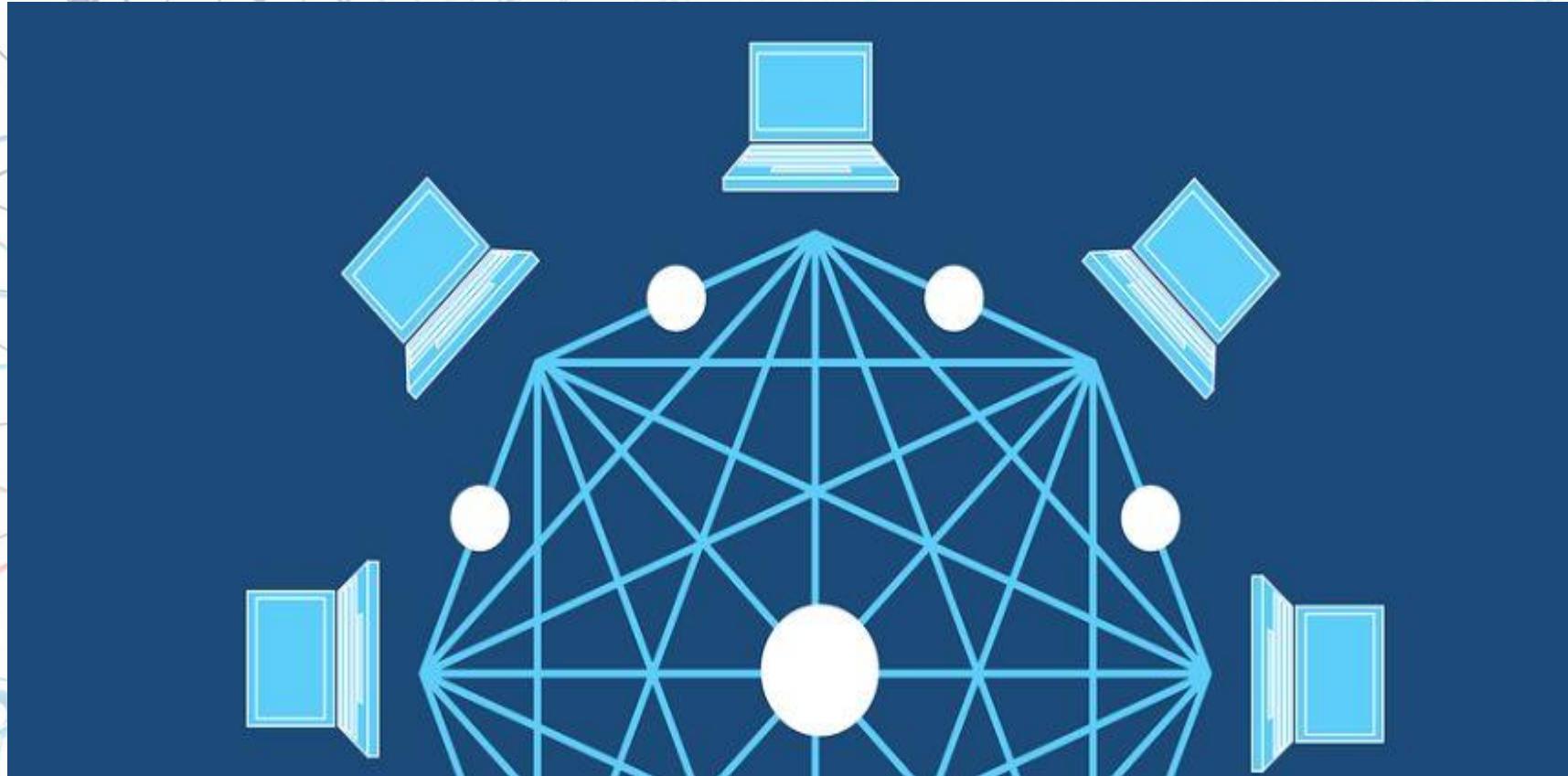


Advanced Topics in Information Systems

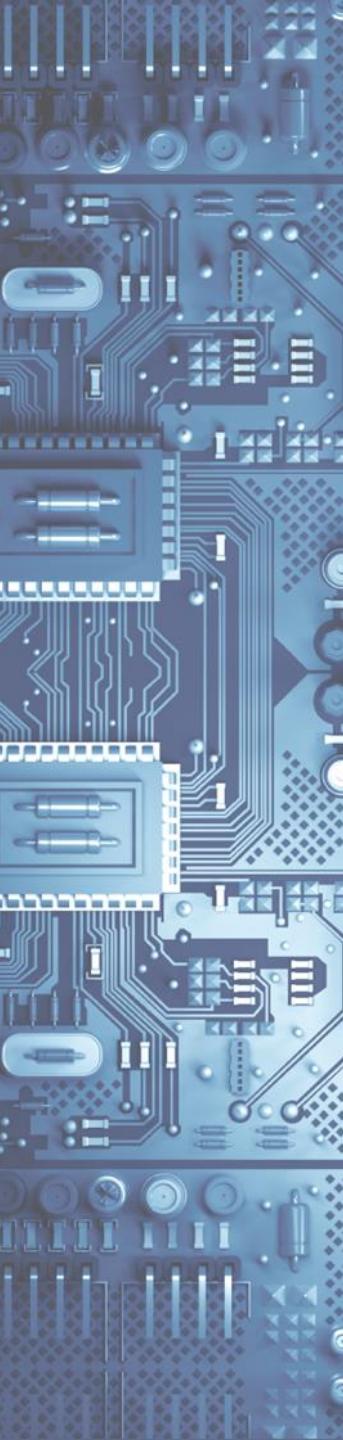




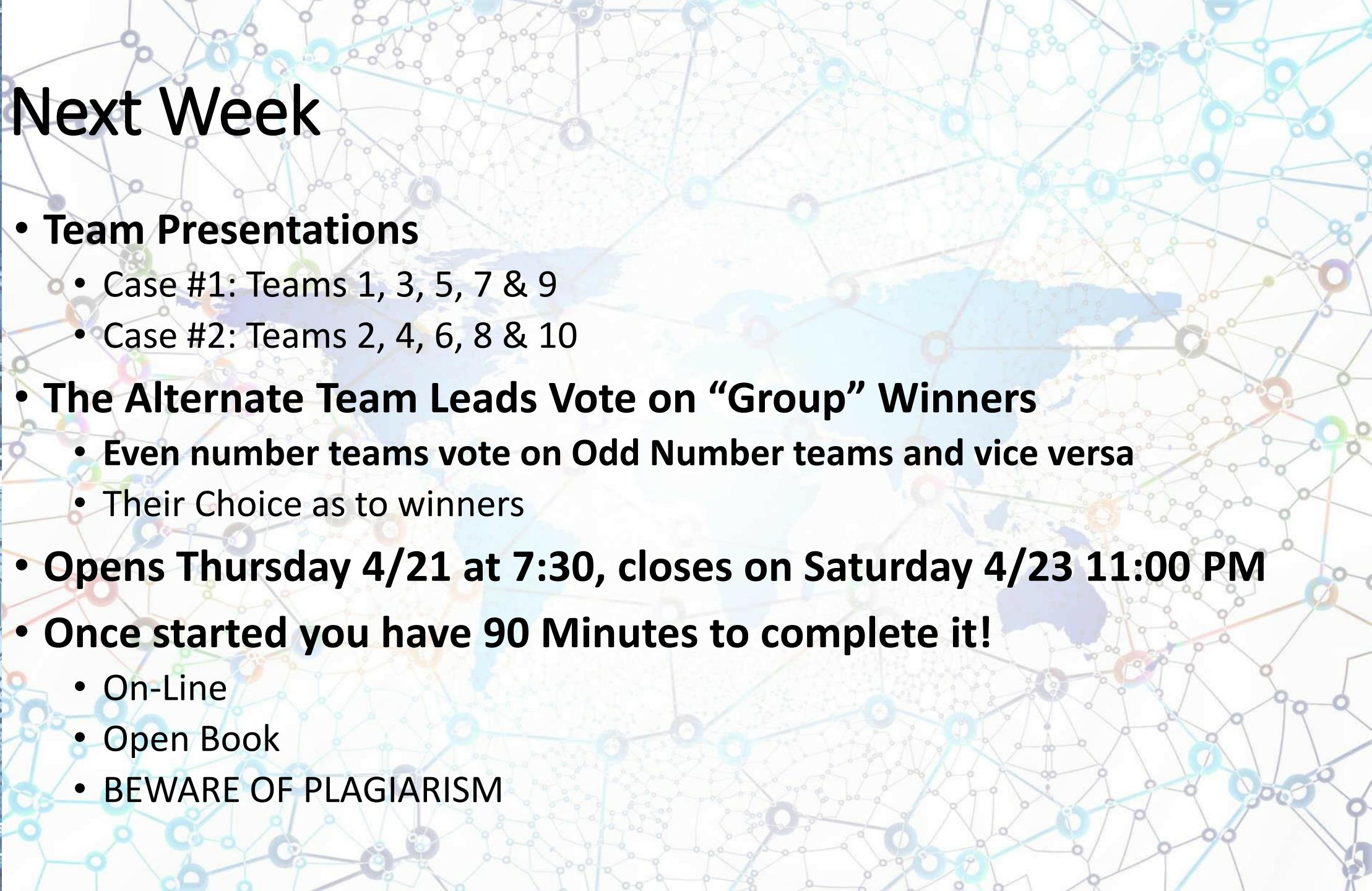
Enterprise Blockchain: The Revolution The Financial Services Market Never Knew It Needed



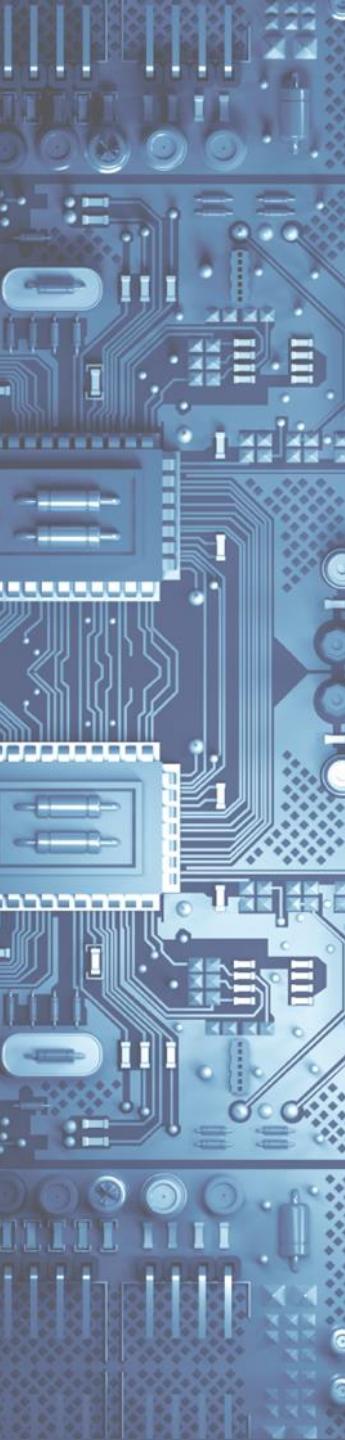
<https://thefintechtimes.com/enterprise-blockchain/>



Next Week



- **Team Presentations**
 - Case #1: Teams 1, 3, 5, 7 & 9
 - Case #2: Teams 2, 4, 6, 8 & 10
- **The Alternate Team Leads Vote on “Group” Winners**
 - Even number teams vote on Odd Number teams and vice versa
 - Their Choice as to winners
- **Opens Thursday 4/21 at 7:30, closes on Saturday 4/23 11:00 PM**
- **Once started you have 90 Minutes to complete it!**
 - On-Line
 - Open Book
 - BEWARE OF PLAGIARISM

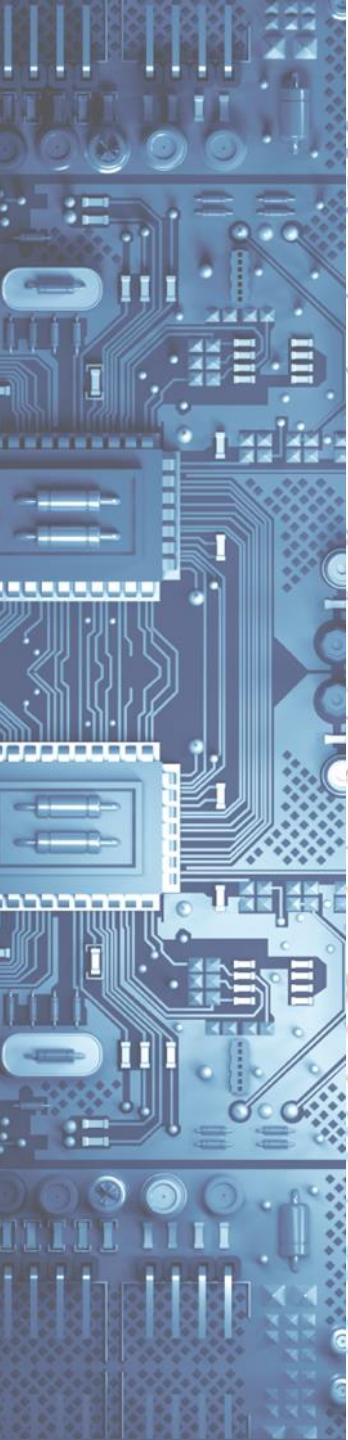


Team Presentations Guidelines

15 minutes MAX each team (7 slides MAX + Title slide)

- 1. “Your Company” Introduction & Overview** (what do you bring to the table!)
- 2. Company and Problem description** (Who is FIS, what is the problem you were asked to resolve)
- 3. “Possible” alternatives to solve problems** (have at least 2!)
- 4. Recommended Solution and why did you select it** (compare your solution to alternatives)
- 5. Time Frame & Costs** (Estimate time to implement and cost estimates if available)
- 6. Conclusion** (Summarize your solution and why FIS should they pick your company?)

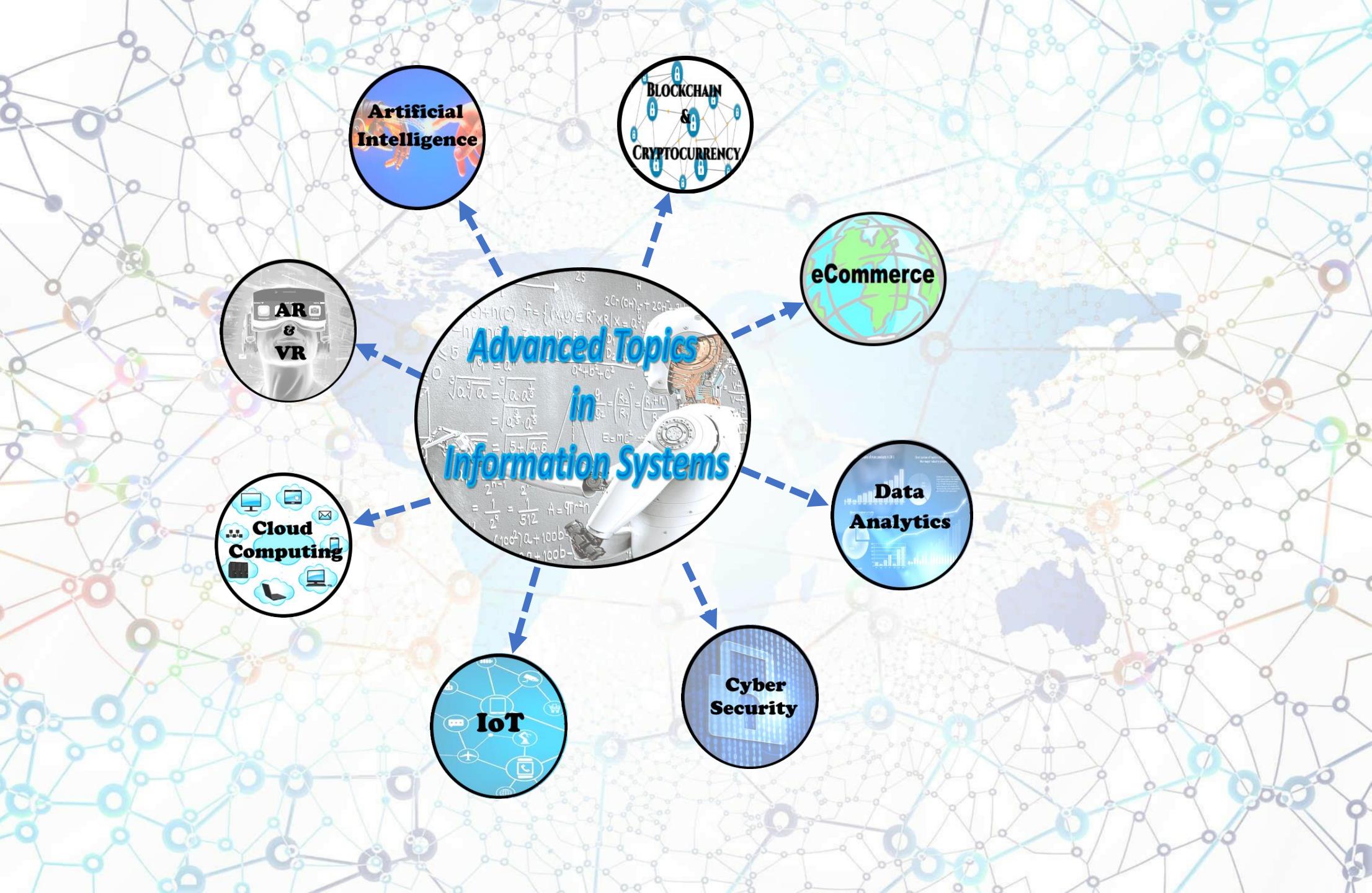
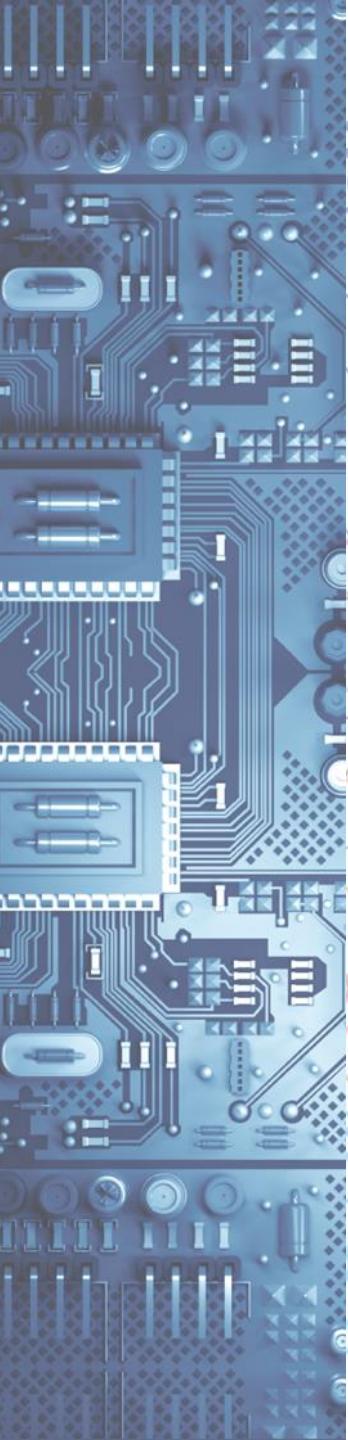
FINAL ARCHITECTURE VISION DOCUMENT DUE BEFORE START OF CLASS!!

