An NFT digital art collection proudly owned by Heyokha Brothers' team member

Into the matrix!

"He is free to evade reality, he is free to unfocus his mind and stumble blindly down any road he pleases, but not free to avoid the abyss he refuses to see."

-Ayn Rand-

Special Edition - 1Q 2021

Inside the Rabbit Hole

Into the matrix!

In light of the recent cryptocurrency mania, many wonder how DogeCoin, a virtual coin that was initially invented as a joke and has no use case, could be more valuable than General Motors and Indonesia's most valuable company, Bank Central Asia.[1] Is such valuation warranted by fundamentals or is it just straight *mental*? It sure feels like a speculative frenzy, but what we are more interested in is the underlying blockchain technology.

Most people thought about crypto when we mentioned digital assets. It is more than that.

In this special issue quarterly, we will explore digital assets and Web 3.0 with emphasis on their technological developments, impact, and potential investment implications.

This report is organised into four parts. Readers who have a good grasp of the digital asset context can proceed to parts 2, 3, and 4 immediately.

The first part introduces digital assets, including definitions, value propositions, comparisons with other asset classes, as well as observable proxies to track the development of the ecosystem. The second part discusses the evolvement of Web 3.0 and how it will change the business and investment landscapes, encompassing digital and virtual assets. The third part discusses investment strategies suitable for digital assets and the fourth part discusses investing in the evolving landscapes with some predictions on what to own and what to avoid along the way.

Walking besides the new kings and queens of Wall Street and *the Matrix* (i.e- the influencers), we would like to remind readers that we are not providing any financial advice. This is an educational research on developments in the digital asset and Web 3.0 technology space.

Without any further due, let us explore the rabbit hole.

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[1] DogeCoin had a USD 87 bn market cap as of May 5th, 2021. Meanwhile, General Motors and Bank Central Asia market cap were USD 80.3 bn and 54.5 bn respectively.

Summary

We are now living in the Web 2.0 era where the internet has redefined our way of living through connectivity, content, and commerce (3Cs).

Under the regime of the 3Cs, tech entrepreneurship has led to centralised wealth and power. Decentralised network technology and regulators effort might reverse the trend as we have discussed in our 4Q20 report.

Decentralised ledger technology to be the foundation of tech-driven decentralisation

We are of the view that the advent of decentralised ledger technology (DLT) would be the foundational technology that drives decentralisation trend.

Data modification, storage, and validation will be done in a decentralised manner through a consensus-driven protocol. Since data is spread to several nodes, the design maintains a robust database integrity.

There is no single point of failure. This in contrary to the existing centralised data ledger with a single point of failure where hackers could simply attack the central node to dislocate a network.

Blockchain is an example of the decentralised ledger technology which has become the bedrock of crypto currencies. The recent hype on crypto currencies has led to a fully-fledged euphoria that eventually led to crash in May 2021.

Even though we are skeptical about crypto asset valuations, we believe that the underlying technology has enormous potential. As the security and efficiency value proposition is high, we also believe that further adoption of blockchain is inevitable.

Digital assets: an emerging asset class

One of the subsequent developments based on DLT are digital assets that exist and stored in the computing network. It is comprised of tokenised asset (digital ownership representation of a real asset) and virtual asset (a digital asset native created in computer space, which has no underlying physical asset).

The digital asset class is both new and could act as an umbrella asset because many asset ownership rights could be represented digitally through a tokenisation process. This process enables fractional ownership of the respective asset, improving liquidity and reducing the barrier to own such asset by lowering the size of the investment.

Thanks to the wide adoption of smartphones and the internet, today's tech adoption curve has never been steeper. On its path to mass adoption, Digital asset class regulation is inevitable. The question is whether such regulation will be accommodative or restrictive.

Today, regulators are still attempting to define digital assets. The definition would determine the law that governs the asset. As regulators would see substance over form in their definition, so do our preferred approach because digital assets can have multiple utilities that blur their core definition.

In respect to the valuation, tokenised assets could be valued in reference to the underlying assets (i.e- equities, bonds, real estate, etc.). For virtual assets, we believe that the asset's utility sets the upper limit of value (not price), which would be the core driver of users who then creates monetary value, meanwhile, cost would set the lowest value of any virtual asset.

Our observation in the crypto rabbit hole suggests that the virtual and real world have co-existed but disconnected. Crypto exchanges and decentralised apps would be the bridge of both worlds. However, the latter are still in their infancy and do little to connect the real and virtual world.

Web 3.0 will redefine the business landscape

Web 3.0 could be defined as a semantic spatial web that is built on the ability of machines to read and interact more contextually with humans (artificial intelligence driven), distributed data infrastructure (DLT), and edge computing infrastructures. The lines between the virtual- and the real would be blurred as a result.

In Web 3.0, on-chain business (business run on chain of blockchains) would become the new distinct differentiator, as being online is already a norm. The network is the business and a company

may only exist in semantic form, virtually represented, and decentralised. This model extends to all forms of organizations and affects all stakeholders.

Web 3.0 business is not about a novel business model but the adoption of the enabling technologies (AI, DLT, and edge computing).

For investors, digital assets would be an essential asset class to invest once businesses are run on Web 3.0 because many asset classes would have been tokenised. Virtual assets such as crypto currencies would be utilised based on their network purposes, businesses would be run on smart contracts, and decentralised applications would take a major role in our lives through finance, social networks, search engines, and many other things.

With such prospects, we believe that the disruption would be huge and painful for some.

However, the value Web 3.0 may bring can be even bigger, comprising the value of ultimate trust, protection, freedom, and governance.

As well as the values of network effect that benefit all, not some. Incumbent institutions whose business model is based on providing such values will be among the first to be disrupted if they do not change, with the financial industry being in the forefront.

A wave of new entrepreneurs (millennials) will experiment with alternatives to change the world by addressing the pain points in every corner.

Web 3.0 would be the tipping point of tech-driven decentralisation as a consequence of decentralised network technology, digital assets, and AI development. We expect the change to be inevitable and to completely redefine business and investment landscapes in the coming two decades, 2020s-2040s.

We are still in the early days of its heyday.

Digital assets possess an abnormal yet unknown risk and reward

Our research suggests that digital assets are going through the stage of Unknown, Unknowable, and Unique (UUU) risk and reward before it normalizes.

The 3Us stage implies an enormous return potential that is accompanied with risk of significant permanent loss of capital. This stage also implies that the skewness of risk and reward to be unknown and unknowable for investors.

Despite being in uncharted waters, virtual assets such as crypto currencies have been enormously profitable to some investors and traders. Due to the UUU circumstances, lots of investors both individual and institutional are reluctant to be involved in this asset class.

Enablers of Digitalisation, Decentralisation, and Democratisation to be in our investment scope

Our view on digital asset investment is that the prospect outweighs the uncertainty. A practical strategy to invest in the new landscape is therefore to look at both virtual assets, tokenised assets as well as the technology space under the expanded definitions of Web 3.0.

Digitalisation, Decentralisation, and Democratisation would be our guiding principle for investing in the Web 3.0 era. The decentralised tech is bound to spark a remarkable difference in our society with the 3Ds as the new trajectory going forward.

As such, we believe that the high investment value can be found at:

- *Equities*: decentralised network enablers, custodians of tokenised asset, and web-3.0-convergence tech companies such as ubiquitous connectivity, network computing, open technologies, open identity, and intelligent web.