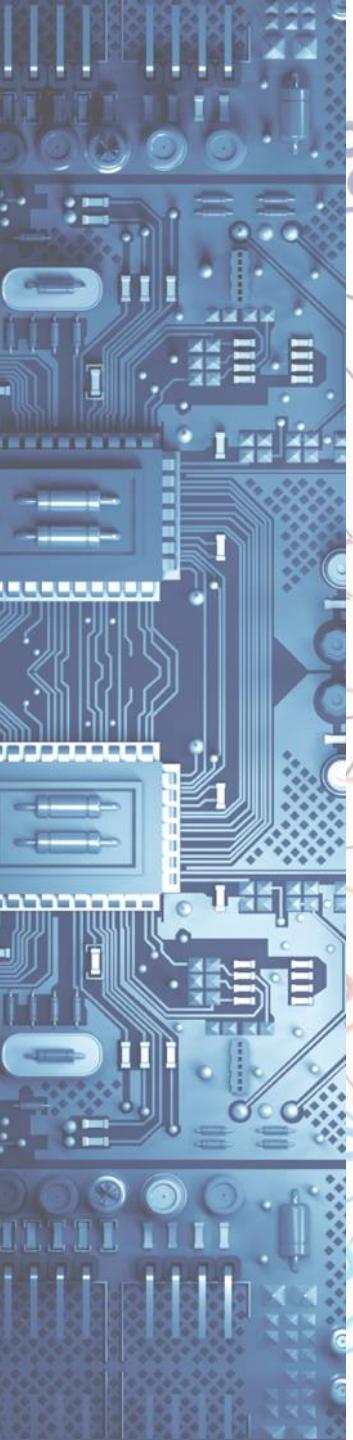


Team Readouts:

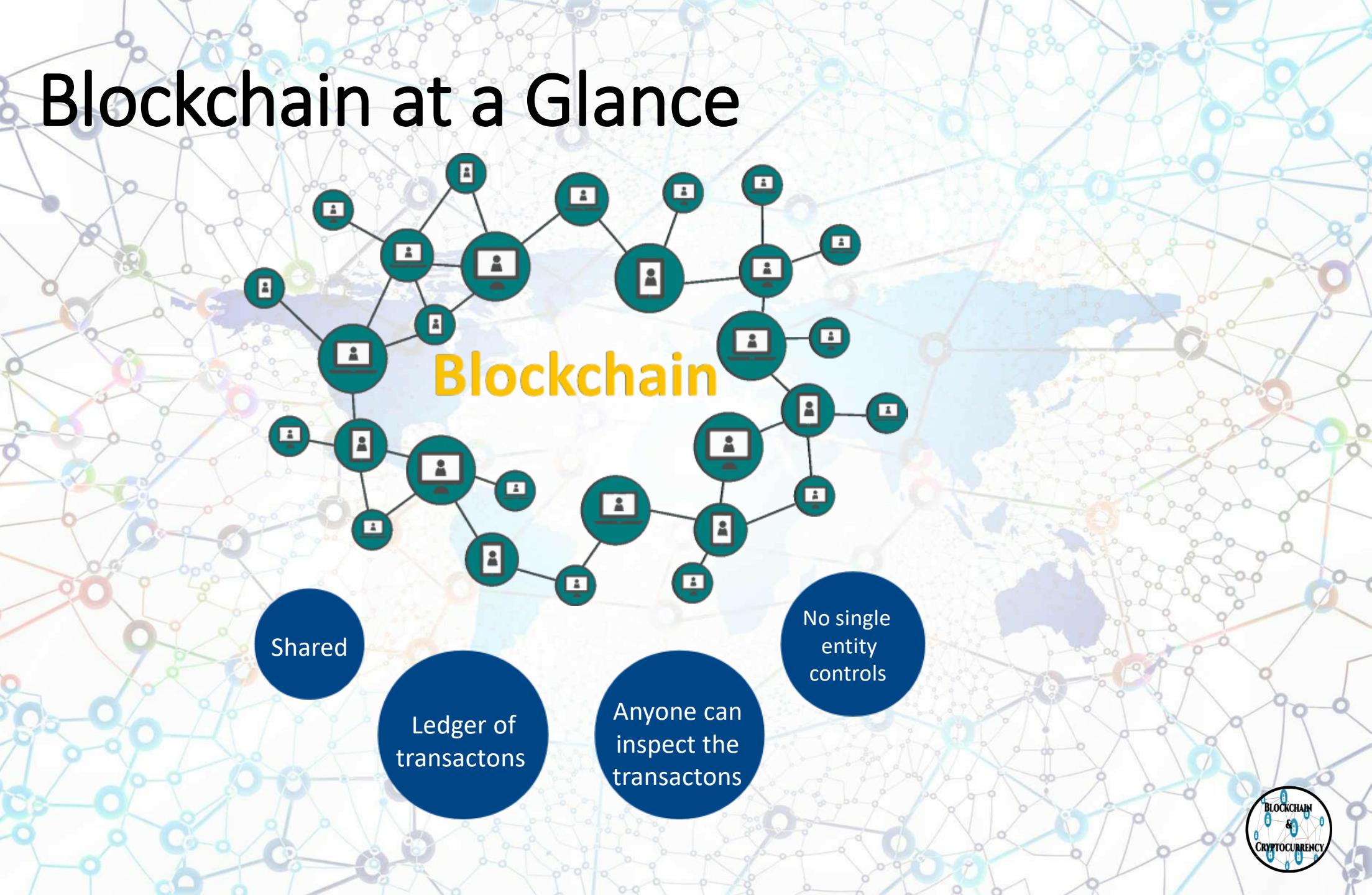


- Status (Green / Yellow / Red)
- Issues / Concerns?
- Team Dynamics?





Blockchain at a Glance



Blockchain

Shared

Ledger of
transactions

Anyone can
inspect the
transactions

No single
entity
controls



Blockchain Timeline



October 2008:
Bitcoin whitepaper by
the nom-de-plume
Satoshi Nakamoto is
published.



June 2014:
LHVpank starts research
on Blockchain and its
digital security with their
app "Cuber Wallet".



September 2015:
Major financial companies
form R3 – a consortium of
over 40 institutions
committed to exploring and
implementing Blockchain
technology.



September 2016:
Over 40 financial service
institutions have invested
in a Blockchain or Bitcoin
startup since 2014.

May 2010:
First Bitcoin purchase: BTC 10k for
a \$25 pizza. Today BTC 10k is
worth \$10m! Bitcoin is known as the
first use case of Blockchain
technology.



July 2014:
Ethereum Project – a
Blockchain platform with
the ability to build
decentralized applications
– is funded by a crowd
sale.



September 2015:
Visa, Citi, Nasdaq,
Capital One and Fiserv
Invest \$30m in the
Blockchain startup
Chain.com.



2020
WEC estimates that 80% of
all banks will initiate projects
concerning distributed
ledger technology – the
underlying technology
supporting Blockchain.

WORLD
ECONOMIC
FORUM





VS

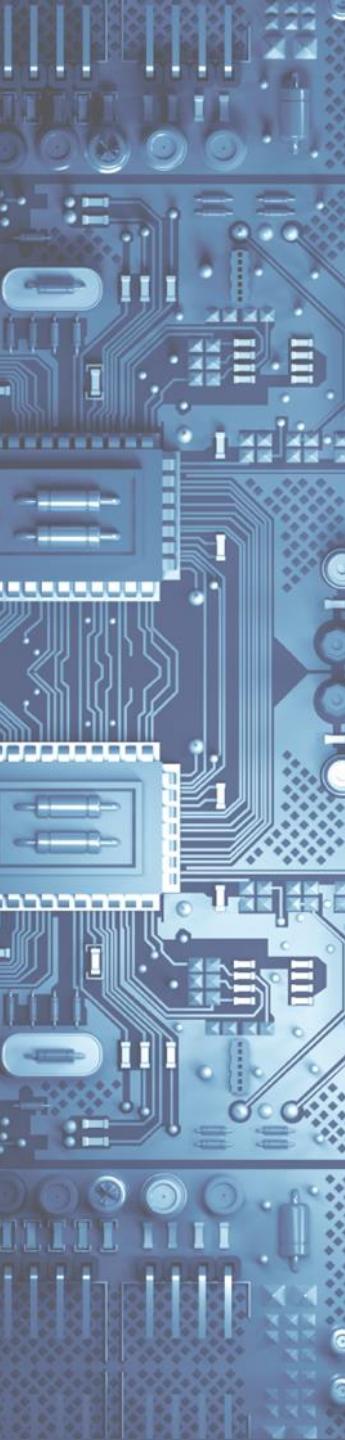


Public Blockchains

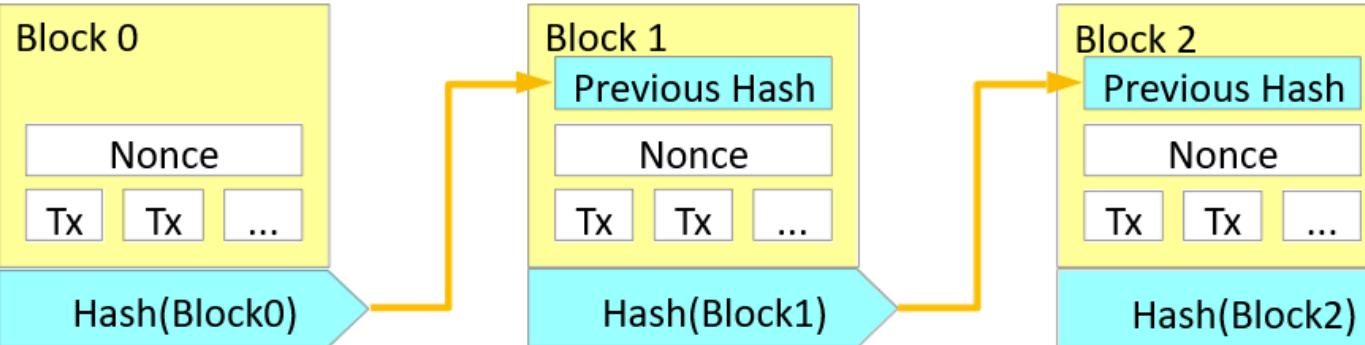
- The public blockchain is permission-less and open to everybody without exception
- Anyone can download it to his or her computer

Private Blockchains

- Give full control to the owners only.
- These owners enjoy a high level of flexibility and can adjust the rules as they see fit

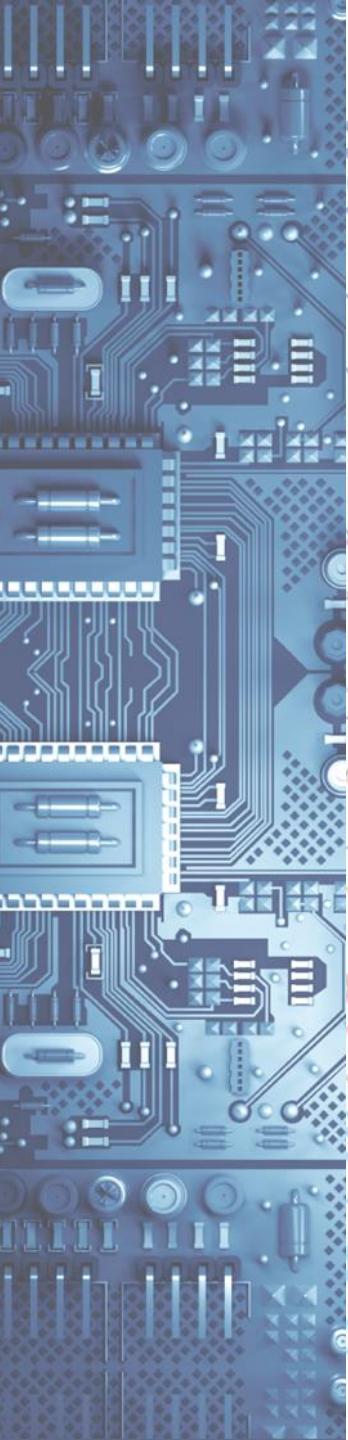


How are Blockchains Formed?

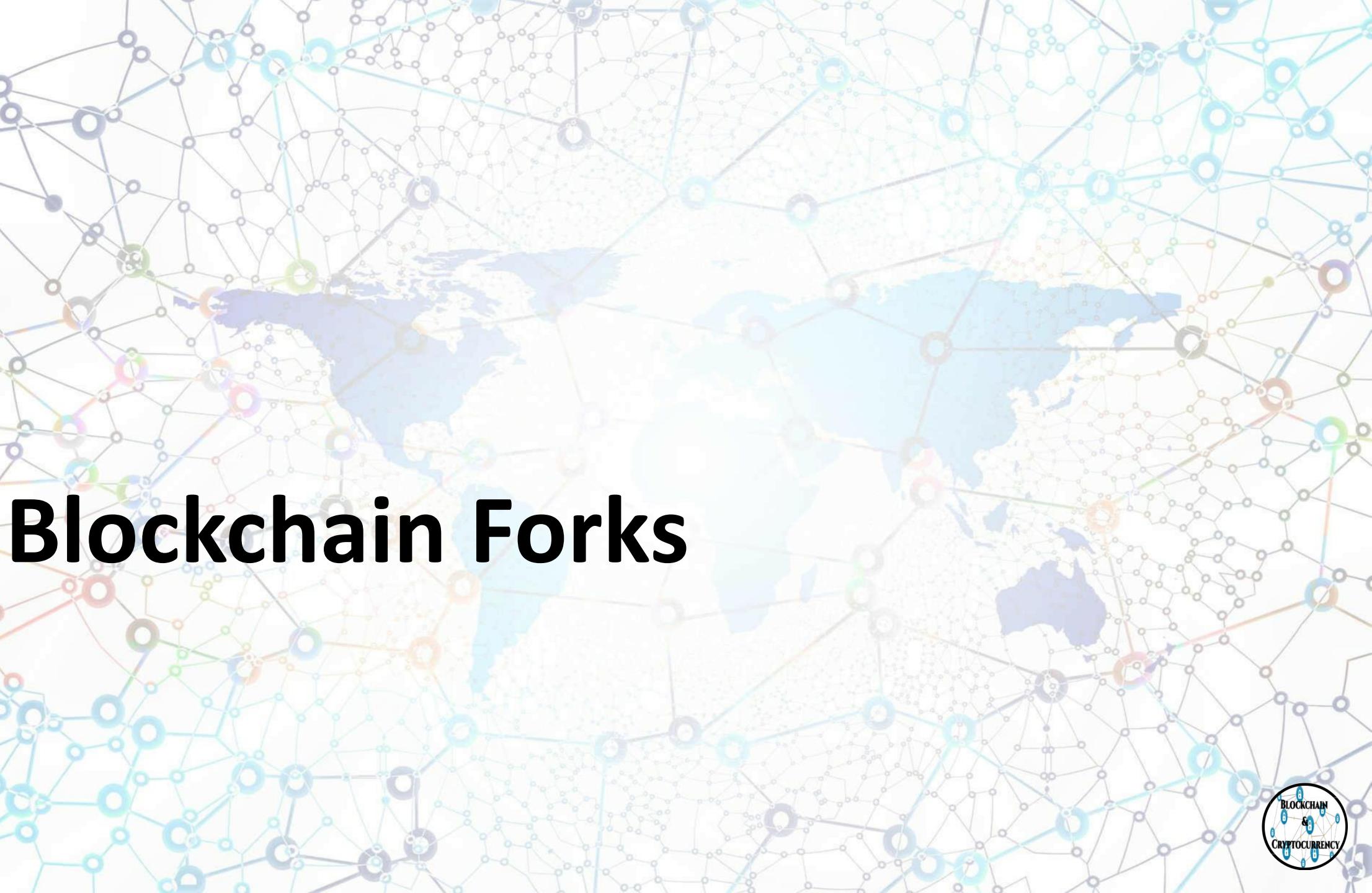


- **It is... An append-only.... sequential data structure.....**
- Meaning.....New blocks can only be appended at the end of the chain
- In order to change a block in the middle of the chain, all prior blocks would have to be changed
- It is really just a “Chain of Hashes”, as in the crypto-hashing that we talked about in the cybersecurity module

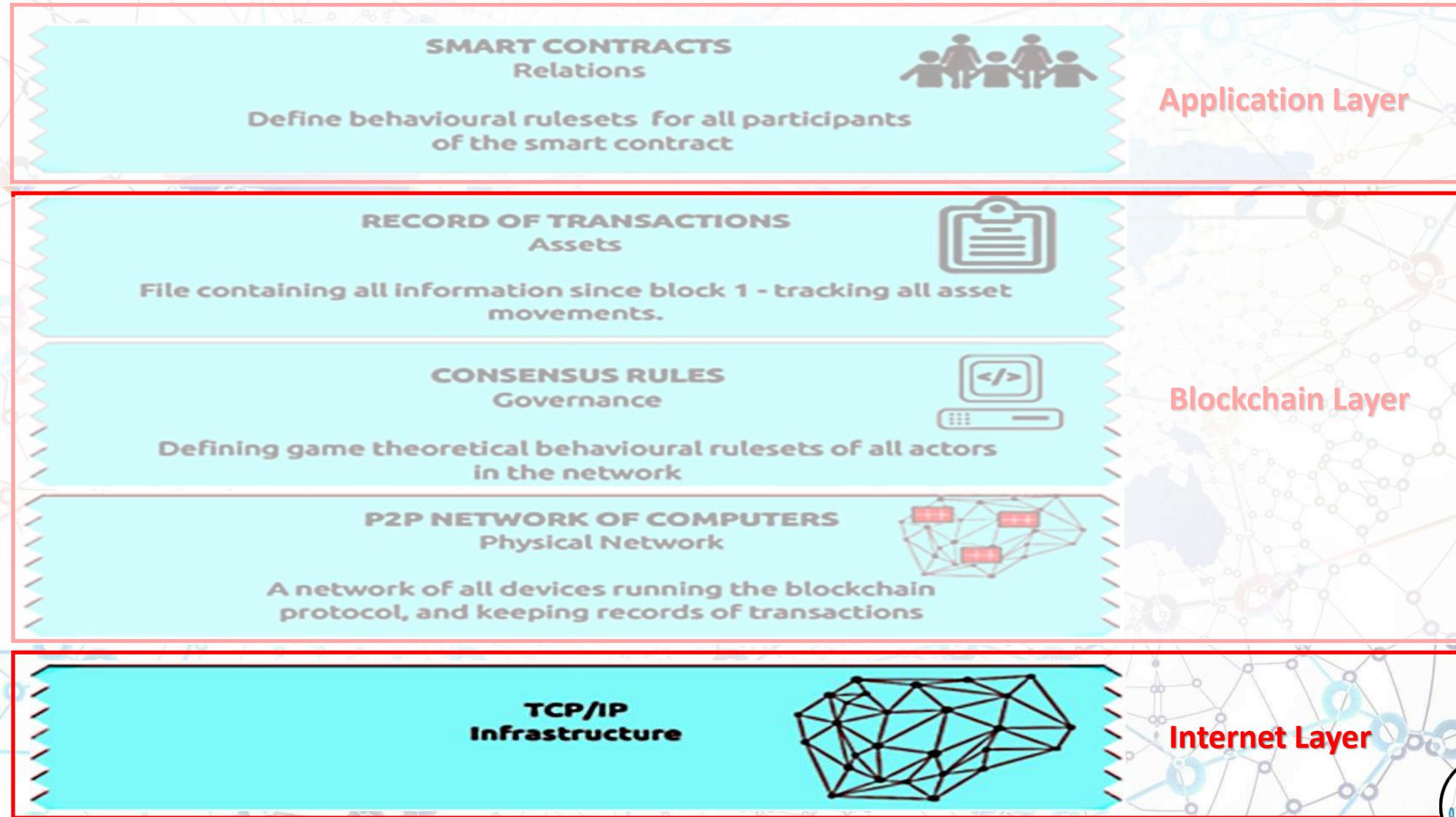
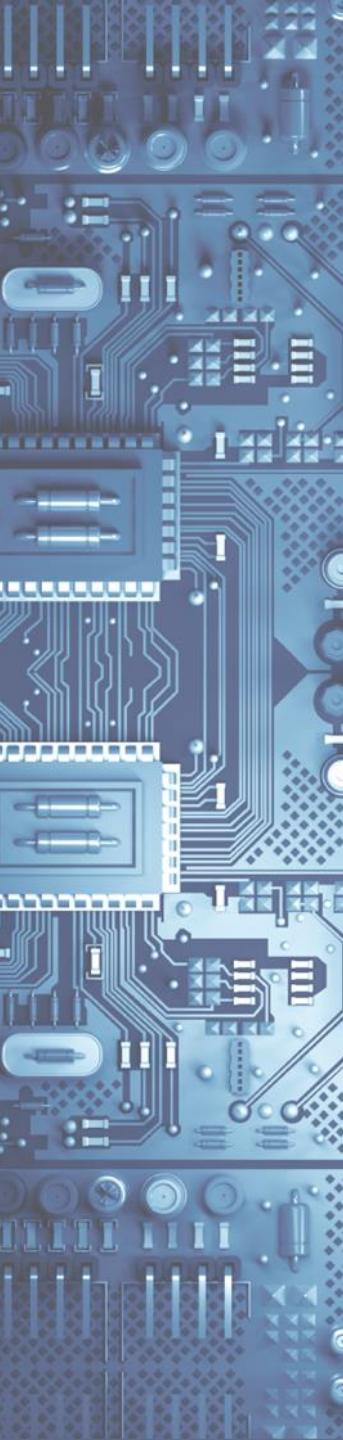


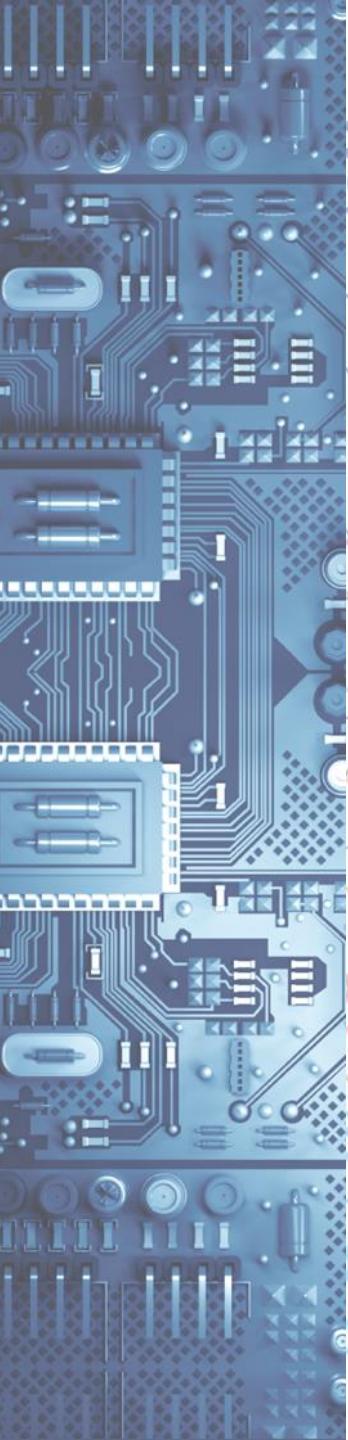


Blockchain Forks



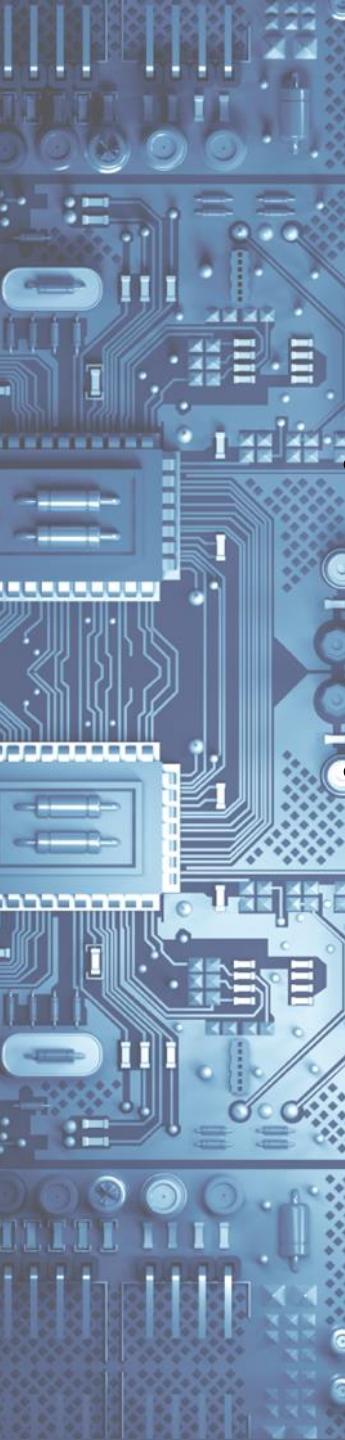
Typical Blockchain Technology Stack





Blockchain Pros and Cons





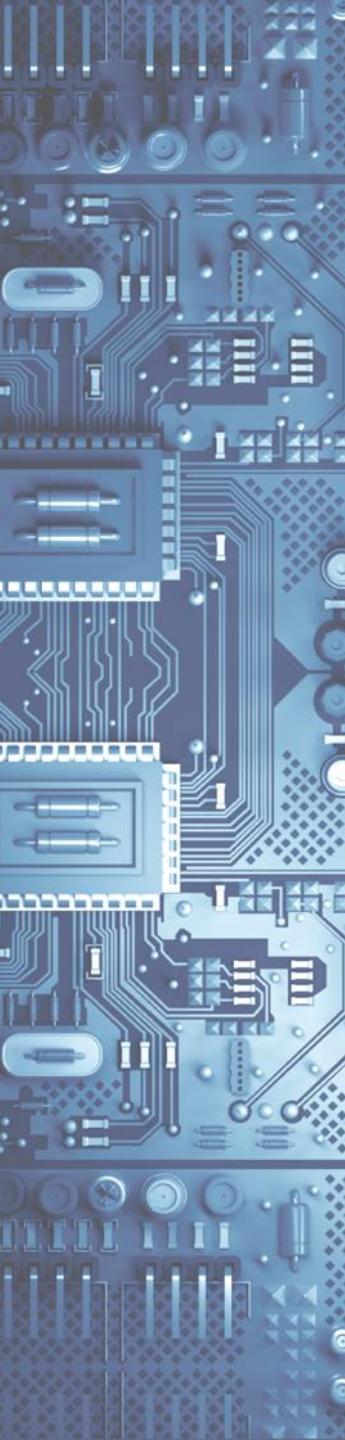
PROS

1. *It is a Decentralized System.*



- The core value is it enables a database to be shareable without a central administrator.
- Blockchain can eliminate the cost of hiring expert people to prevent or to stop the attacks on the system by using cryptography, as was previously discussed.





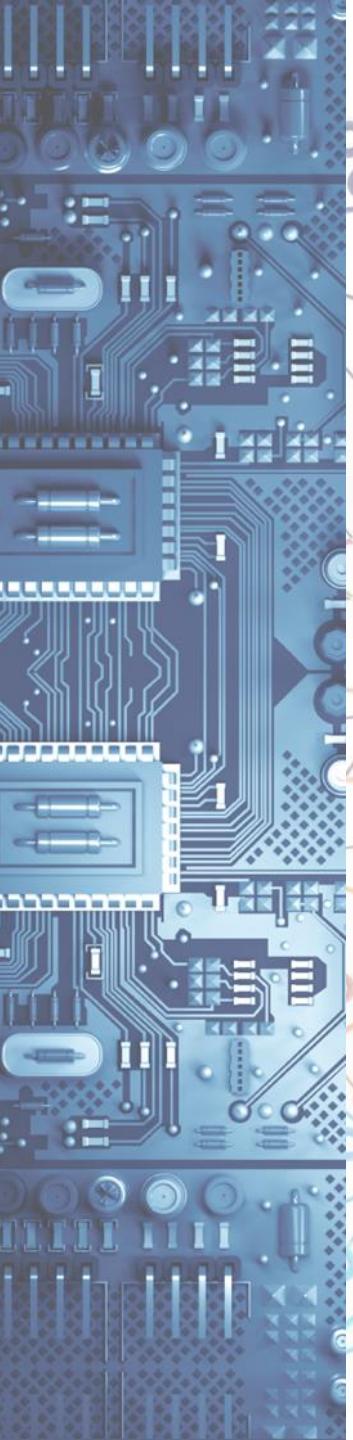
PROS

2. *The Blockchain is Transparent*



- Any data in the blockchain can be viewable for any person
- Any changes made in the blockchain, are publicly viewable.





PROS

3. *The Blockchain is More Secure*

- Blockchain is a more secure way to store data than some other 3rd party systems, because it uses cryptography.
- Also, it is a transparent and secure system at the same time.



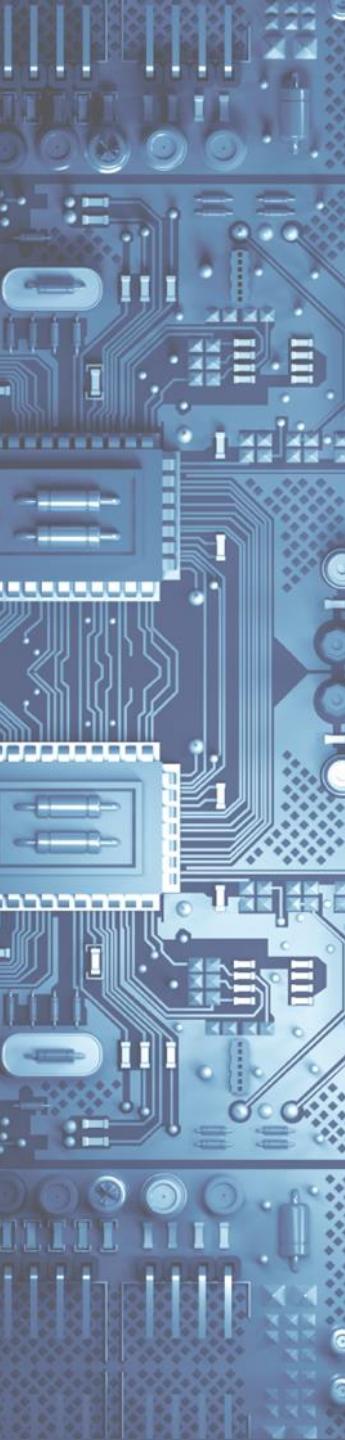
PROS

4. Faster and Cost Effective



- If you used any other method for cross-border transactions and/or between banks, it can take days and be quite expensive.
 - But in the case of blockchain transactions, you can send money to anywhere and to anyone in the world because no paper work is needed.
- To be clear, blockchain transactions are not instant! (at all)
 - They're just faster than international inter-banking.
- They are also cheaper, but not free.
 - Still, compared to traditional system Blockchain is faster and cost-effective.





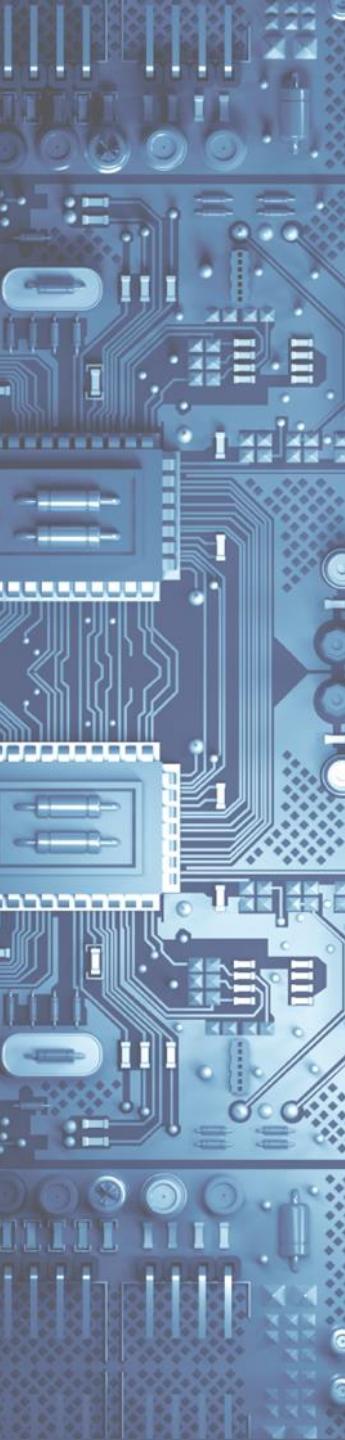
PROS

5. It is Immutable



- If you record any data into the blockchain, it is not easy to alter or change that data.
- In other words, you cannot go back to last week's transaction and alter the block that contains it.
 - Well, you could, but then you would alter every single block – and every single transaction within every block
 - **For better or worse, that transaction is there to stay.**



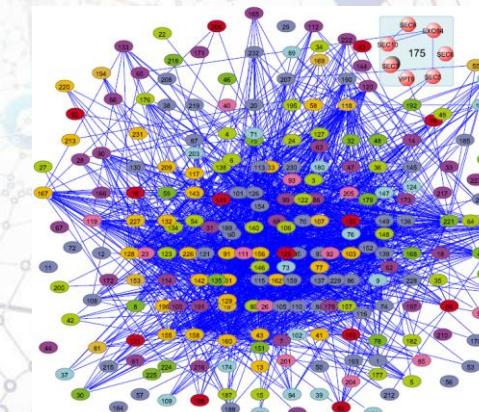


1. Its Complexity



CONS

- Blockchain is not as simple as it may have looked like from our discussion, non-technical people may not easily understand
- ***Nodes, Cryptography, Smart Contract, and Mining....*** are somewhat understandable to most, but it is not possible to have this trustworthy service without understanding these basic terms and their related processes.



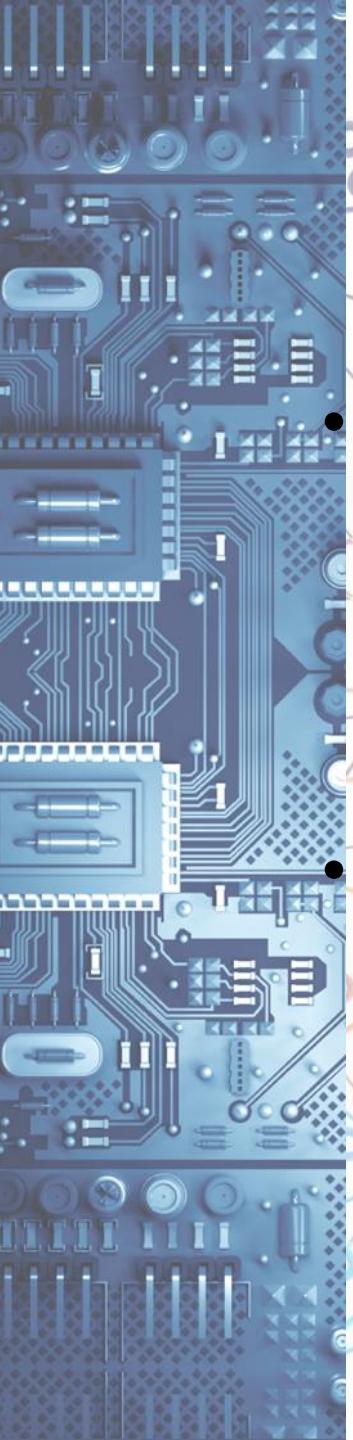
2. Size of Blockchain



CONS

- Blockchains can get extremely large, For instance the cryptocurrency Ethereum's blockchain size is now more than 1 TB!
- But, every day when new transactions are recorded to the blockchain the blockchain grows and gets bigger & bigger.
- This ever increasing size takes ever increasing time and processing power to accommodate its growth





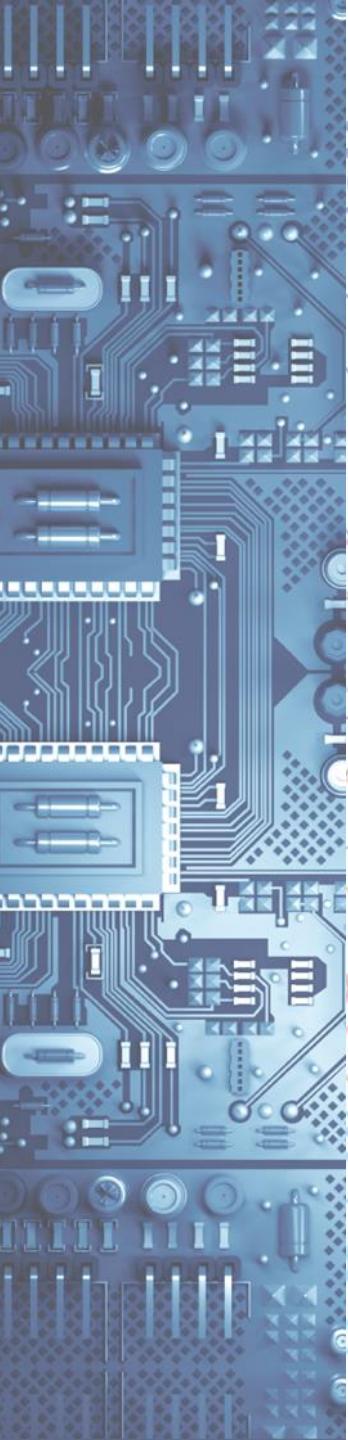
3. Requires More Resources



CONS

- Well established infrastructures have enough processing to run their network
 - But new blockchains may face the problem of a lack of needed bandwidth to facilitate widespread usage.
- Nodes need time and energy to the network to run efficiently
 - Therefore, any new blockchain network will need more initial resources to operate and maintain the required security processes.





4. Human Errors



CONS

- Blockchain is immutable, information going into the database needs to be 100% sure and correct if any mistake happens with data, **then it cannot be altered**
- Most of the blockchain is access through **Private Key** if the private key is lost then, it is almost impossible to access the network, so this technology needs more diligence than other systems

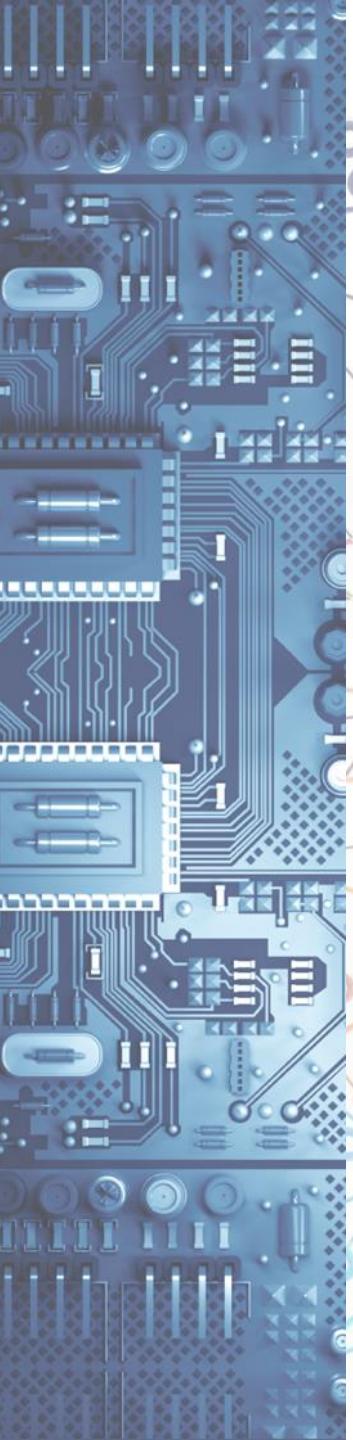


Oops!