- *Utility token*: decentralised finance, smart contracts, and chain integrators.

Investors who wish to surf the tide, must learn the direction in which technology develops in order to identify threats and opportunities early.

Part 1. Understanding Digital Assets

"It's not empty, stupid! You're looking at 3 million in Bitcoin!"

CartoonStock.com

"It ain't what you don't know that gets you into trouble.

It's what you know for sure that just ain't so."

-Mark Twain-

Defining digital assets

There has not been a single and widely accepted definition of digital assets since the scope and much of it is still unknown. CFTC defined digital asset as "*anything that can be stored and transmitted electronically, and has associated ownership or use rights.*"[2]

CFTC's definition has two key implications. First, digital asset scope is broad. Second, the trait of electronically stored and transmittable means that digital asset requires a reliable and secured medium of storage and network to facilitate the transactions.

DLT (i.e- Blockchain) is both reliable and secured network to facilitate data transfer and storage.

From its creation process, digital assets could be divided into two categories, being tokenised assets and virtual assets.

[2] CFTC. (2020). *Digital Assets Primer December 2020*. CFTC.

Tokenised assets
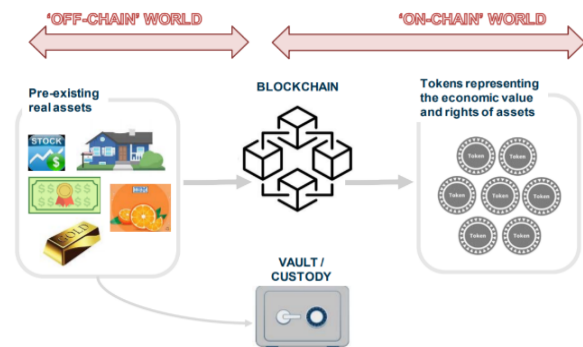
Tokenised assets digitised the rights of ownership of real assets
Source: OECD (2020)

Tokenised assets represent ownership of an underlying physical asset in the digital format.

The ownership rights of an asset is extended and embedded into a digital token that is integrated with a distributed ledger.

Therefore, tokenised assets possess the same characteristic as its underlying asset and should be treated accordingly.

One of the key benefits of asset tokenisation is the fractional ownership of the respective asset. One could own a tiny portion of an asset, like a millionth part of an asset.

It improves liquidity and reduces the barrier to own an asset by enabling smaller-size investors to invest in the lowered ticket-size investment. By operating in a decentralised exchange, tokenisation opens up public fundraising (peer-to-peer basis) opportunities for a wide range of investments.

Tokenised assets therefore would require a custody service because the underlying assets would become a collective asset owned by multiple investors. The custodian would then act as an agent of the collective owners to safe keep the respective asset and also acting as the link between the token and the real asset.

In principle, almost all assets could be tokenised. Examples of potential assets that can be tokenised are fiat money, real estate, commodities, scripless securities (such as equities, bonds, and futures), and

digital content. Since tokenised asset has an underlying asset, its valuation follows the asset it represents.

Virtual assets
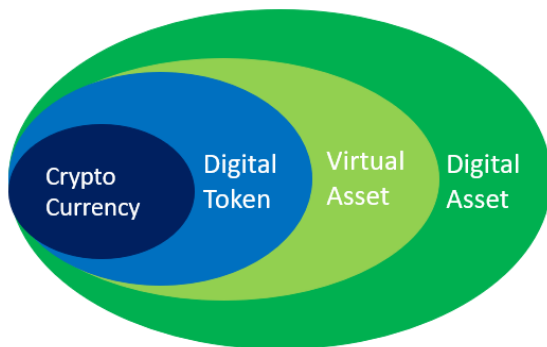
Crypto currency is only a part of digital asset
Source: Heyokha Brothers

Virtual assets are native digital assets, created in the computing space and have no physical representation or underlying assets in the real world. Examples of virtual assets are cryptocurrencies, big data, computer algorithms, and smart contracts.

Valuing a virtual asset is often challenging because they do not represent real (physical) assets. Nevertheless, we would caution against dismissing virtual assets at once just because some of its value tends to be hard to measure.

We could now comprehend that digital asset has a broad definition. It could act as an umbrella asset class that can be categorised as many things at once through its embedded utility. Thus, having a framework to identify the nature of the digital asset is paramount for its valuation purposes.

The definition of digital assets is important for investment and regulatory purposes

As a new asset class, defining digital assets is important for any investment framework and how it may be treated by regulation. By having proper understanding, we can avoid investing in false substitutes.

The novel asset class and its increasing adoption might trigger a bull market (or even a bubble to some extent) that offers plenty of gimmicks and shenanigans. Lesson from 2000s dot-coms: not all dot-coms were worth your capital commitment.

From a regulatory point of view, defining and classifying digital assets is at its dawn. We see that regulation is a prerequisite for the mass adoption of digital assets.

Governments have the interest to protect their sovereignty and to tax digital asset economies. On the other hand, digital assets also require regulator's *blessing* so that they can be widely adopted.

The question that remains is whether the regulation will be constraining or accommodating.

The adage from game theory suggests '*when you cannot beat them, join them*'. Different from a centralised system that has a single point of failure, a decentralised network system of blockchain does not have a point of failure. Hester Peirce, the commissioner of the U.S Securities Exchange Commission (SEC), has opined about banning bitcoin (built on a peer-to-peer distributed ledger system) likening it to shutting down the internet.[3]

With Gary Gensler as the new chair of the SEC, we could expect a reasonable regulation on digital assets as we see him as a regulator with a deep understanding of the subject.

For a perspective on this subject, we recommend investors to diligently attend his lectures on Massachusetts Institute of Technology's YouTube channel about "Blockchain and Money".

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3   https://news.bitcoin.com/sec-commissioner-banning-bitcoin-very-difficult-ban-peer-to-peer-technology/

Distributed Ledger Technology: Enter the On-Chain and Off-Chain era
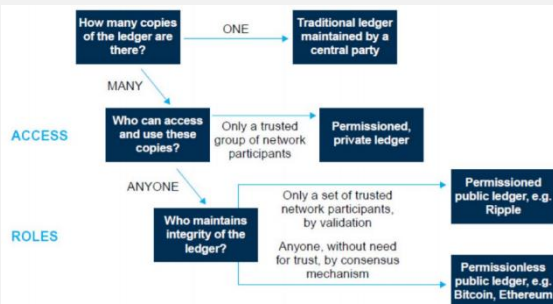
Distributed ledger taxonomy - the potential implementation of DLT is wide.
Source: UK Government Office for Science (2016)

Distributed ledger technology could be defined as technological infrastructure protocols that allow simultaneous access, validation, and record updating in an immutable manner across a network that is spread across multiple entities or locations.

The main idea of DLT is to employ decentralised data modification, storage and validation. Since there is no single authorised entity, data modification could only be done through a consensus protocol and then data would be modified simultaneously in every node.

Therefore, data is spread across several nodes. It creates robust database integrity as there is no single point of failure.

This is contrary to a centralised data system where a hacker would only need to attack the central server to modify the database. For a DLT, a hacker would need to attack all the nodes simultaneously, which is impossible with today's computing power technology, except quantum computing (a very powerful computer) but it is very uneconomical to do so.