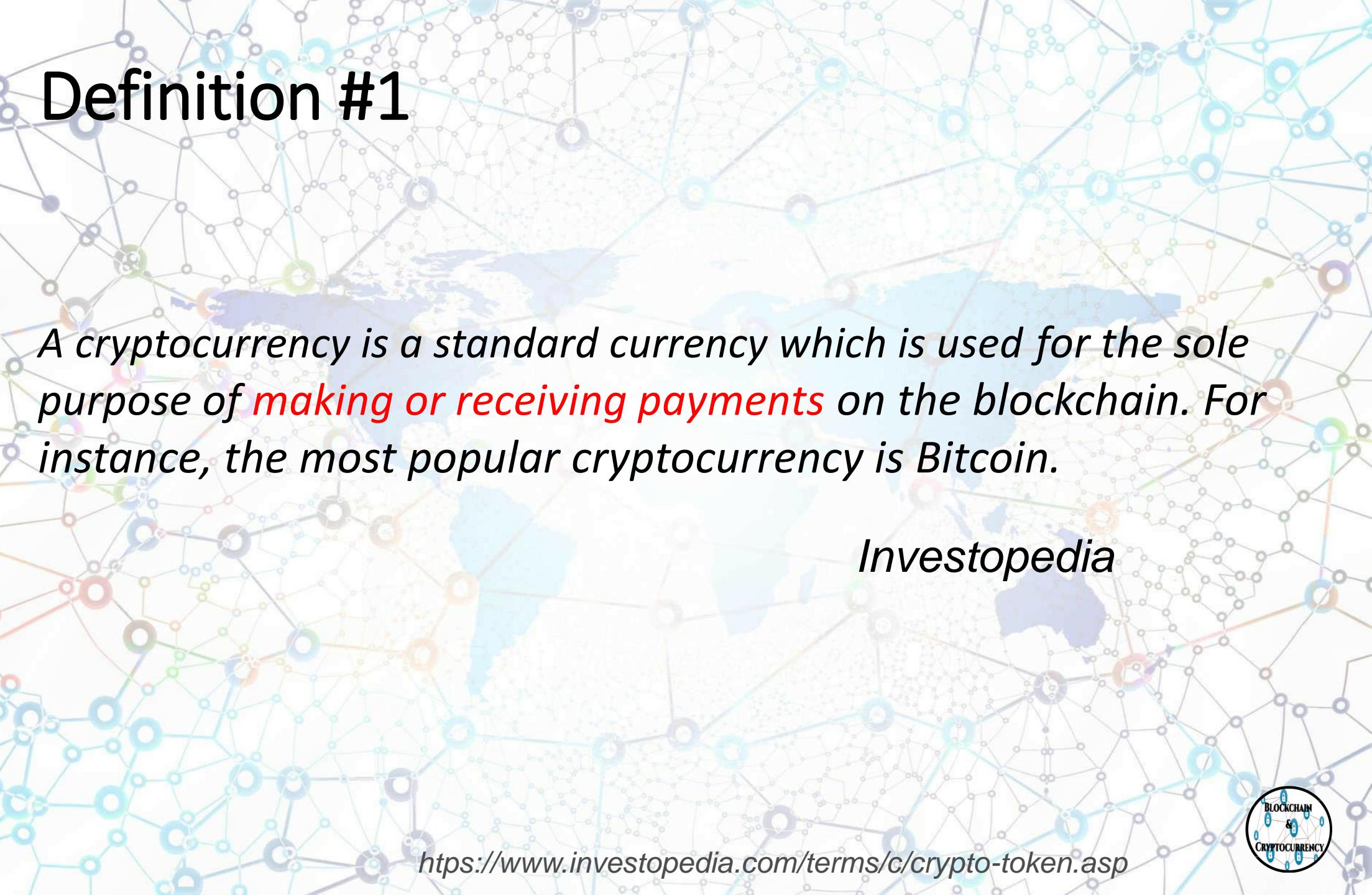


Cryptocurrencies





Definition #1

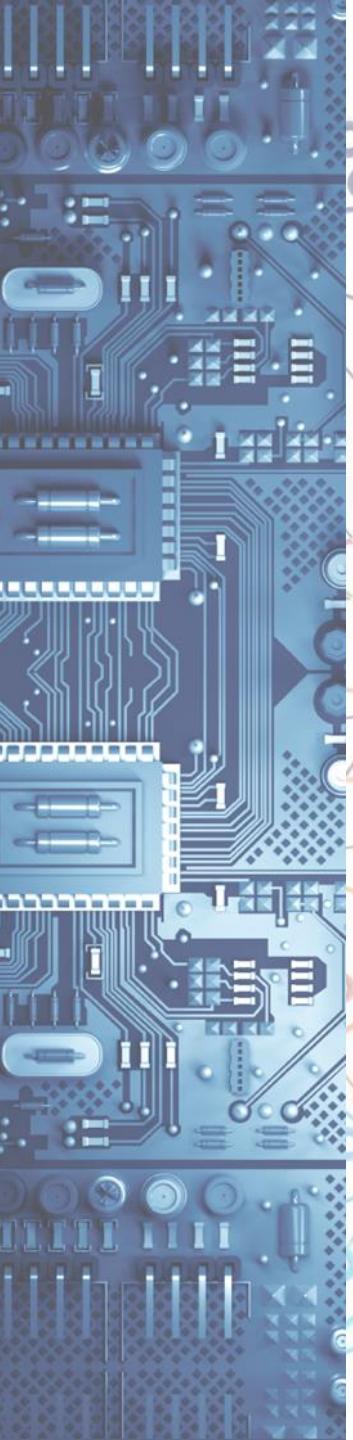


*A cryptocurrency is a standard currency which is used for the sole purpose of **making or receiving payments** on the blockchain. For instance, the most popular cryptocurrency is Bitcoin.*

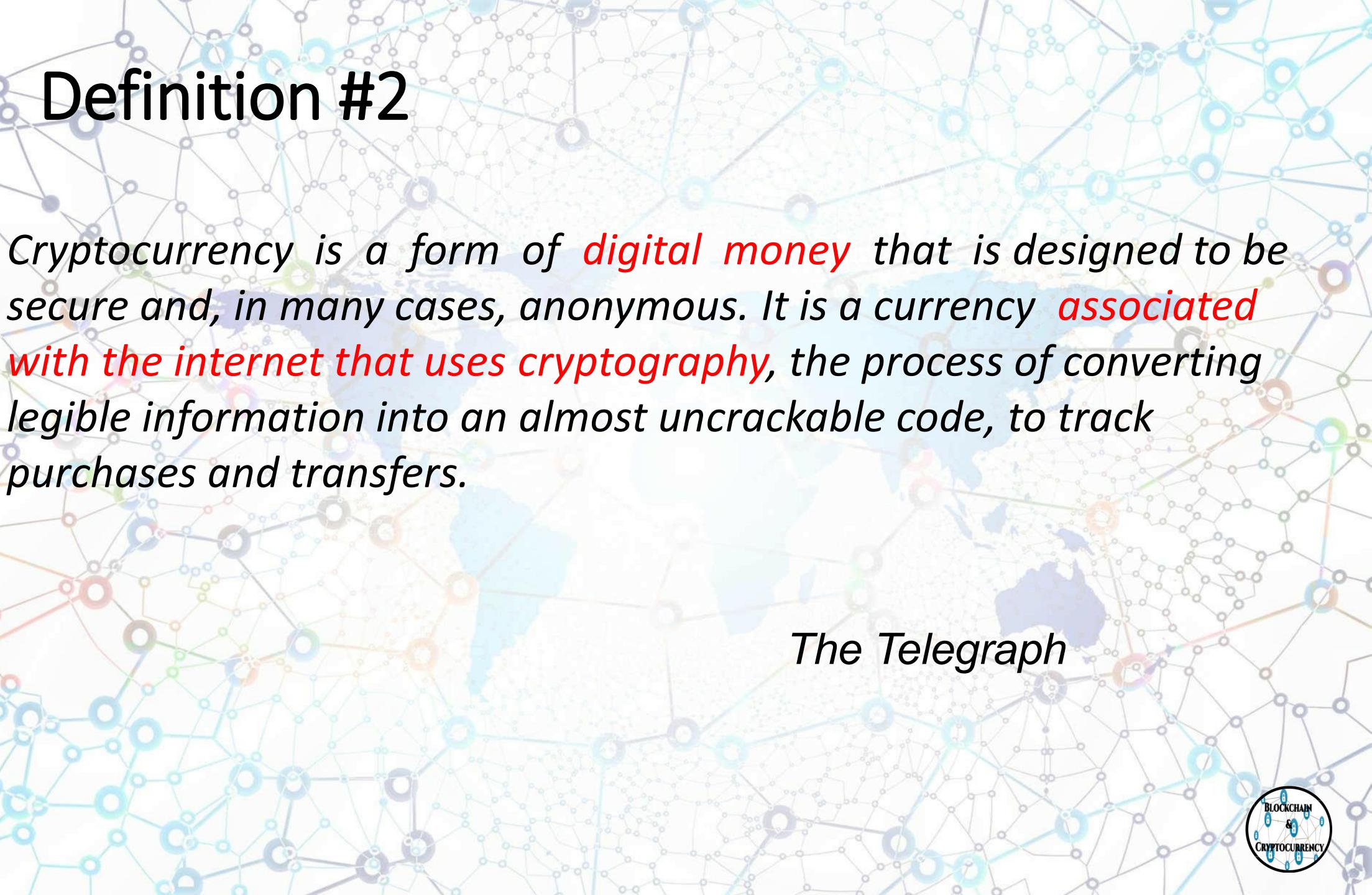
Investopedia

<https://www.investopedia.com/terms/c/crypto-token.asp>





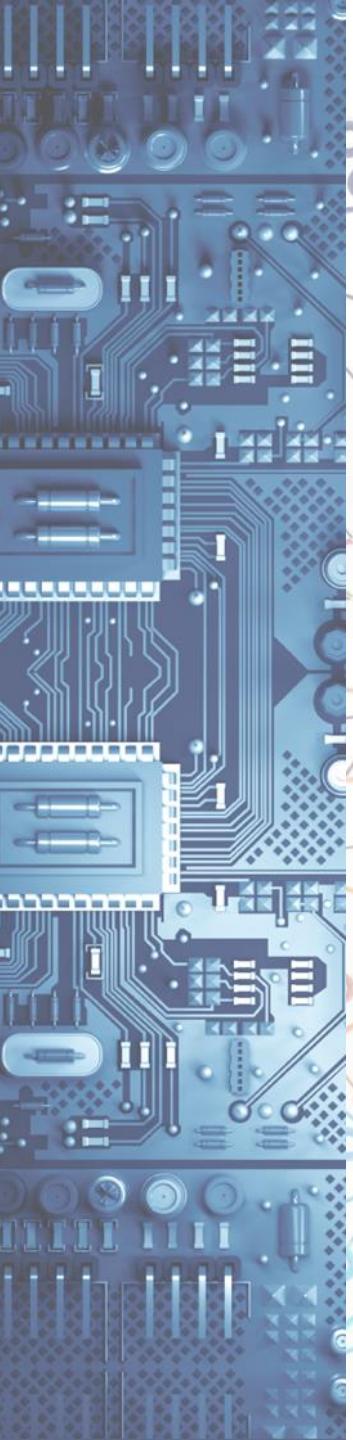
Definition #2



*Cryptocurrency is a form of **digital money** that is designed to be secure and, in many cases, anonymous. It is a currency **associated with the internet that uses cryptography**, the process of converting legible information into an almost uncrackable code, to track purchases and transfers.*

The Telegraph





Is Bitcoin Legal?



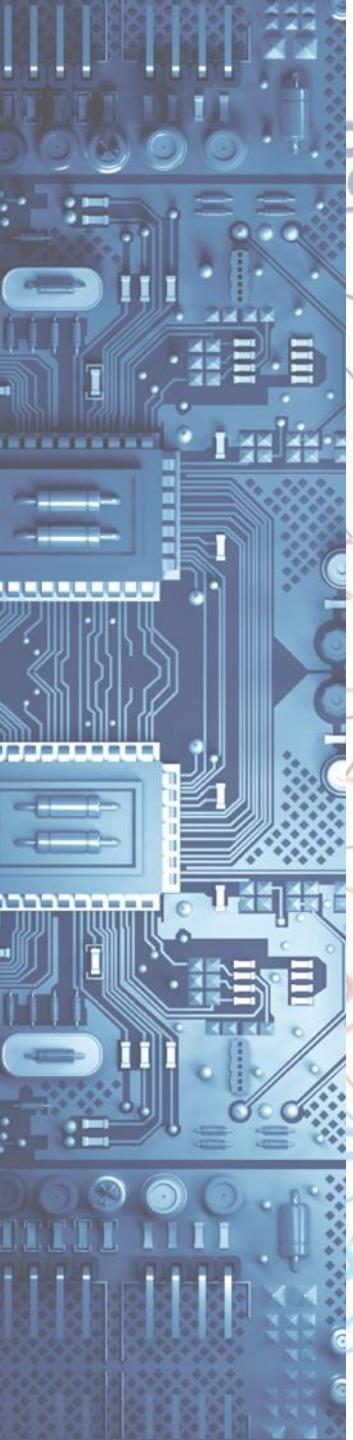
- June 2021 -El Salvador became the first county to recognize bitcoin as legal tender
- Currently legal tender in the U.S., Japan, the U.K. and others
- China heavily restricted bitcoin without criminalizing it
- India banned banks from dealing in bitcoin but left the legal status unclear
- ***It is necessary to look at bitcoin laws in specific countries***

Cryptocurrency in Japan

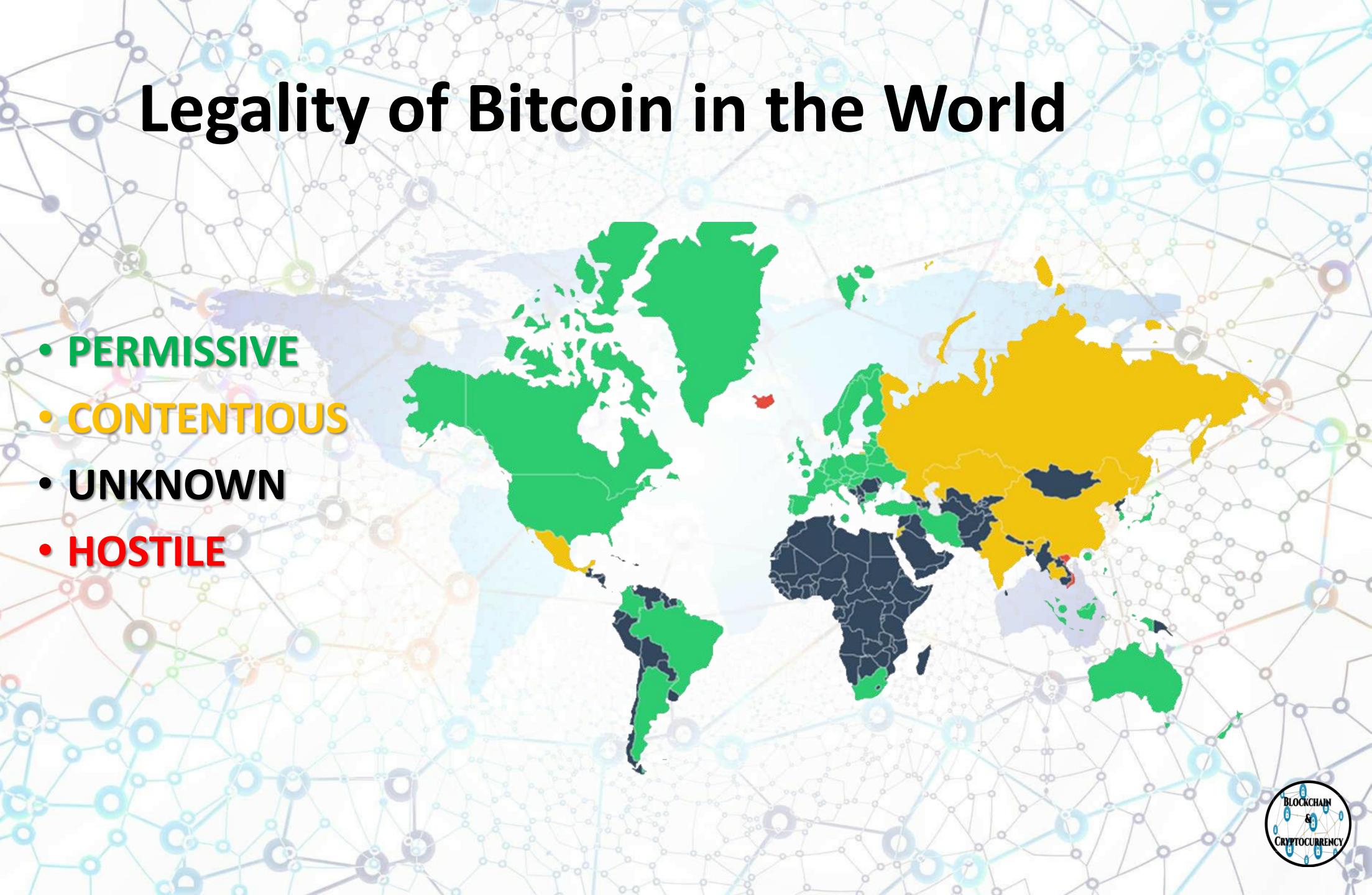


- Bitcoin / digital currencies are an OFFICIAL method of payment
- Exempt from Japan's Consumption Tax (Like a Sales Tax)
- Now Bitcoin is accepted at 260,000 + stores in Japan





Legality of Bitcoin in the World



- **PERMISSIVE**
- **CONTENTIOUS**
- **UNKNOWN**
- **HOSTILE**



What is Bitcoin?

- Software-based online payment system described by Satoshi Nakamoto in 2008 and introduced in 2009.
- There is no physical form, it is only created and held electronically.
- Can be used to buy things, and **is not much different than money**
- It can be divided into smaller unit called **Satoshi** (one hundred millionth of a bitcoin).



What is it based on?

- System is run using the Bitcoin Protocol
- Bitcoin has several features that set it apart from fiat currencies:
 1. It is decentralized
 2. It is easy to set up and it is fast
 3. It is anonymous
 4. It is completely transparent
 5. Transaction fees are minuscule
 6. Transactions are irreversible