We are of the view that businesses will use DLT in the future, as it improves security and transaction efficiency. Transaction security, real-time settlement, transparency, and reliable record are some of the reasons.

At the phase of mass adoption, on-chain and off-chain would be a new differentiator for businesses in the future. More detail on the mechanism of blockchain is presented on the following figure.
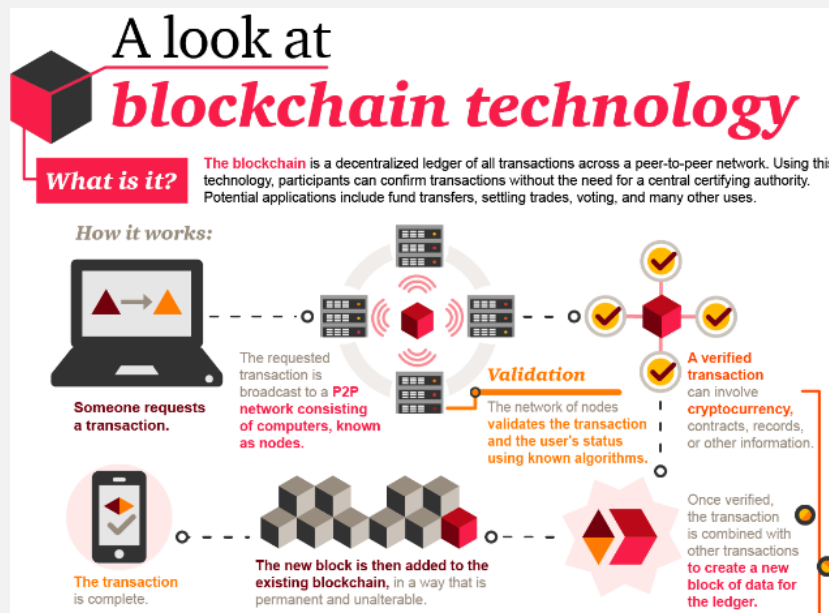
A look at blockchain technology
Source: PWC (2018)

Legal cases on crypto assets in the US and Indonesia

The classification of assets will determine the scope of law that applies.

Case in point #1: U.S: Bitcoin as a currency vs. Ripple as an investment contract

Jay Clayton, Chief of SEC, classified Bitcoin as a cryptocurrency that has a sole feature to replace sovereign currency therefore it is not a security and thus will not subject to SEC supervisory[4].

Meanwhile, Ripple (XRP) was deemed an investment contract following the Howey Test. The test dictates that an asset is a security if: "(1) There is an investment of money in (2) a common enterprise that led to (3) expectation of profit solely from (4) the efforts of a promoter or a third party.

Clayton accused Ripple Labs of offering unregistered securities through the issuance of Ripple tokens in exchange for services and fiat money as fundraising for its development.[5]

Ripple was accused to be a form of investment contract since they definitively fulfil the criteria of investment of money and the coin performance is significantly affected by Ripple Labs Inc. (a common enterprise) and therefore creates an expectation of profit by their efforts.

Should SEC's charges are granted by the Department of Justice, then Ripple would need to comply with SEC rules. The case of Ripple shows how a definition could significantly impact a digital asset.

Case in point #2: Indonesia: Crypto assets as a commodity, regulation that flourish mass adoption

In Indonesia, cryptocurrencies are treated as a commodity, therefore they are regulated by the Commodity and Futures Trading Regulatory Agency (BAPPEBTI).

This more relaxed regulation has bolstered crypto assets penetration in Indonesia, outpacing the nation's securities market penetration. It is prohibited however to use crypto as a medium of exchange in Indonesia.

With the current regulation, the government can monitor the asset flows between Indonesian citizens and crypto exchanges. In our view, this is better than leaving crypto unregulated.

As of 1Q21, BAPPEBTI has recorded 2.8 million crypto traders in Indonesia since its regulation issuance in 2019. This dwarfed the growth of security investor accounts in Indonesia that reached 3.2 million in December 2020 over a period of 35 years. Read more about the Indonesia case of retail investors saga in our 4Q20 quarterly report.

Accommodative regulation could act as a catalyst for mass adoption of digital asset amidst the already high smartphone penetration.

Substance over form to be our preferred approach to defining crypto assets

When we talk about digital assets, crypto is often the first thing that comes to mind. Yet, the digital asset universe goes beyond that. Nevertheless, crypto plays an important role in the digital asset class. Cryptos have been neglected by regulators for years until their market cap and retail investors participation surge.

As of 6 May 2021, the capitalisation for cryptocurrencies reached USD 2.35 trillion combined. It is sizable but still small compared with gold's capitalisation of USD 12.4 trillion and minuscule compared with global equity and bond capitalisation of approximately USD 90 trillion and USD 128 trillion respectively.

Most regulators who regulate cryptos are taking the path of substance-over-form. They classify crypto assets based on their characteristics. "*If it moves like a duck, quacks like a duck, then it is a duck*" was how Gary Gansler described the regulators approach in his lecture.

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[4] https://www.cnbc.com/amp/2018/06/06/sec-chairman-clayton-says-agency-wont-change-definition-of-a-security.html?

[5] https://www.sec.gov/news/press-release/2020-338

Three main classifications proposed by most governments are: (1) Payment or exchange token, (2) utility token, and (3) security token. Some sample cases:

Classification	Examples	Market cap (29th April 2021)	Use cases
Payment or exchange token	Bitcoin	US$ 1.01 Trillion	Considered to be the digital gold. Bitcoin is used as a store of value in the crypto asset universe. It is the first cryptocurrency employing blockchain technology, limited in supply, purely autonomous, and has anti-debasement economics in nature. Bitcoin is getting more scarce every day instead of more plentiful like fiat.
	Tether	US$ 51.01 Billion	A stable coin, purposefully converting fiat money into a digital currency. It anchors to the value of a sovereign currency and is used as the general medium of exchange in the crypto world.
	BNB Coin	US$ 88.33 Billion	Used as medium of exchange in its centralised crypto exchange and related crypto currencies who are built on Binance network.
Utility token	Ethereum	US$ 316.23 Billion	Creation of smart contracts and decentralised application network.
	ChainLink	US$ 15.06 Billion	Integrating blockchain networks with Off-chain data for smart contracts execution.
	Ripple	US$ 51.01 Billion	Currency and remittance exchange network
	Non-fungible tokens	N/A	Used as a digital signature embedded on a digital asset. NFT can be applied to a painting, recording, and digital content.
Security token	FTX derivative exchange has **tokenised several publicly listed stocks** such as Coinbase, Tesla, Square, Google, Facebook, and Apple. These tokenised stocks could be redeemed for the actual underlying at CM-Equity, AG., a German investment firm. Tokenisation enables the stocks to be traded 24 hours a day without decoupling the actual underlying and traded fractionally up to one-of-a-million shares. **FTX has also tokenised commodity futures, lumber.**		

Examples of cryptocurrency classifications by regulators framework

Cryptocurrency taxonomy by industry use case
Source: Crypto Compare

Knowing that cryptocurrencies have utilities, we could try to define them from the perspective of a token as a right container. We can define a stock as a token that represents the residual claim of a company and fiat money represent the right to claim value from the central bank or government.