A Bitcoin Transaction Example



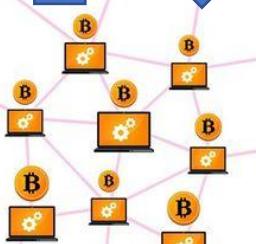
Jane



Private Key

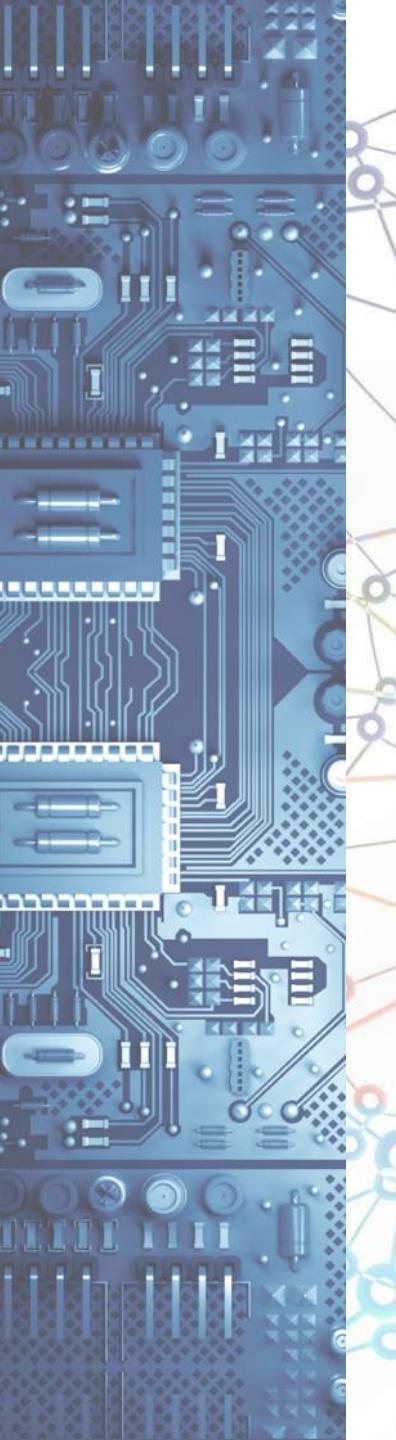


Public Key

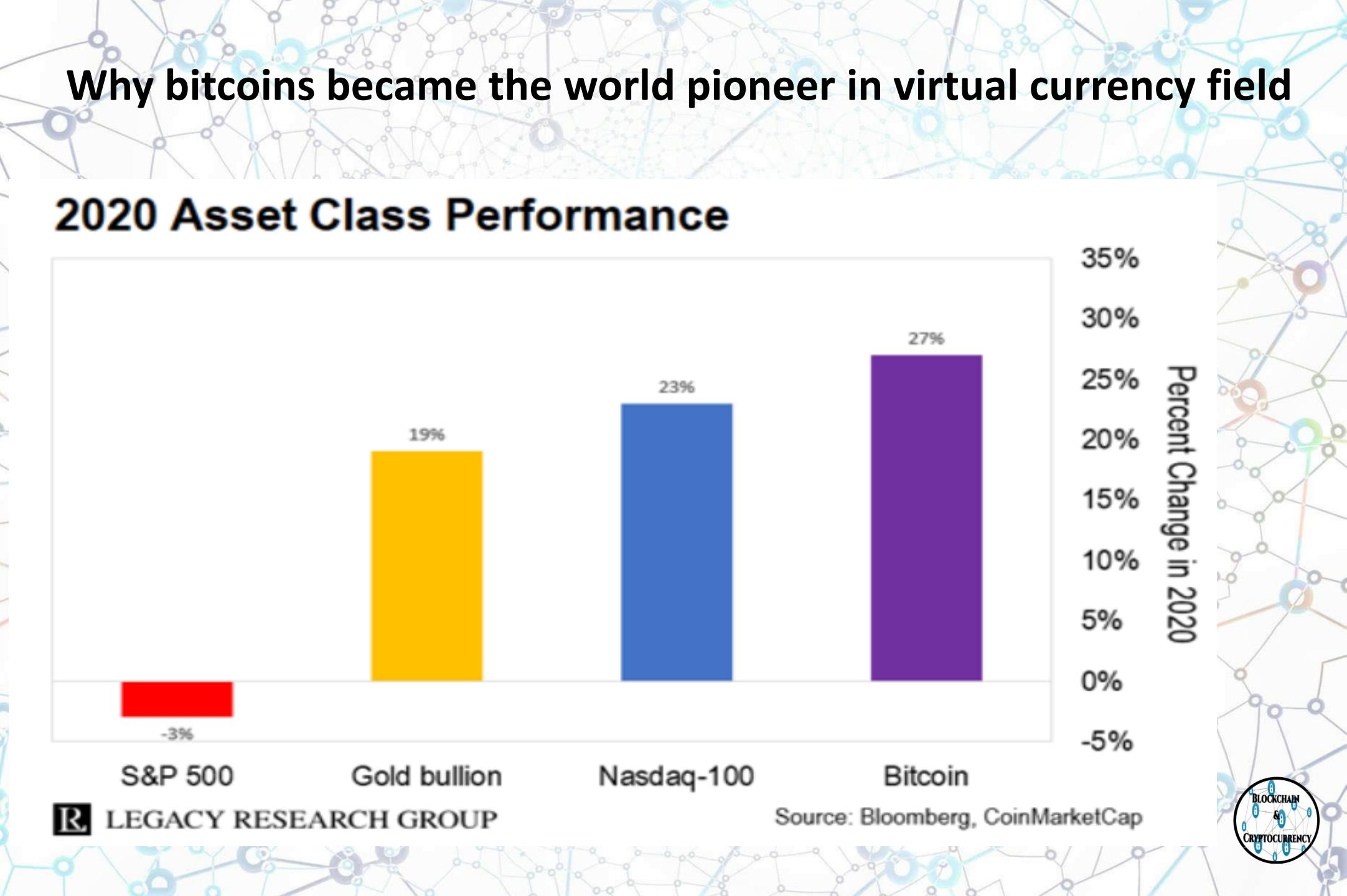


Steve

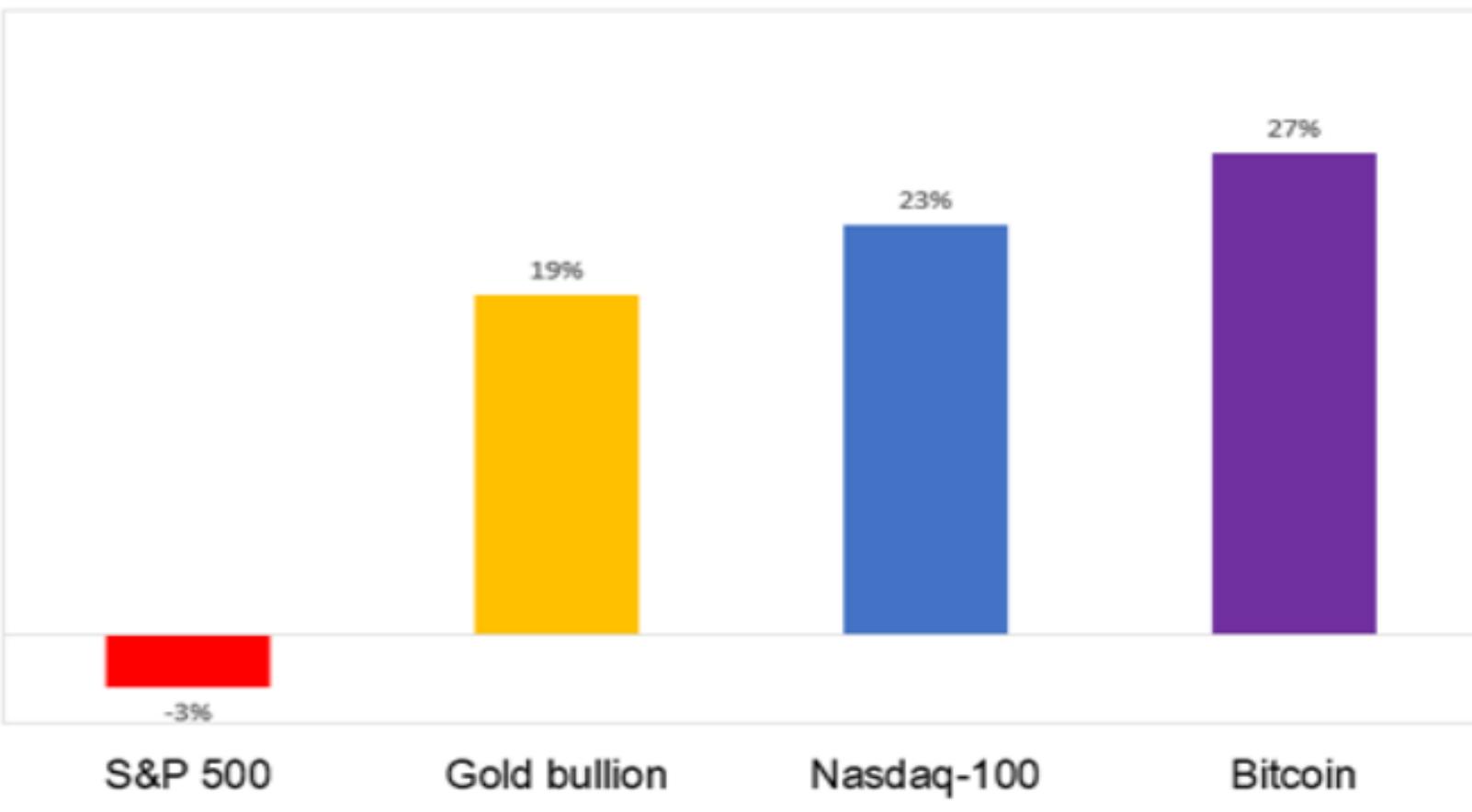




Why bitcoins became the world pioneer in virtual currency field



2020 Asset Class Performance



R LEGACY RESEARCH GROUP

Source: Bloomberg, CoinMarketCap



Bitcoin in U.S. Dollars

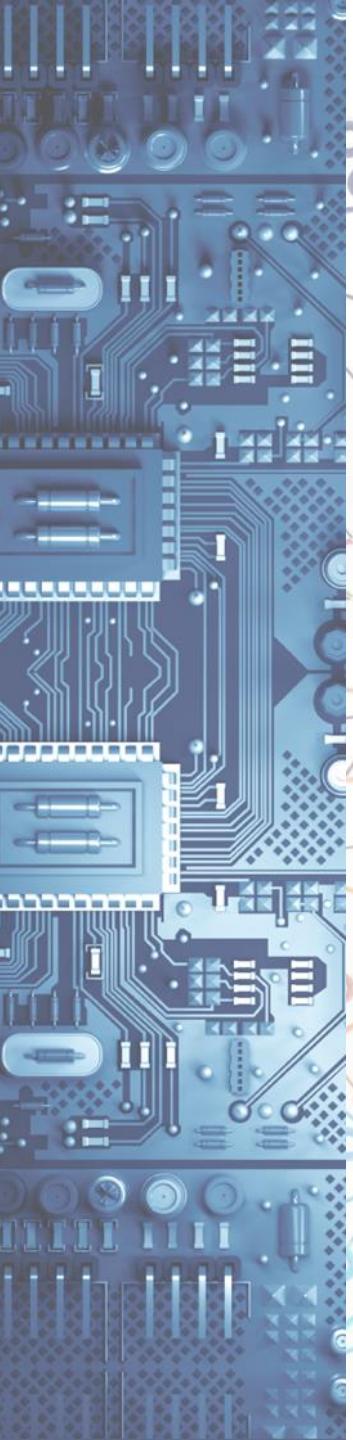
Bitcoin / U.S. Dollar ·

- Although there has been a lot of hype regarding bitcoin, it can be volatile.
- Bitcoin has seen long stretches of little or no growth, along with some dramatic increases and decreases.
- Depending on where you are in the cycles, it may be a good or bad investment.

2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

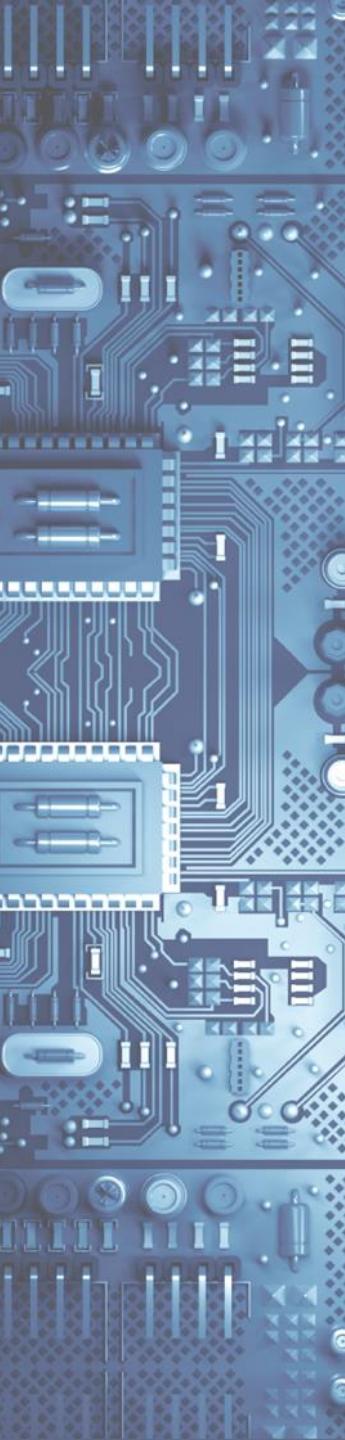
26000.00
24000.00
22000.00
20000.00
18000.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
-2000.00





Initial Coin Offering





What is an Initial Coin Offering?



- An initial coin offering is like an initial public offering (IPO)
- Both are a process in which companies raise capital
- ICO is an investment that gives the investor a crypto-coin, more commonly known as a coin or a token in return for investment
- Is quite different to the issuance of securities like an IPO investment.



How does an ICO work?



Crowdfunding

Innovator of
a project
with good
idea



Blockchain

Trusted platform
that enforces
contract/rules



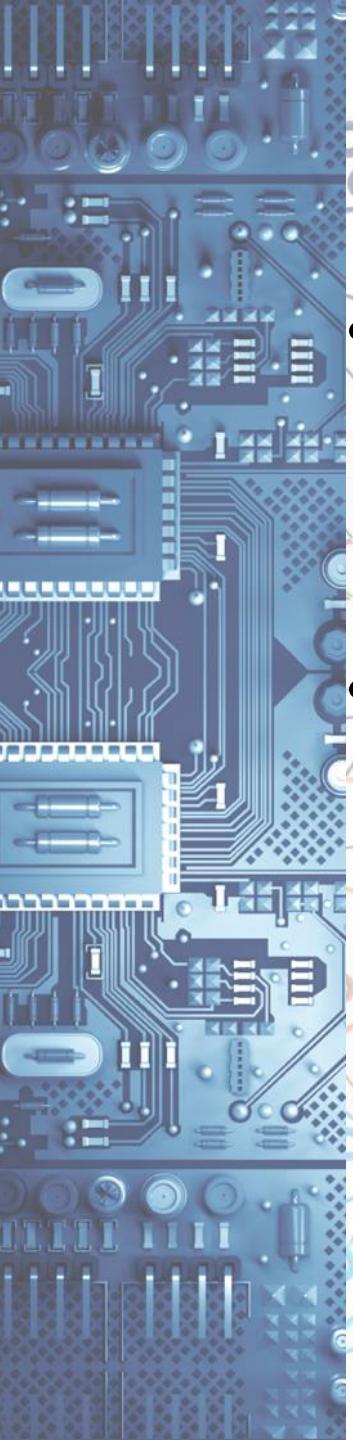
Cryptocurrency

Programmable &
Independent
Payment channel,
accessible globally

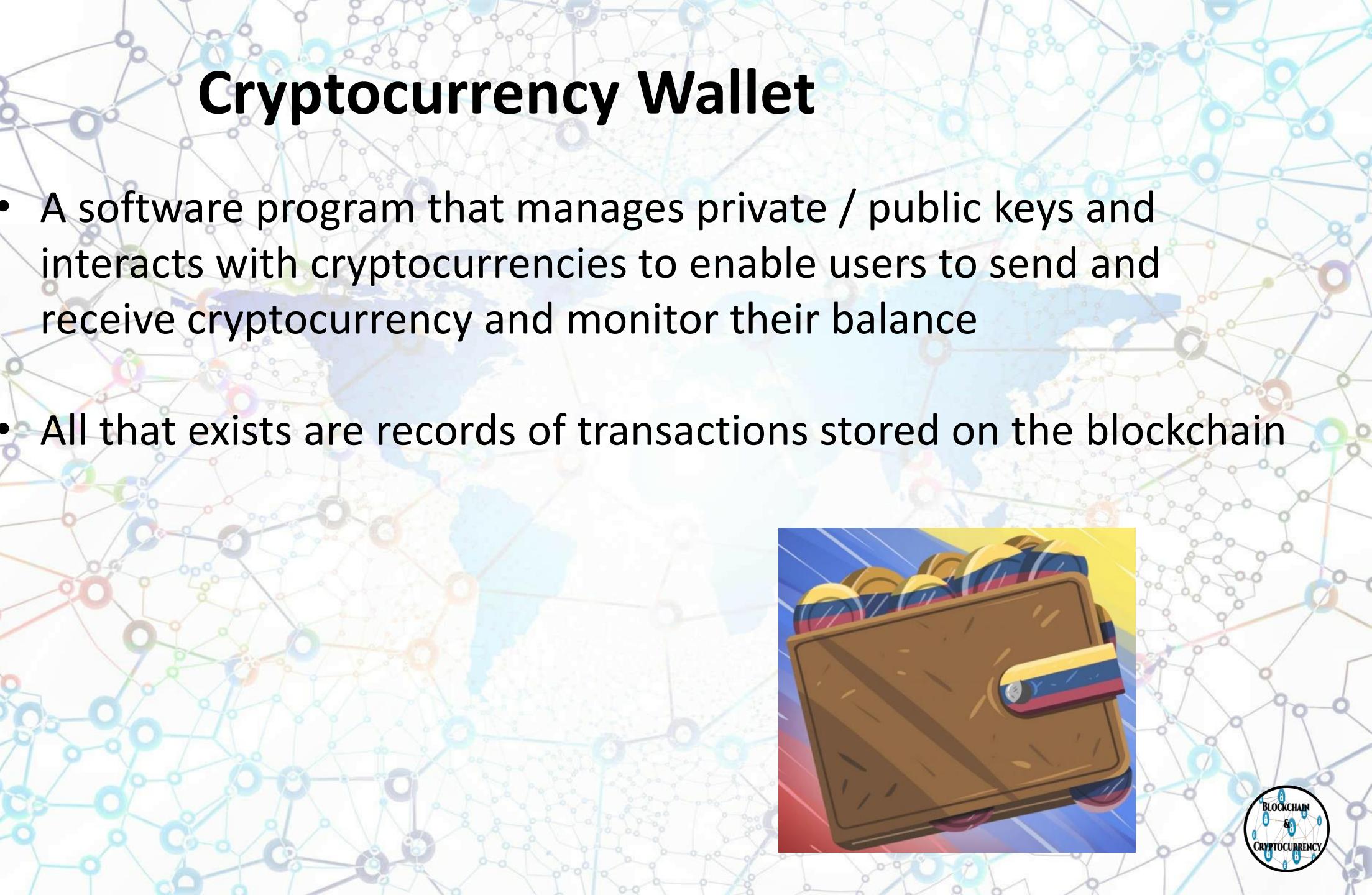
Some Cryptocurrency creator comes up with a good idea and will sometimes start a crowdfunding page to raise some initial capital

They then start the ICO process by establishing the blockchain and set up of protocols and rules, at which point an ICO date is announced.

They will need to join a Cryptocurrency exchange and have an account with the exchange to be able to buy the new cryptocurrency

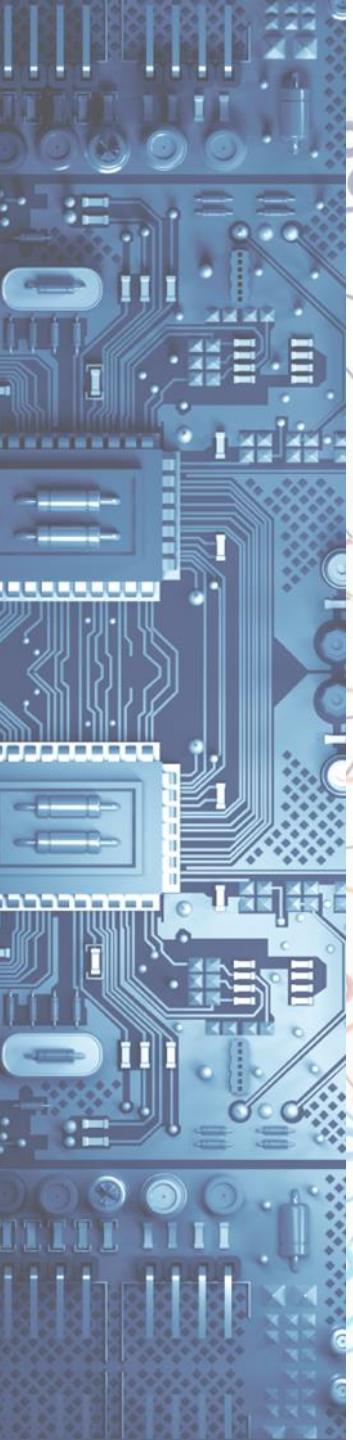


Cryptocurrency Wallet



- A software program that manages private / public keys and interacts with cryptocurrencies to enable users to send and receive cryptocurrency and monitor their balance
- All that exists are records of transactions stored on the blockchain





Different Types of Cryptocurrency Wallets



1. Desktop:

Software wallet installed on a PC



2. Mobile:

An on app on device like your phone



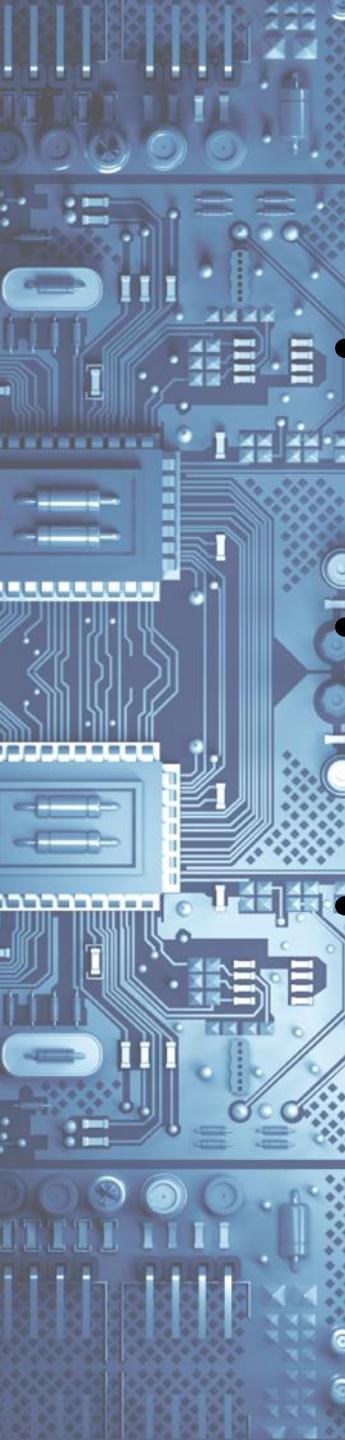
3. Hardware:

A device like a USB to store a user's private keys



4. Paper:

A physical copy or printout of your public / private keys



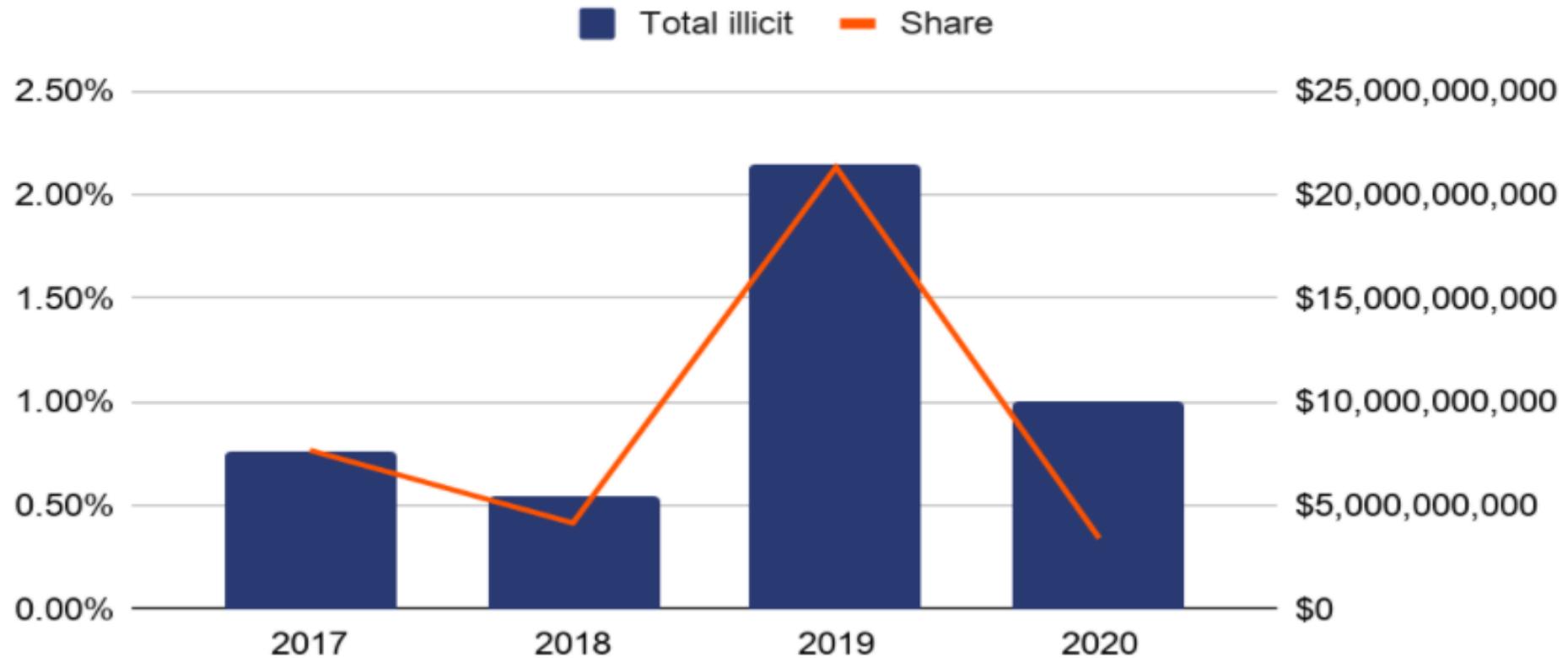
Are Cryptocurrency Wallets Secure?

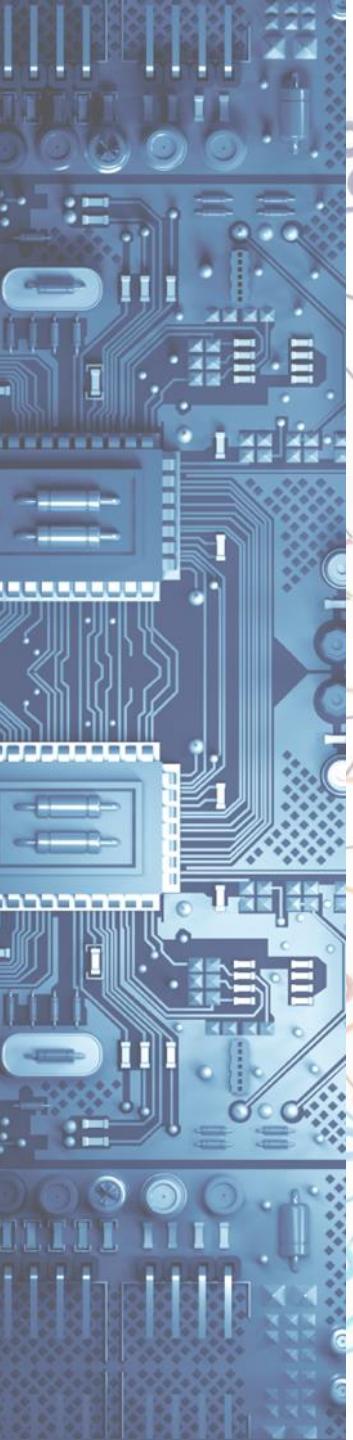
- Depends on the type of wallet you use (desktop, mobile, online, paper, hardware) and the service provider
- Could expose you to vulnerabilities in the wallet platform which can be exploited by hackers to steal your funds
- Remember that no matter which wallet you use, losing your private keys could lead to losing your money.



Criminals use of Cryptocurrencies

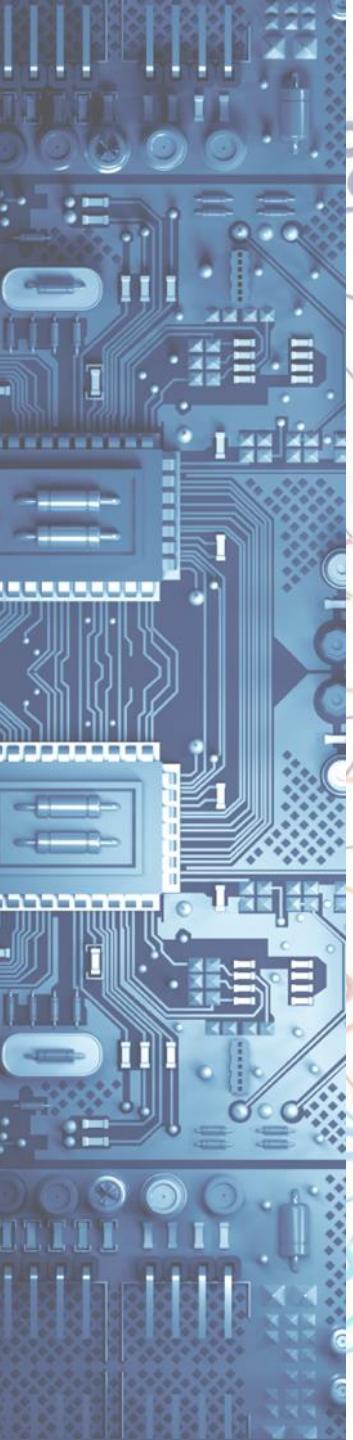
Total cryptocurrency value sent and received by criminal entities vs. Criminal share of all cryptocurrency activity,





Crypto-Currency Security Issues





Double Spending



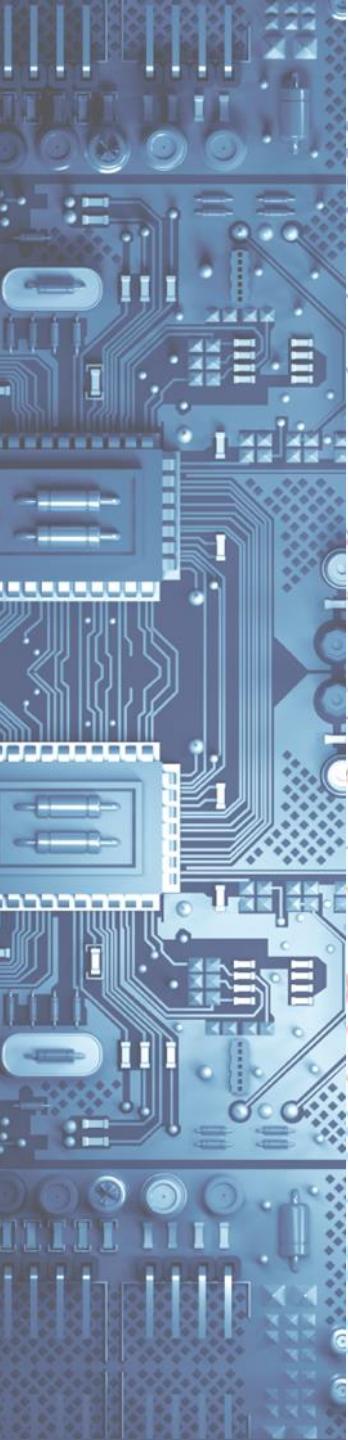
A double spend is an attack where the given set of coins is spent in more than once. There are a couple main ways to perform a double spend:

1. **Race Attack** -Send two conflicting transactions in rapid succession into the cryptocurrency network
2. **Finney Attack** - Pre-mine one transaction into a block and spend the same coins before releasing the block to invalidate that transaction.
3. **51% Attack**- Owning 51+% of the total computing power of the cryptocurrency network to reverse any transaction you feel like, as well as have total control of which transactions appear in blocks (remember consensus).

Cryptocurrency Scams



- **Shady Exchanges** – Lure trade from existing reliable exchanges
- **Ponzi Schemes** - Investors give money to a portfolio manager. Then, when they want their money back, they are paid out with the incoming funds contributed by later investors..
- **Pyramid Schemes** - the initial schemer recruits other investors who in turn recruit other investors and so on
- **Pump and Dump** - artificially inflating the price of a coin
- **Scam ICO's** – Coin Doesn't exist

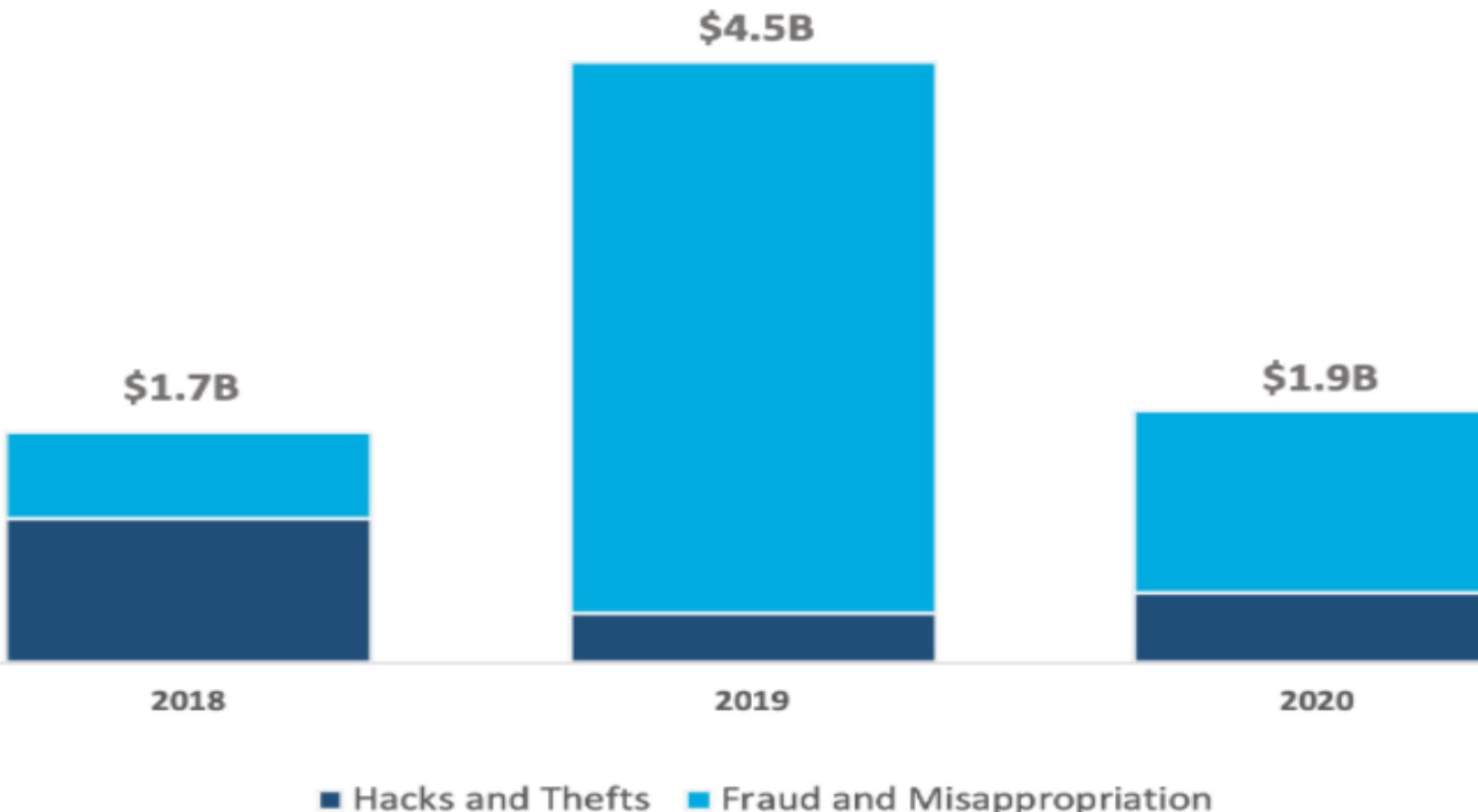


“Modern-day cybercriminals are increasingly using the dark web to facilitate cryptocurrency theft on a large scale.”

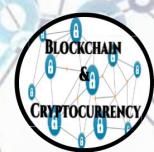
Carbon Black

Loss from Cryptocurrency-Related Crimes

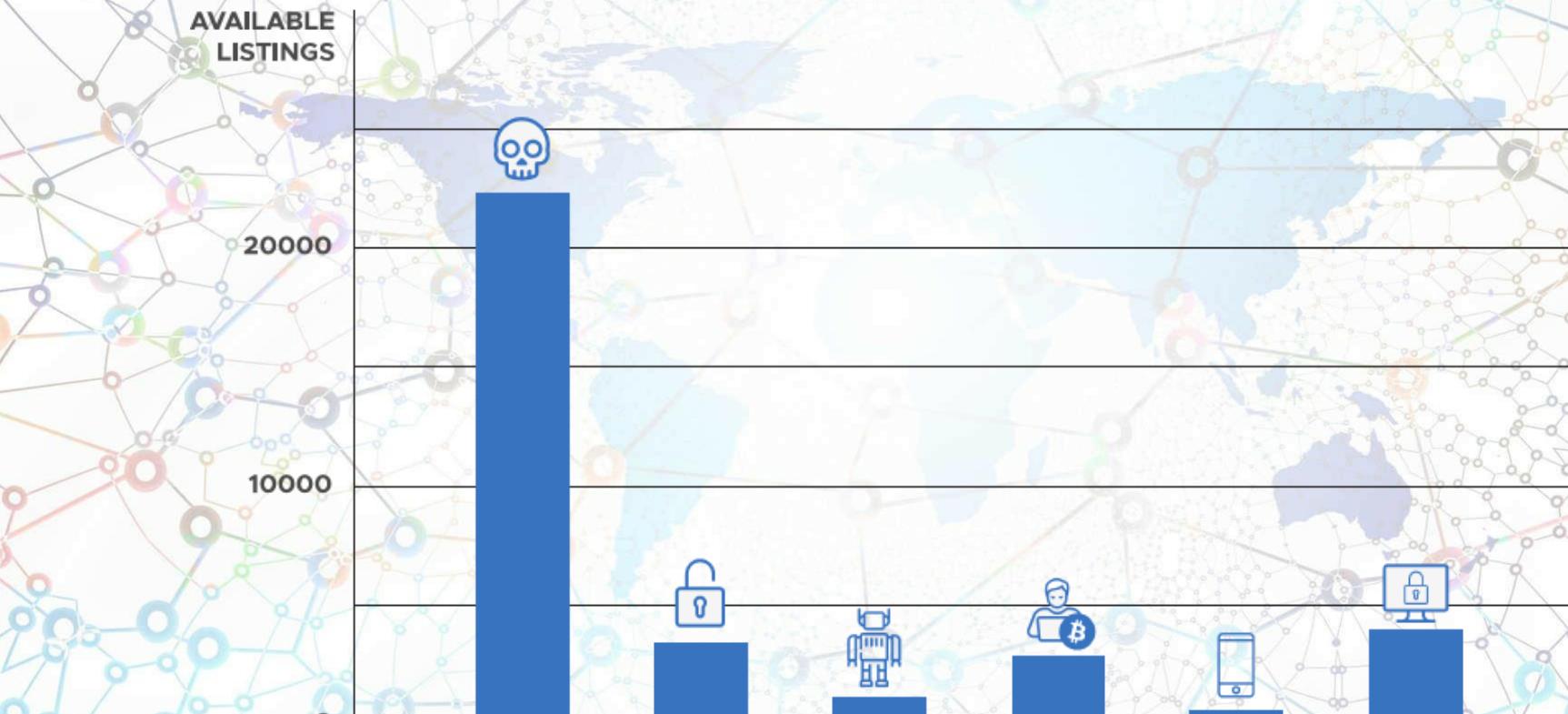
**Blockchain Fraud Continues to Vastly Exceed
Hacks and Thefts in 2020**



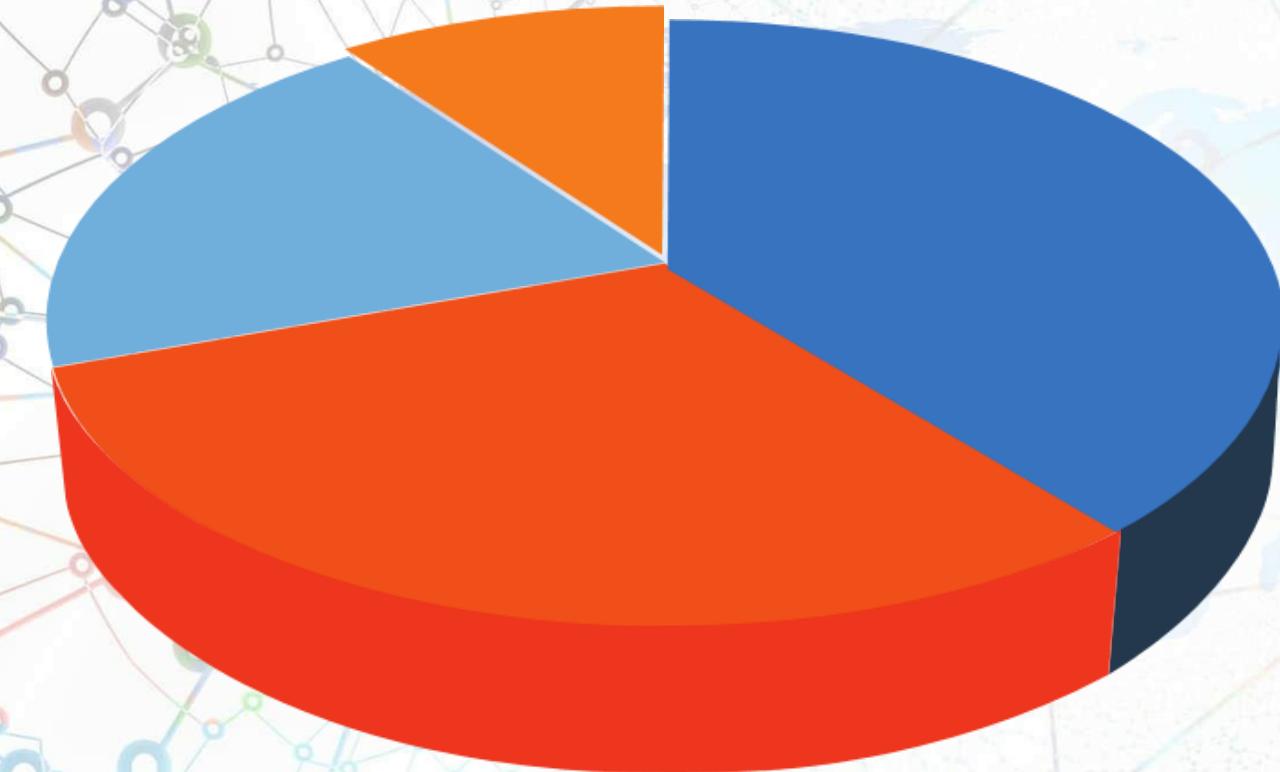
Source: CipherTrace Cryptocurrency Intelligence