Therefore, we can also define cryptocurrency as the right to use a distributed ledger technology network.

In line with the regulator perspective, we prefer the substance-over-form perspective on crypto assets to be our guiding framework for investments. Quoting Batman in the Batman Begins (2005) as our patron in defining digital assets:

"It is not who I am underneath, but what I do that defines me"

Similarities and differences with other asset classes

Variables	Digital Assets (Tokenised and virtual assets)	Crypto Currencies (a part of virtual assets)	Securities (Investment contract)	Commodities	Currency
Utility	Can hold several utilities	Consumable, store of value, or medium of exchange	Rights of claim	Consumable	Store of value, Medium of exchange
Exchange	Decentralised	Decentralised	One for each region	Centralised	Centralised
Economics	Anti-debasement, limited in supply	Anti-debasement, tighter supply overtime	Limited supply	Constraint to natural productivity	Tend to debase itself
Standard quantity	Could be fractional	Could be fractional	Standardised	Standardised	Certain denominator
Ownership proof	Bearer	Bearer	Registered (mostly)	Bearer	Bearer
Authorization	Consensus driven	Consensus driven	Central authority	Consensus driven	Central authority
Transparency	Anonymous	Anonymous	Yes	Yes	Anonymous
Governance	Code Protocol and consensus-driven	Code Protocol and consensus-driven	Exchange and law enforcement, Centralised	Exchange and law enforcement, Centralised	Central bank, Centralised
Relevancy	Intra network	Intra network	Intrastate	Global	Intrastate
Participation	Inclusive	Inclusive	Exclusive	Exclusive	Inclusive

Digital assets comparison with other asset class

To provide another angle for investors, we compared digital assets (confined to the ones integrated with DLT) with other asset classes.

From the comparison, we could conclude that digital assets have four essential features which are (1) multi-utility asset, (2) decentralised governance, (3) bearer assets, and (4) frictionless trade.

Frameworks to look at an asset and its value

Usefulness and scarcity are the two prerequisites for an object to be a valuable asset.

The diamond and water paradox shows how both factors interact. We all agree that in terms of utility, water is more critical to our survivability compared to diamond. Nevertheless, water is cheaper compared to diamond because of its abundance in nature.

Therefore, to possess a high economic value, an asset must conform to the two prerequisites. It has to be both useful and scarce.

How about the opposite, assets that have no utility but possess high prices?

Referring back to an investment classic, 3rd edition of Security Analysis (1951), Benjamin Graham wrote that an asset price could be driven by the general market and individual asset factors.

The individual asset factor comprises two main drivers, namely: investment (i.e-fundamental) and speculative factors. Therefore, it is also possible for an asset to have a high price yet have low fundamental value.

Such cases commonly happen during an asset bubble. George Soros once said "*a bubble does not grow out of thin air, but they have a solid basis in reality that is distorted by a misconception*".

In the 2000s dot-com bubble, some companies became tech titans with exceptional economics. However, along the way, numerous false substitutes got undeserving valuations due to speculative (or manipulative) and general market factors. History suggests that such false substitutes tend to end in tears.

By thoroughly understanding an asset and its price factors, investors could avoid the false substitutes and their pitfalls.

As mentioned earlier, the value of tokenised assets can be determined by valuing its underlying asset.

Methods to estimate the intrinsic value real (physical) assets such as real estate, equities, bonds, and futures have been long discovered and standardised. Therefore, we prefer to put more weigh on the valuation of virtual assets.

In our observation, there are three reasons why valuing a virtual asset is challenging: (1) it does not represent a real (physical) asset, (2) the market is still underdeveloped, and (3) there is insufficient empirical evidence to arrive at a reasonable estimate on the future state of the asset value. Much about the asset is pretty much *unknown and unknowable* to begin with.

About cost and utility

The cost of acquiring the coin (similar to the cost of production) sets the minimum value of an asset and utility value sets the maximum value (not price) of an asset. A utility could mean a benefit or protection from adversity. *This concept assumes that the respective digital object has qualified to the definition of an asset in the first place.*

Essentially, it is the core utility of the virtual asset that will drive its users and therefore its valuation. If we buy a crypto asset, we are buying the right to use the network.

User-based value

Bitcoin price modeling that incorporated Metcalfe's law shows high goodness of fit.
Source: Glassnode, NYDIG

Network effect is one of the key features of crypto assets. The more people use it, the more it becomes valuable. In assessing such an asset, we could utilise Metcalfe's law to estimate its value. It states that the value of a telecommunication network is proportional to the square of the number of connected users of the systems (Shapiro and Varian, 1999).

A study in modelling bitcoin price using Metcalfe's law suggests that bitcoin usefulness as a store of value is driven by its monetary network effects, shown by r-squared of 93.8%.[6] This network effect is pretty similar to our currencies, social media, and the internet itself. The more people use it, the more it becomes valuable.

Besides the three key drivers, we can attach monetary parameters such as daily transaction value and the tokenomics, the supply dynamics such as burning and halving mining rewards, in valuing crypto assets.

Pathways for digital assets to be a dominant force

To be a dominant force, digital assets require mass adoption. We are now at the stage where people could acquire and trade it but not at the stage where people utilise it as intended.

Value extraction from this asset class lies more on frontrunning future use instead of utilizing the token.

According to Binance 2021 Global Crypto User Index, 67% of cryptos are used for buy-and-hold or trading, 22% use it for staking (read our grey box on the next page for more information), and 11% for payments.

No wonder it feels like *a greater-fool game*.

Staking and mining, what is the difference?
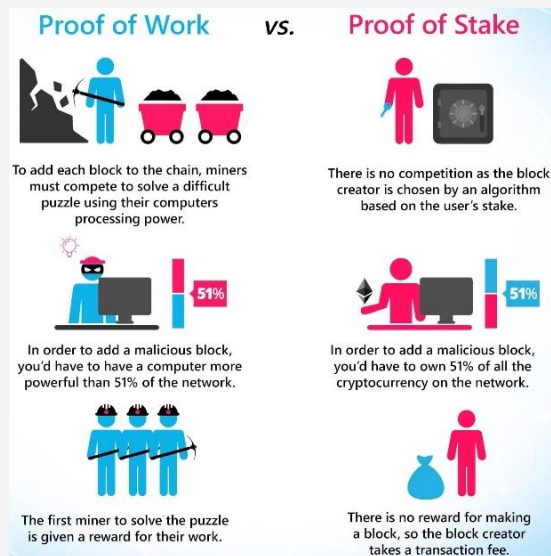
The advent of blockchain is meant to replace the centralised authority system in transactions by a consensus-driven validation
Source: Blockgeeks

Any blockchain has a consensus algorithm to validate a transaction. The consensus of users replaces the role of a centralised authority such as clearing houses and banks in the transaction clearing process.

Bitcoin's mining process that consists of solving a cryptographic problem is an example of a Proof-of-Work (PoW) consensus algorithm.

One usually needs to do something (usually called mining), in order to validate a transaction. It has been infamous for its energy-intensive and state-of-the-art computing equipment requirements.

The first miner to crack the cryptograph will then be rewarded with bitcoin. Every miner, therefore, has the incentives to use the most sophisticated computer hardware to win the competition.

Alternatively, there is Proof-of-Stake (PoS) consensus algorithm where a transaction is validated by a validator chosen by the system.