Key Tactics, Techniques Most Favored by Cybercriminals



Most Targeted by Cryptocurrency-Related Attacks



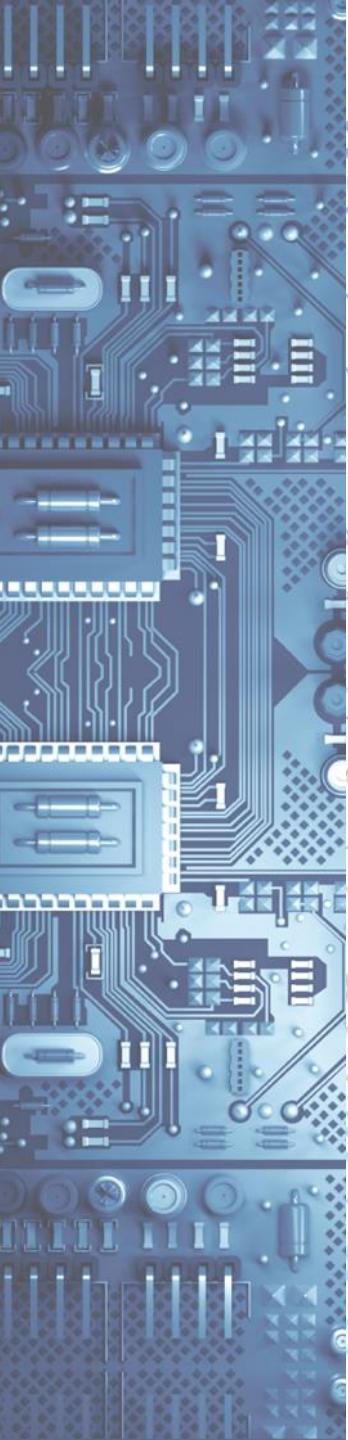
Exchanges

Businesses

Consumers

Governments

Source: Cryptocurrency Gold Rush on the Dark Web, Carbon Black, June 2021



Some Blockchain Players Today



Most Traded Cryptocurrencies Today (Sept 23, 2021)

#	Name	Price	24h %	7d %	Market Cap	Volume(24h)	Circulating Supply	Last 7 Days
1	Bitcoin BTC Buy	\$44,096.44	-4.18%	-7.43%	\$830,089,587,764	\$38,389,971,422 870,575 BTC	18,824,068 BTC	
2	Ethereum ETH Buy	\$3,130.31	-6.82%	-12.69%	\$368,424,168,836	\$22,218,075,354 7,094,515 ETH	117,642,540 ETH	
3	Cardano ADA	\$2.24	-5.77%	-7.82%	\$71,998,536,522	\$4,281,529,366 1,905,206,341 ADA	32,038,100,544 ADA	
4	Tether USDT Buy	\$1.00	-0.02%	-0.02%	\$68,622,126,147	\$79,782,024,177 79,756,422,763 USDT	68,600,105,856 USDT	
5	Binance Coin BNB Buy	\$378.68	-4.50%	-10.56%	\$63,657,292,678	\$1,698,463,695 4,486,126 BNB	168,137,036 BNB	
6	XRP XRP	\$0.9961	-5.85%	-9.16%	\$46,587,553,318	\$4,647,694,205 4,660,672,044 XRP	46,717,640,571 XRP	
7	Solana SOL	\$148.41	-8.63%	-4.18%	\$43,930,589,377	\$4,562,580,308 30,861,107 SOL	297,144,717 SOL	
8	Polkadot DOT	\$31.72	-6.92%	-9.05%	\$31,334,392,780	\$2,565,808,594 80,867,675 DOT	987,579,315 DOT	
9	USD Coin USDC	\$0.9999	-0.06%	-0.04%	\$30,202,280,858	\$3,586,613,610 3,587,414,626 USDC	30,209,026,084 USDC	
10	Dogecoin DOGE	\$0.2232	-5.75%	-6.79%	\$29,304,198,178	\$1,688,139,625 7,569,956,386 DOGE	131,405,897,241 DOGE	

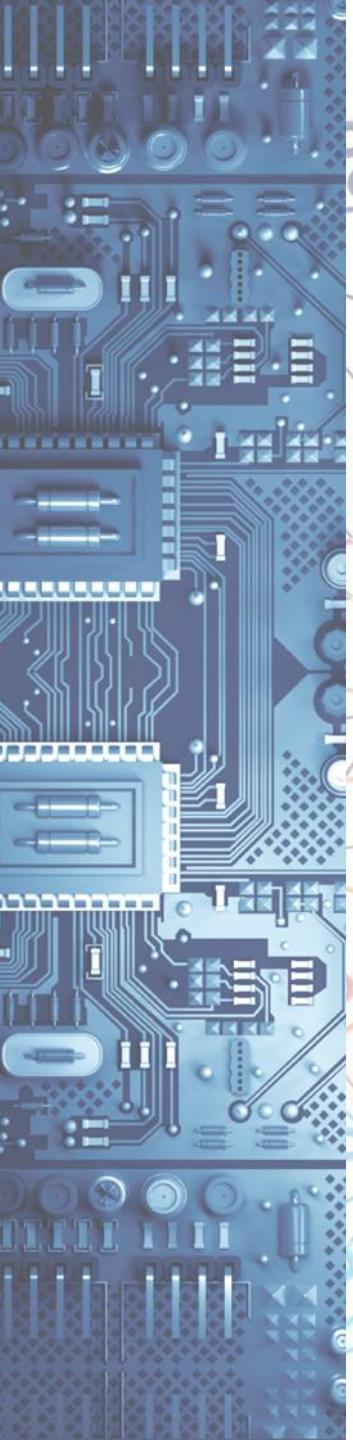
Most Watched Cryptocurrencies today (Sept 23, 2021)

#	Name	Price	24h	7d	30d	Market Cap	Volume(24h)	Last 7 Days
1	Nano Dogecoin INDC	\$0.00000007601	-11.67%	-8838.42%	-662.88%		\$346,852	
2	EpicHero 3D NFT EPICHERO	\$0.5266	+21.95%	+0.00%	+0.00%		\$549,121	
3	Catgirl CATGIRL	\$0.000000000033	+4.91%	+7.32%	+27.87%		\$7,975	
4	PlantVsUndead PVU	\$3.84	-11.39%	+61.58%	+82.32%		\$51,494,121	
5	RichQUACK.com QUACK	\$0.000000000058	+6.47%	+13.81%	+42.23%		\$40,233	
6	Bitcoin BTC	\$44,097.25	+3.80%	+7.45%	+9.35%	\$830,089,587,764	\$38,389,971,422	
7	Cardano ADA	\$2.25	+5.61%	+7.57%	+17.94%	\$71,998,536,522	\$4,281,529,366	
8	Ethereum ETH	\$3,131.73	+6.64%	+12.65%	+3.56%	\$368,424,168,836	\$22,218,075,354	
9	Smooth Love Potion SLP	\$0.07901	-30.51%	+7.20%	+44.60%	\$169,489,461	\$488,593,111	
10	SHIBA INU SHIB	\$0.000007572	+8.09%	+14.84%	+1.57%	\$2,989,455,050	\$377,118,607	



Blockchain For Fintech





Why blockchain In Fintech?

“How seriously should we take this? I would take it as seriously as we should have taken the concept of the Internet in the 1990s.”

—Blythe Masters



Blockchain Potential Fintech Disruption

Blockchain has the potential to disrupt several the traditional process areas in the Financial Industry

Smart Contracts

As it relates to things like escrow and digital rights

Digital Currency

When you talk about payments, remittance, and Microfinancing

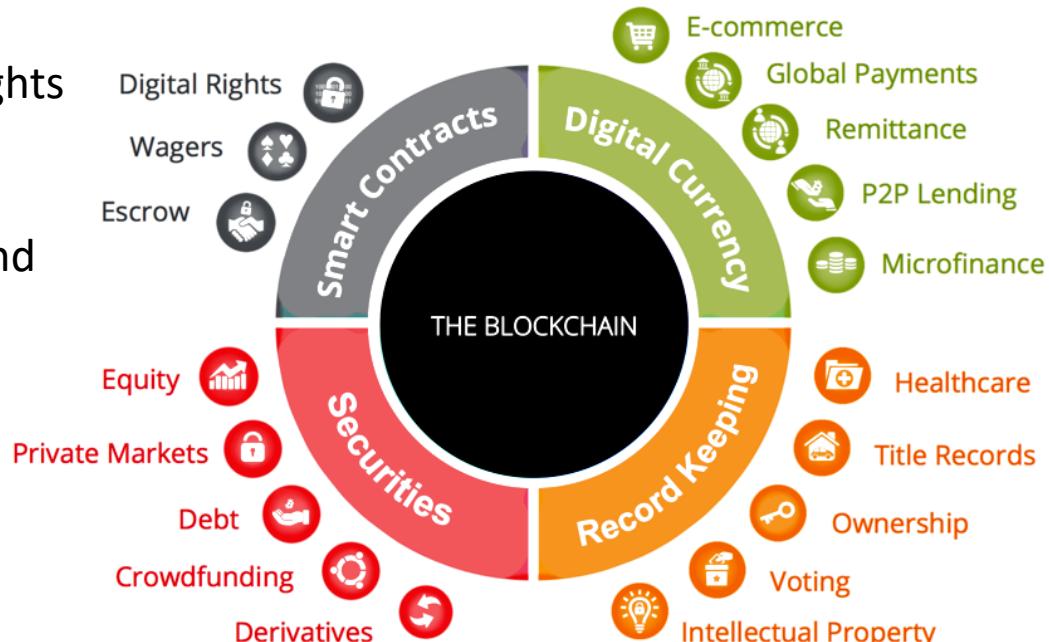
Records Keeping

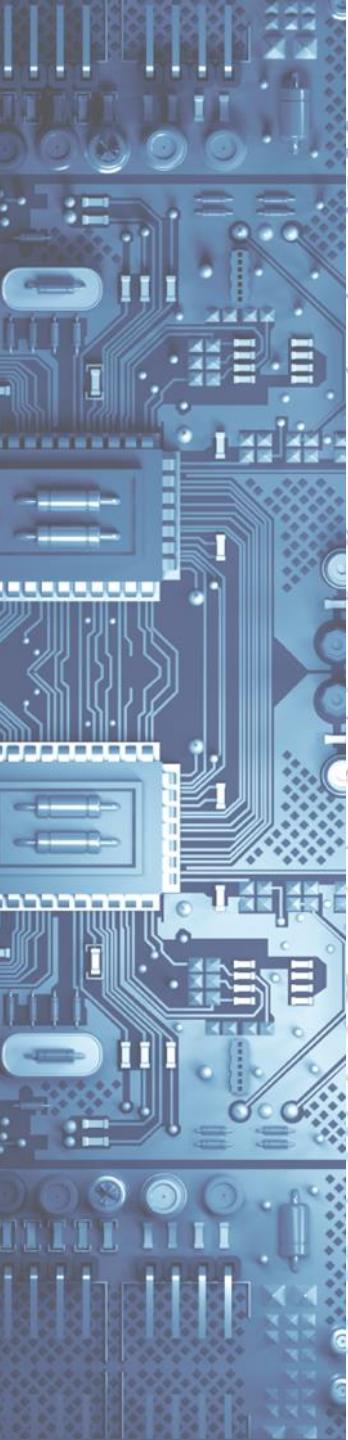
For things like Title records, ownership, and intellectual property,