Users who wish to participate must stake their coin to be locked up for a certain period of time. Staker who owns more coins has a better chance to be elected as the transaction validator. From such activities, the validator will receive a fee. From a finance perspective, staking is similar to receiving an interest for saving money in a bank account. Such yield could reach up to 20-30% per annum in the

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6 Cipolaro, G., & Stevens, R. (2020). *The Power of Bitcoin's Network Effect.* NYDIG.

respective coin. An example of crypto that currently uses PoS is Binance Coin.

We believe that PoS adoption will increase in the future because it is way more efficient - consumes far less energy than PoW and require no state-of-the-art computing equipment.

Ethereum, the second-largest crypto asset in market capitalisation, is now transitioning to apply PoS from PoW. The transition of which is expected to reduce Ethereum's current PoW energy consumption from 45,000 GWh per year to just less than 1/10,000th of it according to Danny Ryan.[7]
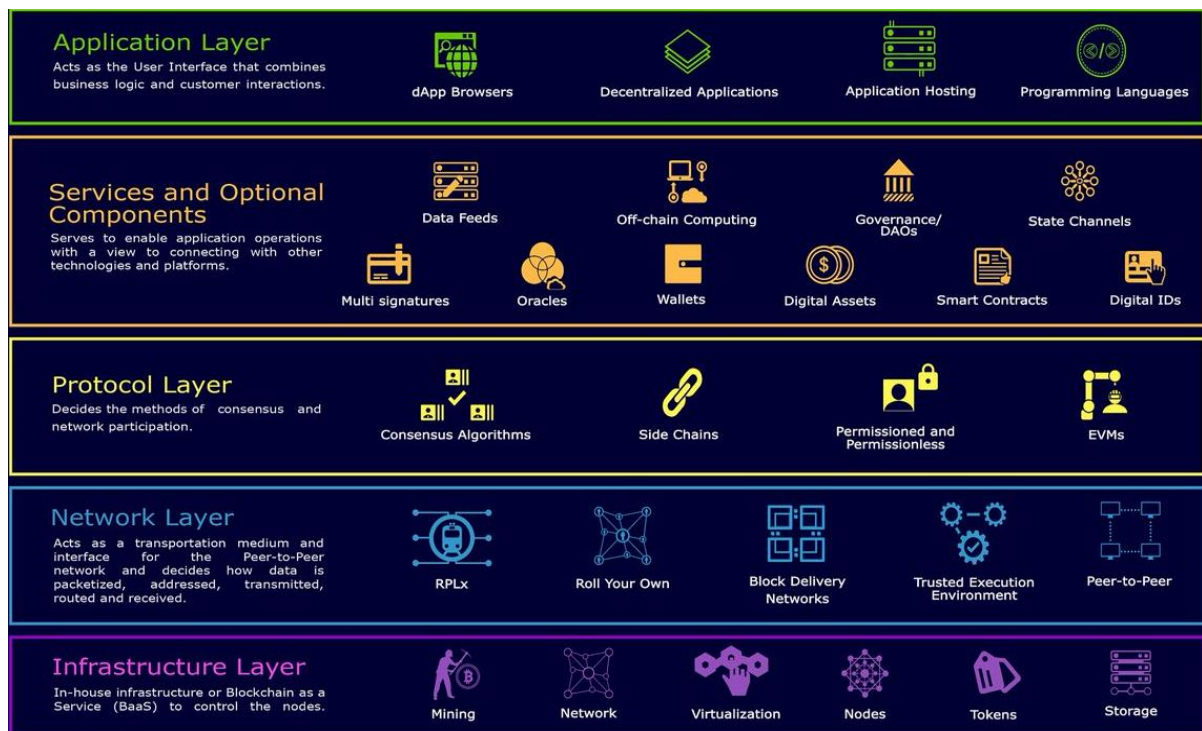
Blockchain technology is built layer by layer.
Source: Blockgeeks

Like other technologies, digital assets are developed layer by layer like a sandwich. The development of the blockchain technology stack suggests that the sandwich pile is almost complete.

We see that the required technology has been completed and the virtual world has indeed existed yet it is still disconnected from the real world.

Crypto exchange is part of the bridge that connects both worlds. However, this bridge is only half complete. It only helps the users to own and trade their crypto assets.

Decentralised applications (dAPPs), applications built on a decentralised network (a peer-to-peer

basis), are the last piece of the bridge. As we have used centralised applications in our smartphones such as Google and Facebook, dAPPs might emerge as the future substitute with everyone in the network owning it.

It will allow users to consume the utility embedded within the cryptocurrencies from on-chain activities. Executing a transaction on smart contract is an example.

We believe that dAPP would be where the two worlds collide, the digital and real. It is where people truly consume the utility token for a transaction with economic substance.

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[7]   https://www.bloomberg.com/news/articles/2021-05-23/ethereum-closes-in-on-long-sought-fix-to-cut-energy-use-over-99

Our observation in the rabbit hole suggests that dAPPs are still in their infancy. Most of the dAPPs are only relevant within the virtual world and serve no function to integrate real and virtual economies yet.

Such dAPPs are used for gaming, staking (yield-generating asset scheme), gambling, and decentralised exchange. As of March 2021, there are about 3.5 thousand developed dAPPs and 79.2% of them are built on the Ethereum network.

We believe that anyone who can connect the two worlds seamlessly could add substantial value (i.e- the future winner). The following figure lists some examples of dAPPs built on the Binance Smart Chain (BSC).
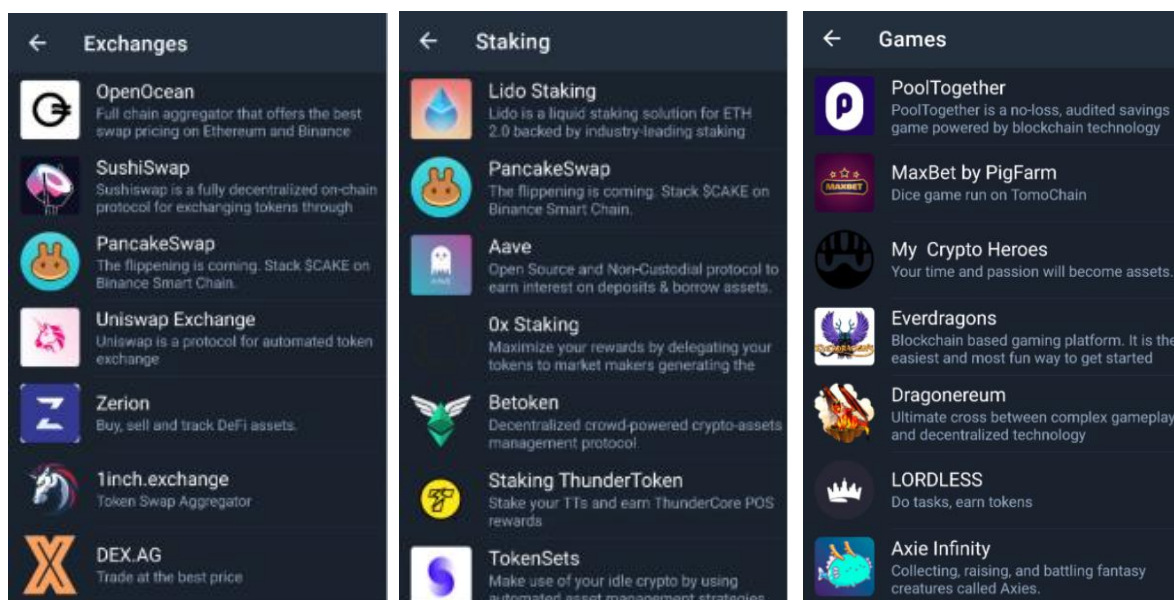
Most dApps serve no use in the real world at the moment. Co-exist yet disconnected.
Source: TrustWallet

You can join the matrix within twenty minutes

We are amazed about how little time it took for someone to join the cryptocurrency ride. One of our analysts opened an account in Tokocrypto.

It took him less than twenty minutes to complete the account opening process and be ready to trade.

This is incredibly fast when compared to opening a brokerage account, which usually takes 3-7 working days in Indonesia. Zero to crypto within twenty minutes experience was truly an eye-opener.

Bitcoin's road from zero to a trillion (now billions again)

Weekly Price USD/BTC Aug 2010 – 20 May 2021 (log scale)

Bitcoin just took its 6th crash after its 6th rally.
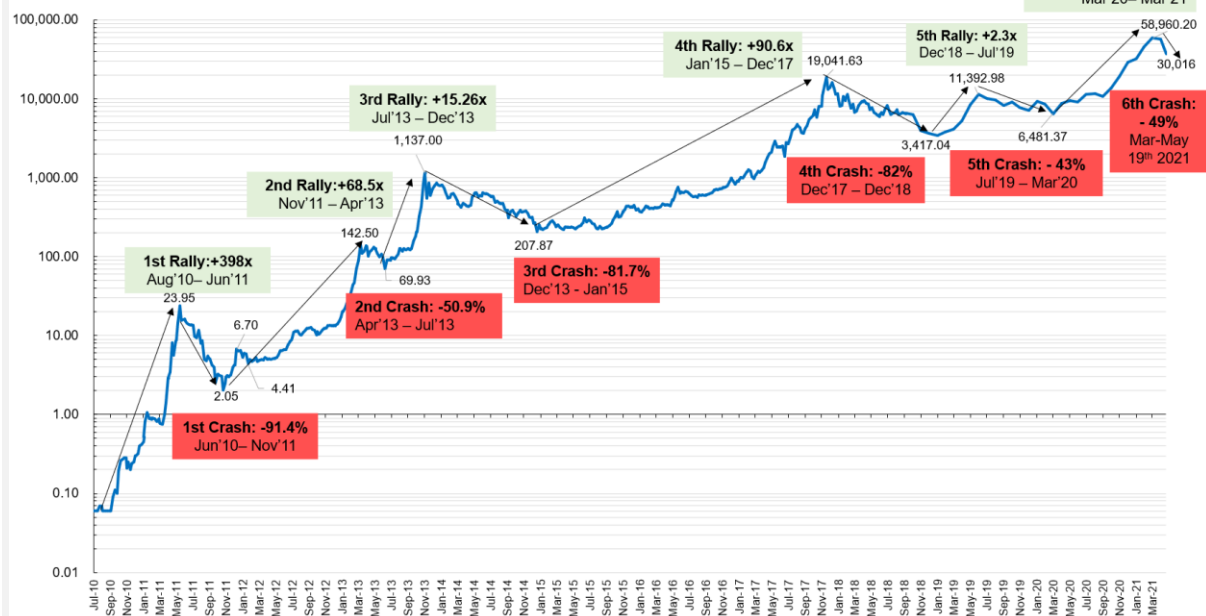
It took Bitcoin about a decade to grow from zero to a trillion-dollar market capitalisation. Since its inception, Bitcoin has experienced 6 rallies and crashes.

Regardless, the total gain from bitcoin has exceeded that of any asset class. From its inception of USD 0.06 per BTC up to its lowest in 19th May 2021 of USD 30,016 per BTC, the Bitcoin price multiplied 500,265 times.

At its latest peak, the return even reached a multiple of 982,665 times. It only took a USD 1.02 Bitcoin investment in 10 years to become a millionaire.

However, investors who have been able to hold on to their bitcoins since 2010 might either have nerves of steel or simply forgot that they own bitcoins. Over the course of a decade, Bitcoin experienced three crashes in which at least 50% of value was lost, and three crashes during which at least 80% of value was lost. Who can endure such volatility to their wealth?

Several studies have shown that crypto asset could be considered as a diversification because it behaves differently compared to other asset classes and could improve a portfolio risk-to-reward ratio with 1 to 3% exposure to the asset class.[8] We have discussed the risk-to-reward of Bitcoin in our 4Q20 quarterly.

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[8] Holovatiuk, O. (2020). Cryptocurrencies as an asset class in portfolio optimization. *Central European Economic Journal Vol.74. Issue:54*. ; Hougan, M., & Lawant, D. (2021). *Cryptoassets: The Guide to Bitcoin, Blockchain, and Cryptocurrency for Investment Professionals.* CFA Institute Research Foundation.

Proxies to follow

Variable	Proxy	Description
General market performance	Bloomberg Crypto Galaxy Index (BCGI)	*Weighting*: Bitcoin (30%), Ethereum (30%), XRP (18.58%), Bitcoin Cash (9.34%), Litecoin (6.63%), EOS (5.45%).
	Bitwise 10 Crypto Index	*Track top 10 largest crypto*: Bitcoin (79%), Ethereum (15.8%), Litecoin (0.9%), Chainlink (0.8%), Filecoin (0.8%), Bitcoin Cash (0.7%), Stellar Lumens (0.6%), Uniswap (0.6%), Aave (0.3%), Cosmos (0.3%).
	J.P Morgan Crypto Exposure Basket	*Track stocks with crypto exposures*: 20% Microstrategy, 18% Square, Riot Blockchain (15%), NVIDIA (15%), Paypal (10%), Advanced Micro Device (5%), Taiwan Semi-Conductor (5%), Intercontinental Exchange (4%), CME Group (4%), Overstock.com (2%), Silvergate Capital Corp. (2%).
	Blockchain Technology ETF (HBLK.TSX)	Harvest Blockchain Technologies Index tracks companies that use or enable Blockchain technology. Marathon Digital Holdings (7.1%), Akamai Technologies (6.8%), EPAM Systems (6.7%), Square (5.4%), DocuSign (5.1%), Voyager Digital (4.6%), Overstock.com (4.2%), Riot Blockchain (4.1%), Oracle Corp (4%), IBM (4%).
Market Activity	Trading Value	*Check on Crypto Compare*; Monthly Exchange Review, Trading volume from centralised exchange aggregate
Fund Flows	ETP/ETF/ETN Fund Flows report	*Check on Crypto Compare*: Digital Asset Management Review
Institutional Stance	Miscellaneous	*Finding the stance and view of the institutions*: (1) Regulators, (2) Fund management, (3) Business use case.
Volatility index	Crypto Volatility Index (CVI)	Source: https://cvi.finance/ CVI is a crypto volatility index, a decentralized version of VIX (known as the "Market Fear Index") for the crypto market, predicting volatility in BTC and ETH for the upcoming 30 days. CVI is calculated through Chainlink Oracles.
Price to cost-to-mine	Miscellaneous	Proof-of-work coins such as bitcoin have an acquiring cost component like commodities. Price to cost-to-mine could help as a 'bargain' indicator. Several POW coins: Bitcoin, Ethereum, Doge, Litecoin

We have listed several market proxies that could be followed by investors who have an interest in digital assets development

Value proposition of digital assets

As we have mentioned before, the utility of an asset has two sources. It either comes from a direct benefit for its owner by consumption, or from protection against adversities. We see both utilities emerging from digital assets.