Securities

As it relates to Crowdfunding, derivatives, and Private markets

The blockchain is radically changing the future of transaction based industries



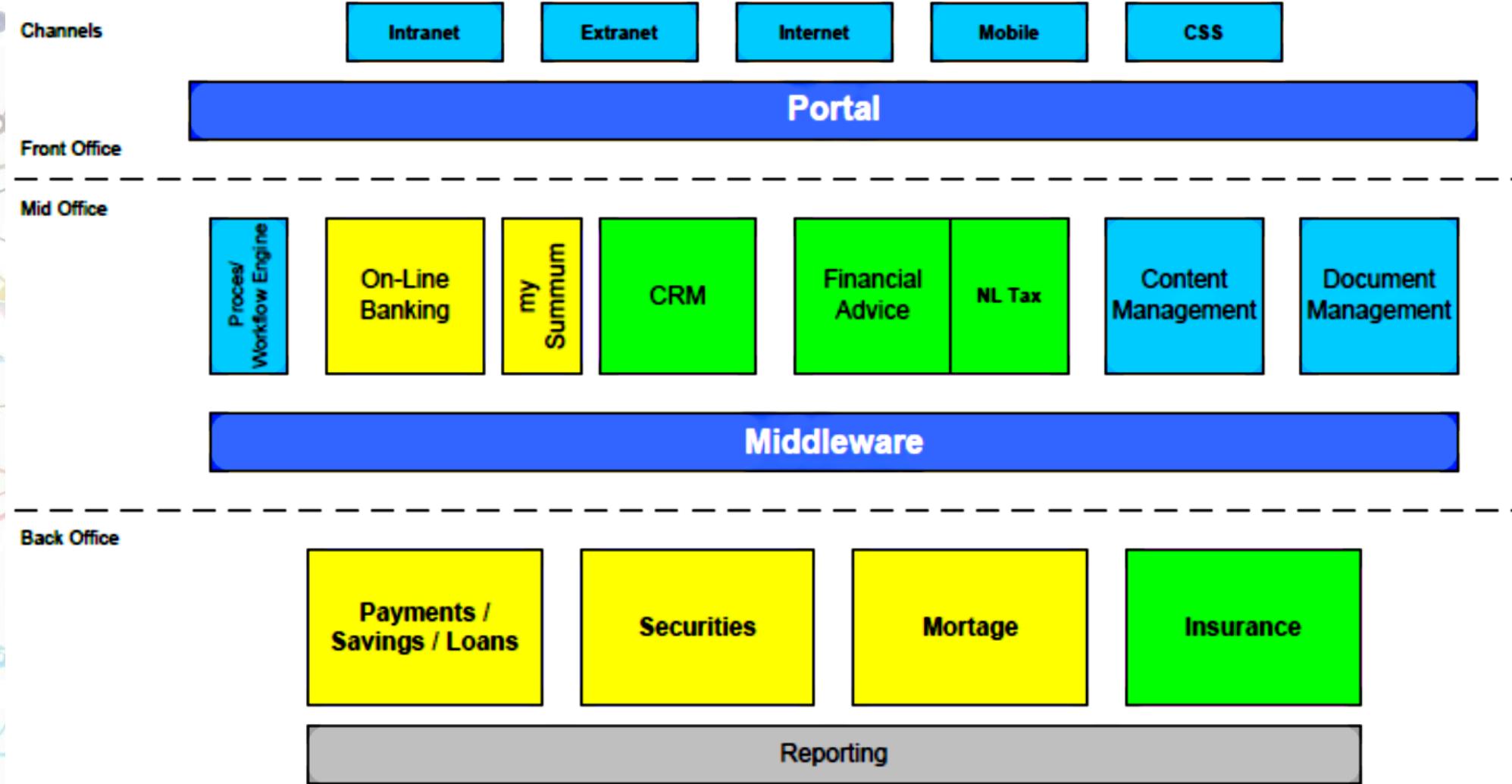


TOGAF – Diagrams that might help tell your story

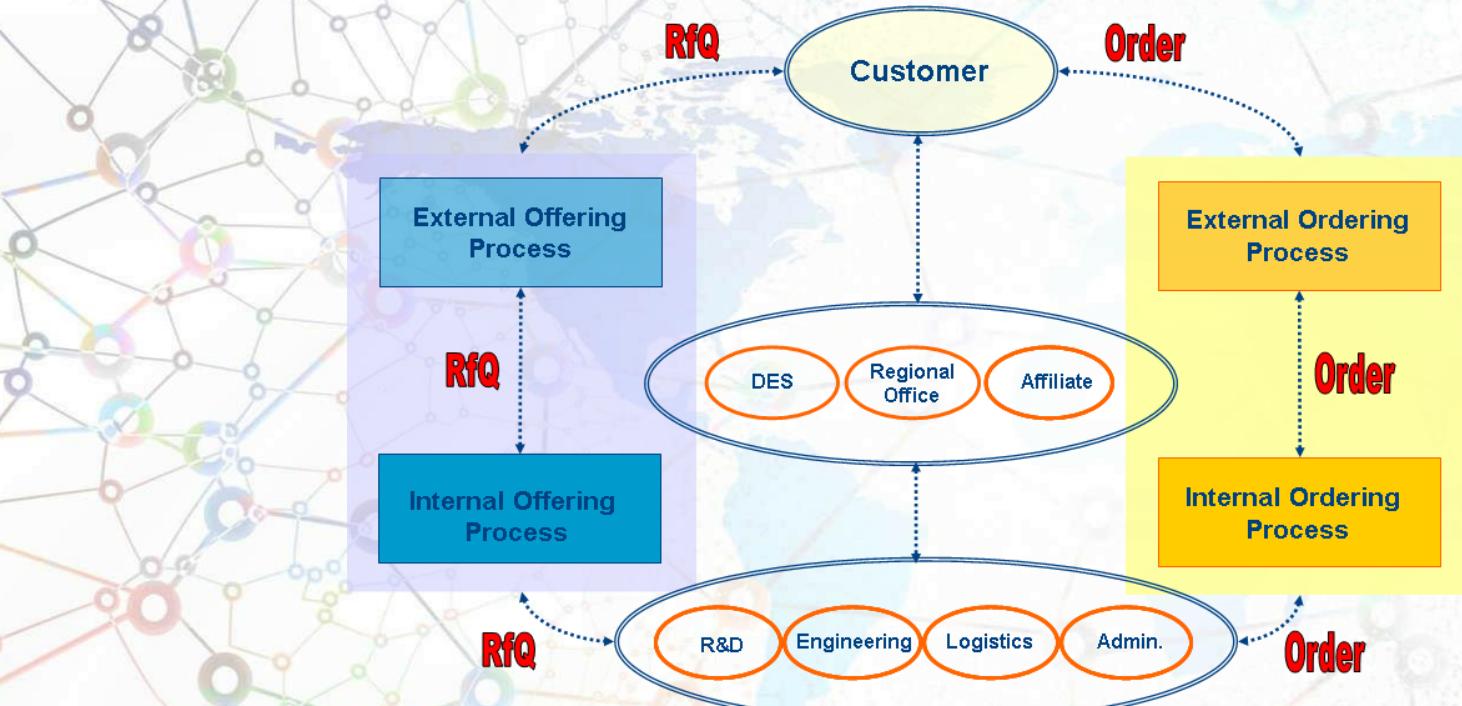
Value Chain Diagram



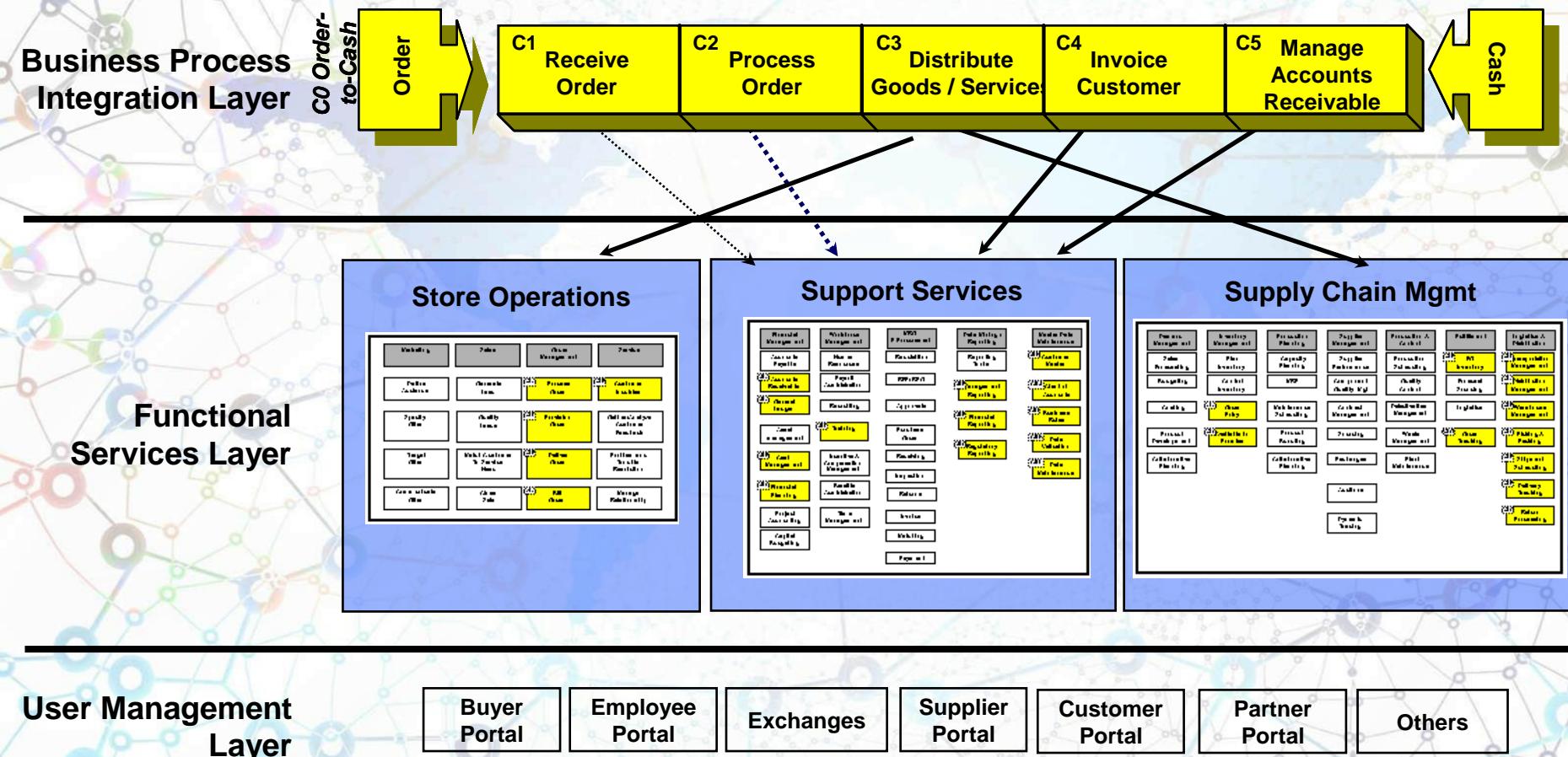
Solution Concept Diagram



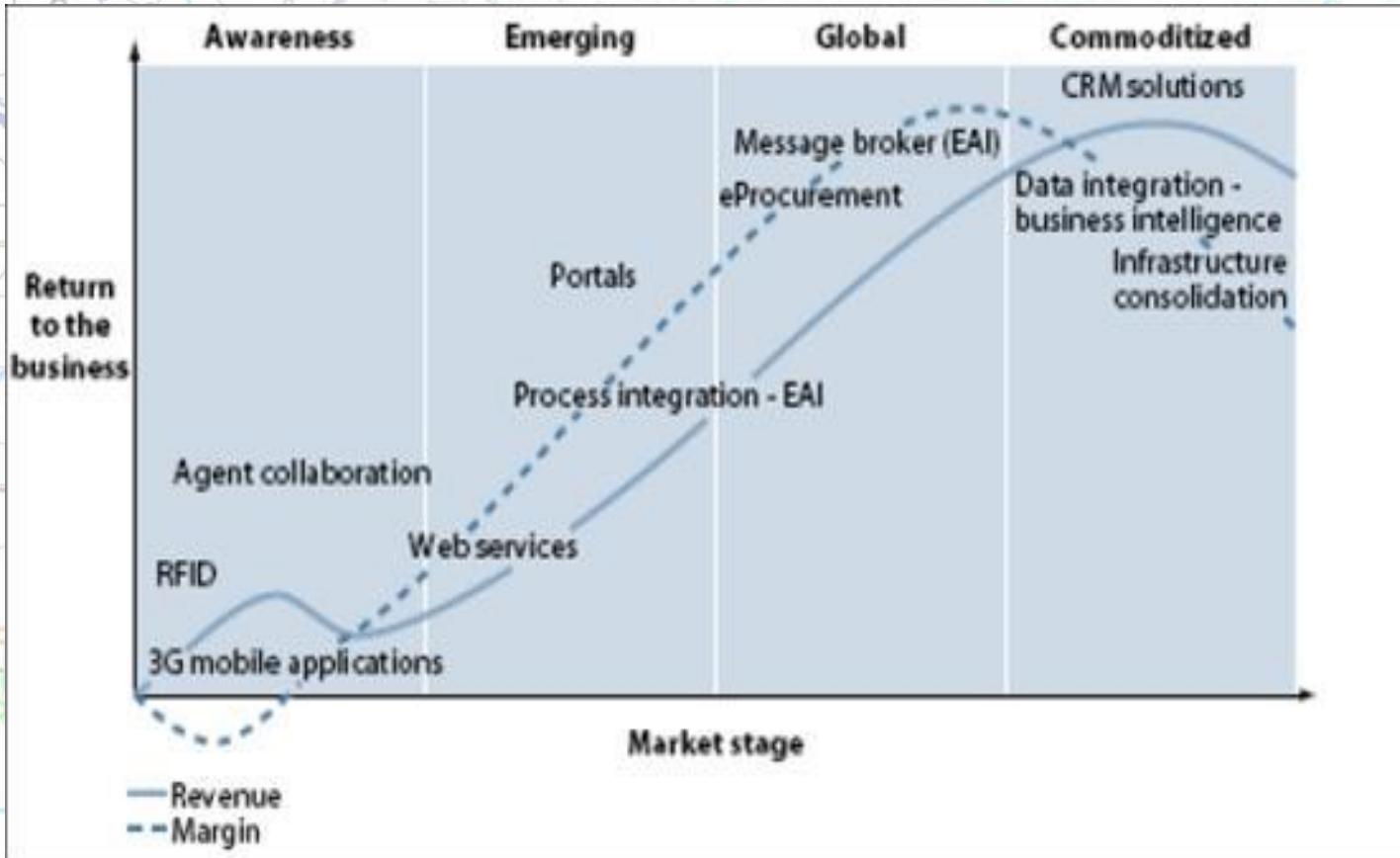
Project Context Diagram



Business Footprint Diagram



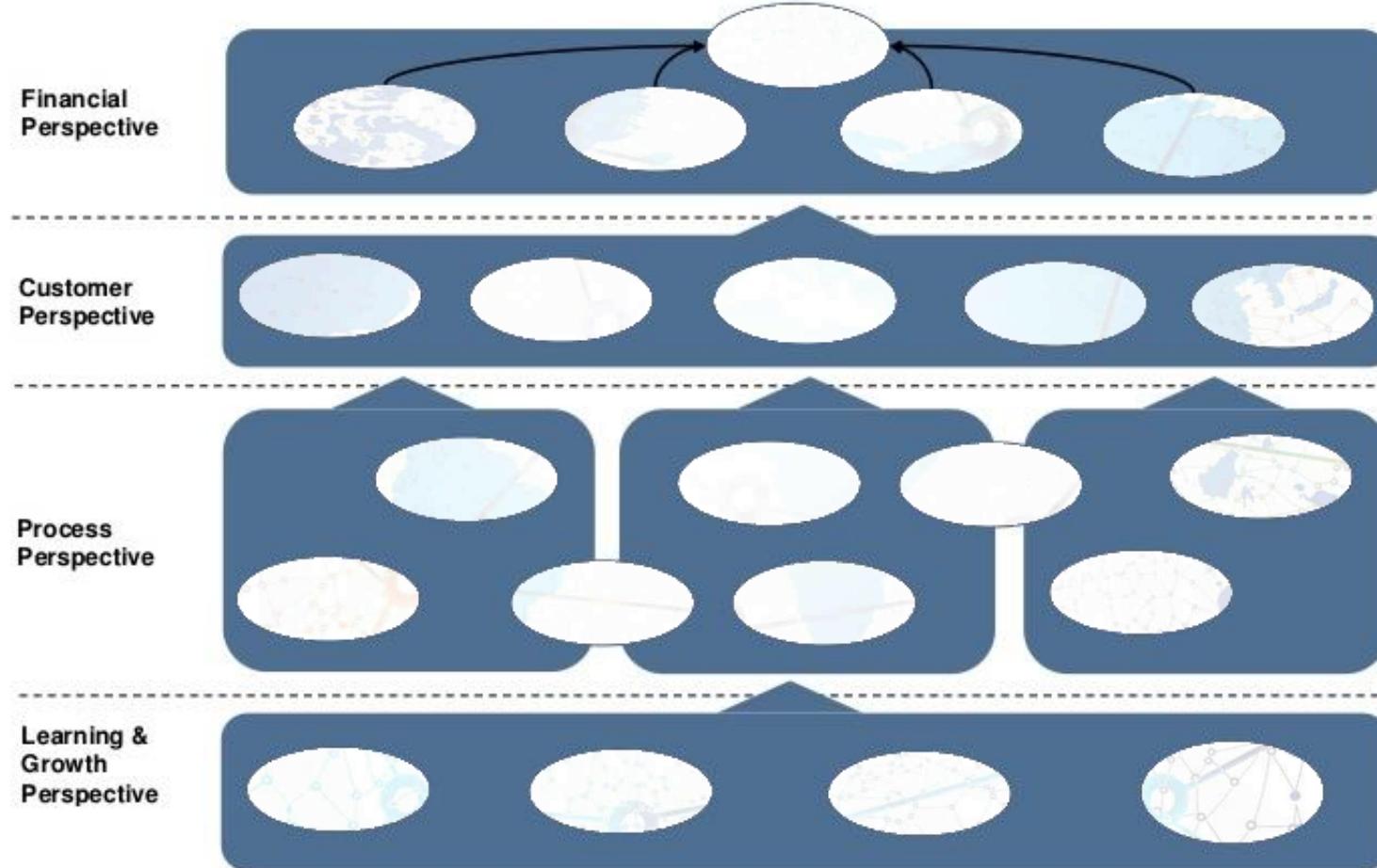
Product Lifecycle Diagram

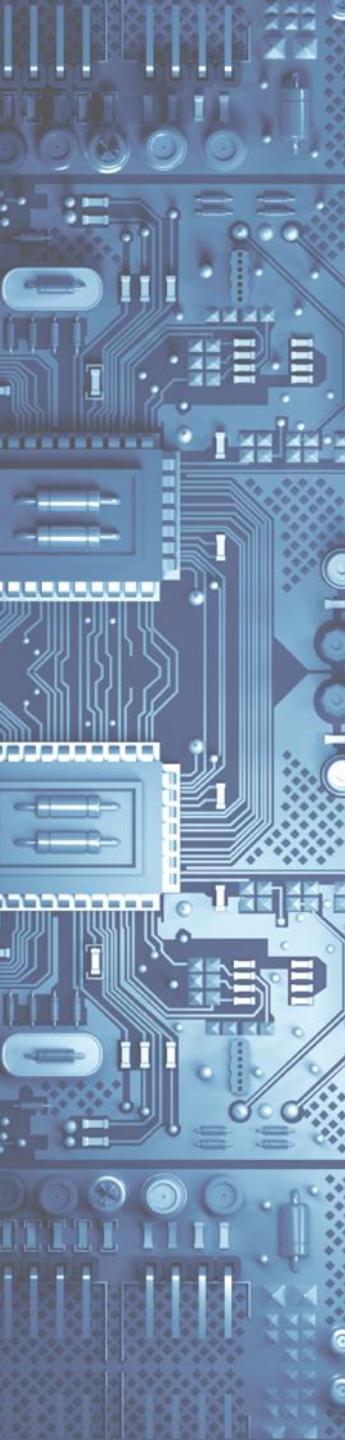


Operating Model Diagram

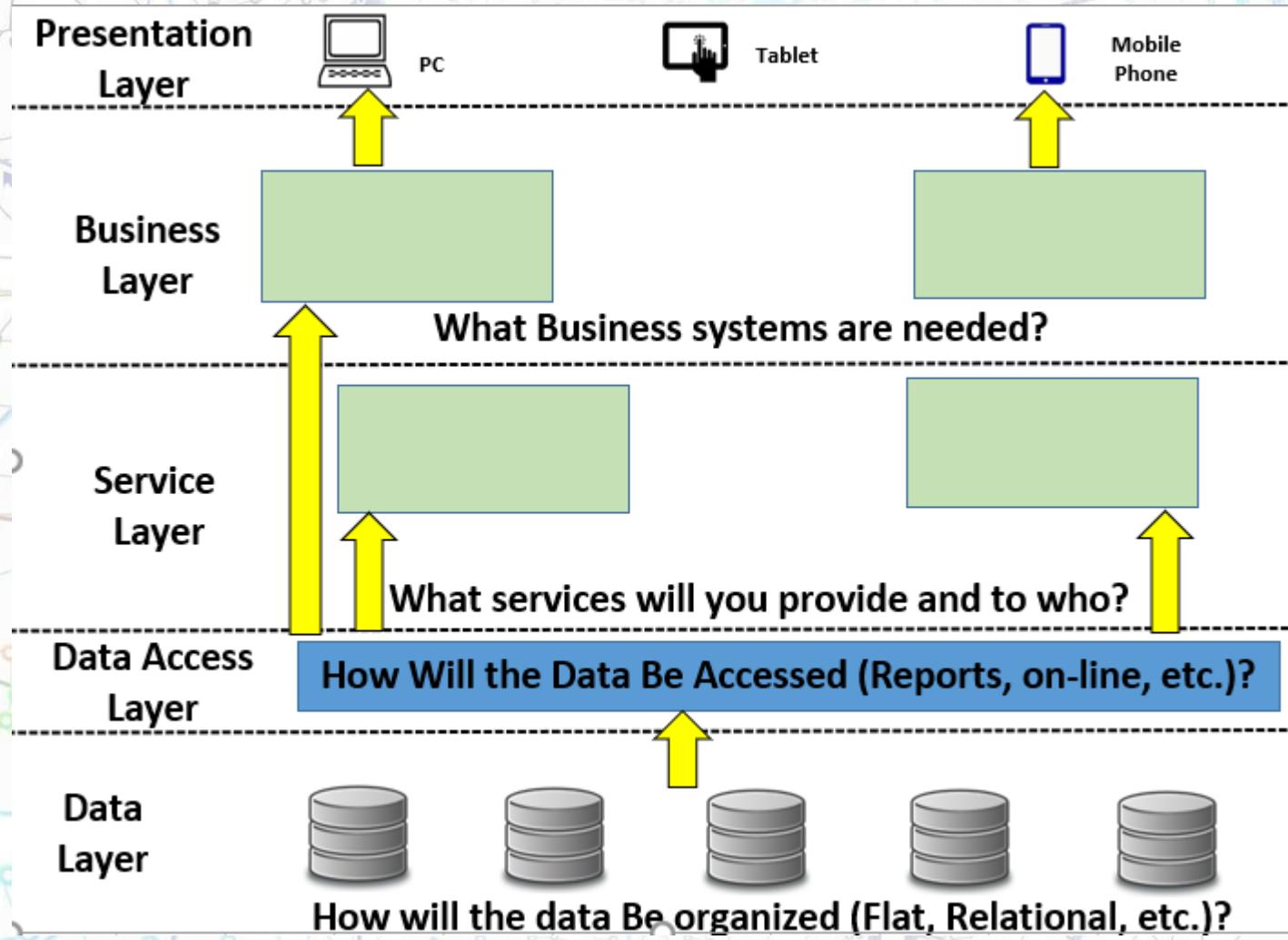
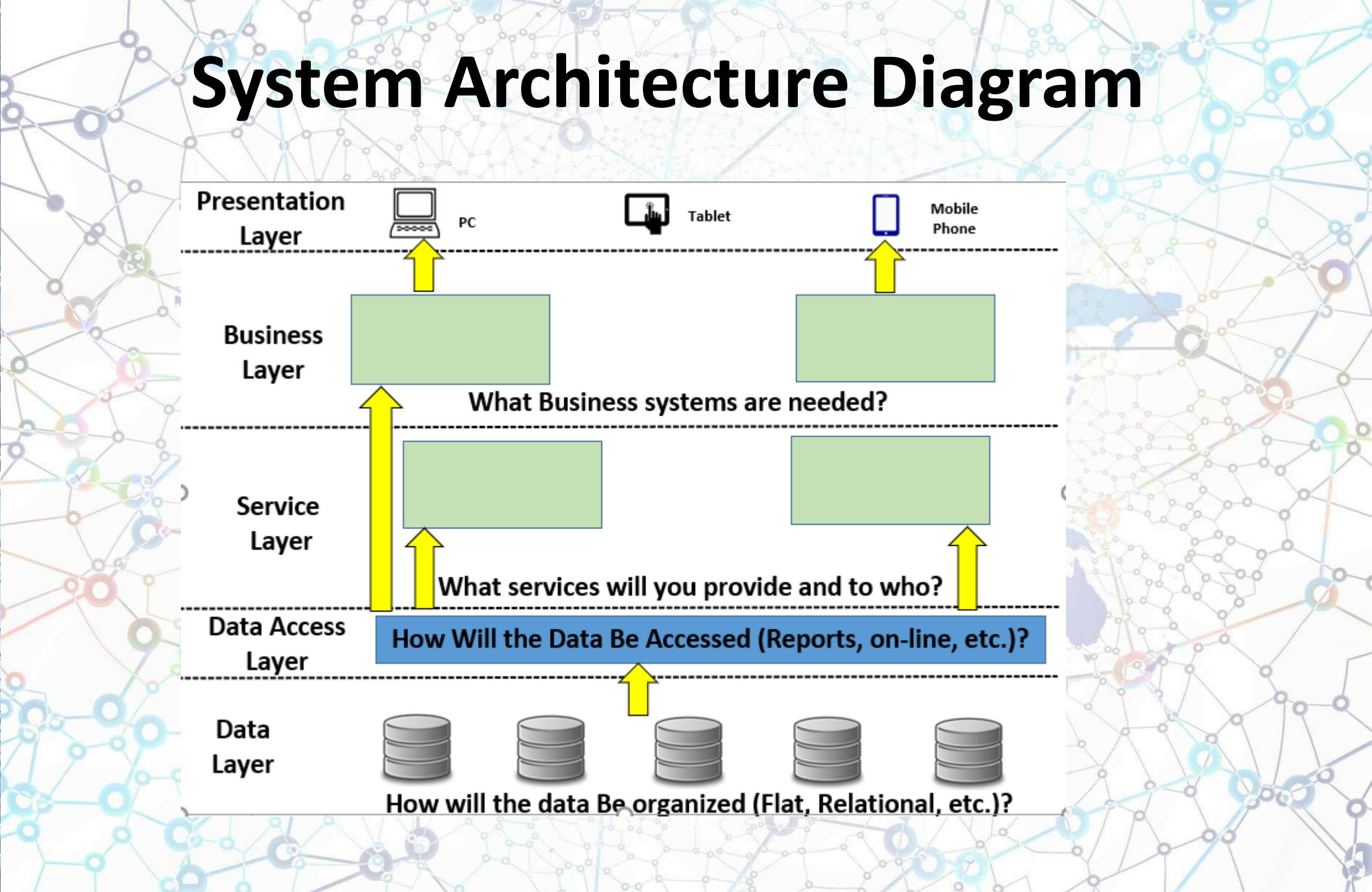
CURRENT STATE (as is) or FUTURE STATE (to be)					
Key Partners 	Key Activities 	Value Proposition 	Customer Relationships 	Customer Segments 	
1. List their partners here 2 3	1. Describe their key product support activities here (ie. manufacturing, distribution, marketing, etc.) 2 3	1. Insert their value propositions here. What do the customers get for their spend? 2 3	1. Describe how they establish and manage the relationship between the customer and their brand. 2 3	1. Describe their target customer segment. 2 3	
Key Resources 	Risks 	Channels 			
1. List the key resources available to them here to support the activites. 2 3	1. List their current and/or potential risks. 2 3	1. Describe 1) how they acquire customers, 2) how they deliver their value proposition to them and 3) how they communicate with their customers. 2 3			
Cost Structure 	Revenue Streams 				
1. Describe their cost structure here (fixed, variable, and % of each) 2 3	1. Describe their revenue streams here. What are he methods by which money comes into the company? 2 3				

Project Strategy Diagram





System Architecture Diagram



Using PowerPoint Templates to Build Templates