Risk taken by owning digital assets

Constraining vs accommodating regulation

In order for digital asset ownership to be institutionalised, more regulation is required. This phase is critical. It will make crypto assets legitimate (i.e- subject to taxation and regulation) and enables such assets to be widely adopted.

High disruption and competition among cryptocurrencies

Similar to other technologies, each cryptocurrency represents a technology which is subject to competition. Different from the previous technologies that were owned by an enterprise, crypto currencies are decentralised.

However, the competition for users remains. With a transparent whitepaper (design of the crypto), an expert could easily pinpoint the weakness of a design and create a new design to replace the incumbent. Every founder of crypto has the incentive for a better system as they will be rewarded from value appreciation of their coins.

The current underdeveloped market creates frictions and high volatility

Crypto adoption is still rather low as we mentioned its capitalisation comparison with other asset classes. It creates frictions in the exchange activities such as wide slippage (bid-ask spread).

In crypto swap markets, you can buy unlisted crypto coin with a spread of 10% or more. Furthermore, the bearer asset characteristic also creates an asset recovery problem when the owner lost their access key. Custodian services might be useful in future developments.

A chain is only as strong as the weakest link

So far, there has been no case of sabotage in any distributed ledger technology. However, there have been several cases which suggest that investors' or exchange's hot wallet - software to store crypto assets - are prone to cyber attacks.

Storing crypto assets in a cold wallet, hardware disconnected to the internet, is one of the popular measures to prevent hacking.

Investors who are interested in this space should thoroughly consider their asset safeguarding measures. The security of digital assets works like a chain, it is only as strong as the weakest link.

Benefits of digital assets
Reduce displacements of value

One of the significant pain points in our daily life is addressing counterparty risk in transactions. Compared to traditional asset classes, the embedded technologies in digital assets could act to enhance (1) contracts and record credibility, (2) minimize asymmetric information, (3) asset liquidity, (4) exchange and business governance. We have been accustomed to spend significant amount of resources for an intermediary to solve those issues.

Digital assets embedded technologies simply return these displaced values from intermediaries back to the transacting party. More values could be retained as a result of dis-intermediation.

Wealth protection

Crypto assets tend to have an anti-debasement mechanism that could protect the wealth of the

owners. Most tokens are getting harder to be created or their supply is being reduced over time.

Therefore, by design, certain crypto assets have an inherent characteristic that might protect their owner against currency debasement.

In case of tokenised asset, the wealth protection function depends on the nature of the underlying asset.

Many retail investors see cryptos as a quick path from rags to riches. Some speculate and some see value in it.

Conclusion

From an investor perspective, assets are the basic units for investment. At the top level, asset allocation is the most important investment decision every investor must make. Traditionally, assets are classified by their nature and behaviour over economic cycles.

Equities, fixed income, commodities, currencies formed their markets and are considered as major asset classes.

Digital asset is both a new asset class as well as an encompassing asset that wraps all the major asset classes of equities, fixed income, commodities, and currencies into one market like an umbrella. Virtualisation and tokenisation are distinct features of digital assets.

Digital assets became more relevant with the advent of the distributed ledger technology (DLT). The combination of digital assets and distributed ledger technology in the financial market enables transaction without the need for a central authority or intermediary and allows for efficiency gains driven by the dis-intermediation.

Real-time settlement, transparency, reliable records, and improved liquidity are some of the main value propositions offered by this technology mix (OECD, 2020).

These value propositions are in-line with our tech investment theme of *digitalisation*, *decentralisation, and democratisation.*

Multiple asset classes would be more accessible in the digital world. Exchanges of value could be run by a decentralised authority in a permissionless manner. Last but not least, smaller-sized investors could now obtain more exposure on otherwise high-ticket investments thanks to ownership fractionalisation through tokenisation. Financial markets would be more inclusive than ever before.

It might not be a good idea to store 'dirty money' in cryptocurrencies

One common false notion about crypto is its potential use for money laundering. We view such belief as misleading. According to the United Nations, about USD 1.6 trillion money is laundered each year, almost 3% of global GDP.

The proposition to launder using fiat money is clear. Fiat currency is untraceable and has no record of transfer nor ownership. This is different from most crypto currency where there is an accessible blockchain ledger that explicitly shows the flow of money.

If we roll back to September 2020, we were shocked by the numerous big banks globally associated with money laundering activities. Their names are listed in FinCEN files leaked by the International Consortium of Investigative Journalists (ICIJ).

The Society for Worldwide Interbank Financial Telecommunication (SWIFT) has stated that cases of money laundering through cryptocurrencies remain relatively small compared to the volumes of cash laundered through traditional methods.
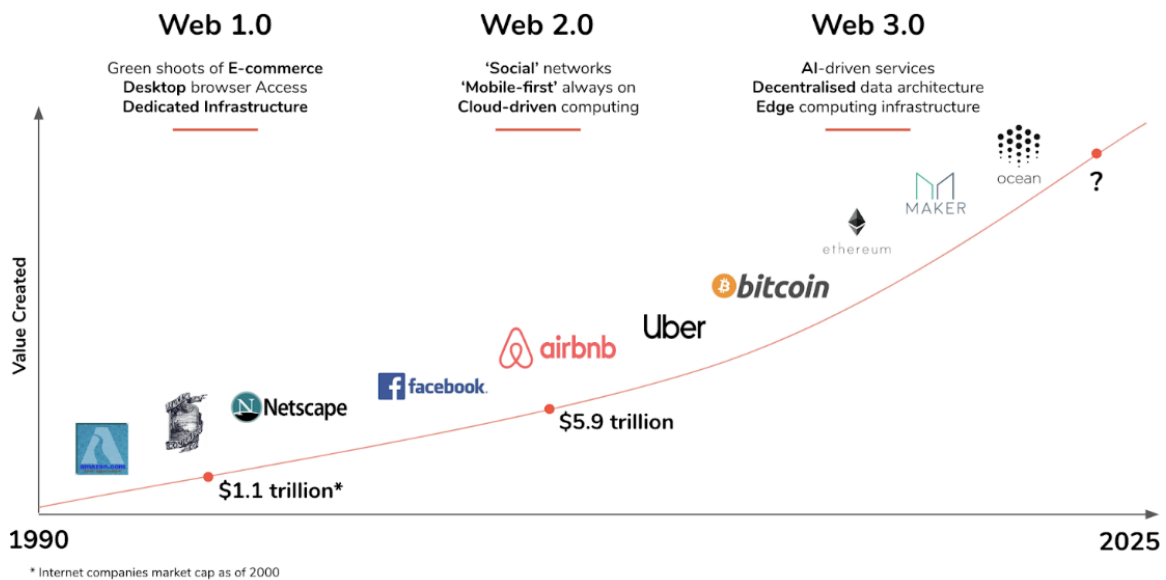
We would like to provide a perspective that misuse of any kind of assets has always existed.

The Evolution of the Web

No picture perfectly shows what Web 3.0 is, but still, a picture paints a thousand words.
Source: Fabric Ventures

We are now at the beginning of Web 3.0 as suggested in the above timeline. The chart nicely summarises the key terms that characterise the various stages, from a technology point of view. There is no doubt that in Web 3.0 **data** is the only thing that matters – the new gold.

Data powers AI-driven services, which in turn requires decentralised data architecture and pushes for edge computing architecture. Such structure is contrary to the centralised Web 2.0.

Web 2.0 focuses on applications (Content and Commerce) while the internet is the enabling infrastructure (Connectivity).

"The most potent weapon of the oppressor is the mind of the oppressed."

-Steven Biko-

Commentators described the Internet's current stage as akin to the auto industry in 1920 — that is, it's a world-changing technology that has been around for 20 years but is still relatively immature and in need of major improvements.

Most of us do not realise that we are the products being sold by today's tech giants

Making sense of the jargon

Artificial Intelligence

Artificial Intelligence could be explained as a machine with the ability to learn, think, and decide.

The foundational technology for AI is machine learning and big data analytics. To be able to learn, it requires the ability to autonomously analyse patterns, interpolate and extrapolate. Then, the AI will take an automated decision with it.

AI can be classified as weak AI that focuses on performing a specific task and strong AI that can do a variety of functions.

Man vs. Machine: Chess Grandmaster Gary Kasparov rematch with Deep Blue Supercomputer in 1997
Source: Business Insider Source: Fabric Ventures

Weak AI can be deceiving by its name. Its implementation in games have proved themselves better than world-class experts. For example, IBM's Deep Blue defeated World Chess Champion Garry Kasparov in 1997 and Elon Musk's Open AI (founded in 2015) in DOTA 2 has been unbeatable by any top global gamers.
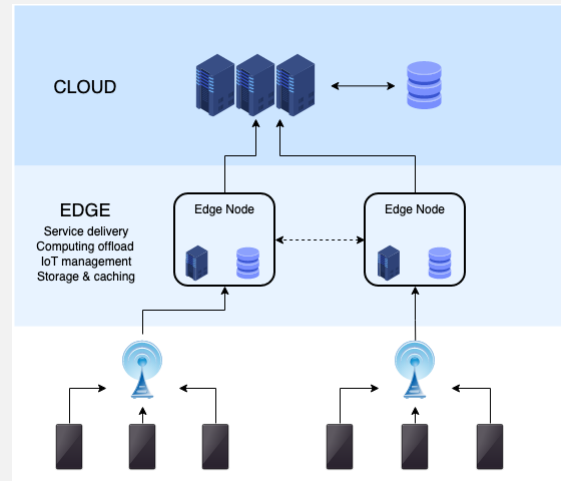
Edge computing

Edge computing is the reverse of today's architecture of centralised computing. Data are computed in the respective device in the network or a local server. Only relevant data would be sent to the central server.

Such computing structure reduces data feed for tech titans like Google and Facebook whose monetisation highly dependent to user-generated data.

Edge computing would not just be the forefront of decentralised Web 3.0 but also improve the latency of the Internet of Things, physical objects that are connected to a network.

Computation of edge computing is decentralised – done in the edge node rather than the centralised cloud
Source: Wikipedia

Data storage

In today's environment, we are facing high volume, variety, velocity, and veracity of data. According to Domo (2020), the average person creates 1.7 Megabytes of data every second. That is equivalent to 53.6 Terabytes per year that is spread across the internet and personal storage from a single person alone.
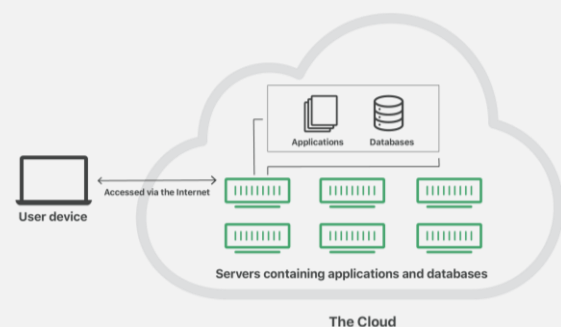
How data storage works
Source: Cloud Flare

Data storage solutions are essential for AI and machine learning applications, as these require massive data to be processed and stored. Not to mention, the trend towards working from home is driving the demand for cloud services. Cloud service and storage will be essential.

How the internet development went off track

Tim Berners-Lee's dream was for the internet to be "a collaborative medium, a place where we all meet and read and write." An interconnected computer system designed for scientists to share experiments was soon dominated by AOL, Compuserve, early Yahoo, and other portals.

These *online service providers* were the gateway to **Web 1.0**, where businesses, individuals, and governments began to consume and occasionally post content. Netscape launched its web browser in 1994, *prompting the dot-com explosion*, and the browser wars began.

Web 2.0 brought us the '*Web as a Platform,*' where software applications are built on the Web instead of the desktop. These apps enabled masses of users to take part in content creation on social networks, blogs, sharing sites, and more.

Search engines and social media platforms are driven by user-generated content that disrupted the media, advertising, and retail industries. *As a result, giant companies in retail and publishing that did not adapt have died or are struggling to stay alive.*

Many business models based on Web 2.0 rely on user participation to create fresh content and profile data *to be sold to third parties for marketing purposes.*

As such, the internet has become a massive *app store*, dominated by *centralized apps from Google, Facebook, and Amazon*, collecting data and monetise that data through targeted advertising. In short, the centralisation and exploitation of data without users' consent defines Web 2.0's business model.

The internet dream went off track. *Read our 2Q20 and 4Q20 reports to read more about tech-entrepreneurship driving wealth and power centralisation.*

Web 3.0 to be the Berners-Lee's original vision of a decentralised internet

Berners-Lee envisioned that the next generation of the internet would be a *Semantic Web*, in which machines would process content in a humanlike way – a "Global Brain" where all data would be connected and understood both contextually and conceptually. Such Semantic Web did not materialise.

The primary reason was that the real AI technology, referred to as RDF (resource description framework), was nearly impossible to implement. How can a machine know the difference between a jaguar (the animal) and a Jaguar (the car)? The only way to know the difference is to understand the context in which it is being described.

Although not the Semantic Web envisioned by Berners-Lee, **Web 3.0** is in many ways a return to his original web, where *"no permission is needed from a central authority to post anything … there is no central controlling node, and so no single point of failure … and no "kill switch".*

Tim Berners-Lee: The father of the internet
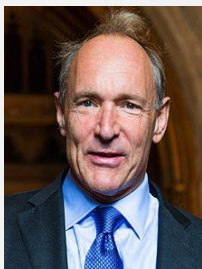
Sir Timothy John Berners-Lee, also well-known as TimBL is an English computer scientist who invented the World Wide Web. The idea of the world wide web was first inspired to address a pain point in a research process, to share research across the world.

The internet he founded was born on March 12, 1989, in an information management system proposal. He then implemented the proposal as the first communication between a Hypertext Transfer Protocol (HTTP) client and server in Mid-November 1989. Instead to patent his invention, he open-sourced it so everyone can develop it. "The web is for everyone", he said.

Berners-Lee was knighted in 2004, received the Turing Award in 2016, and named as one of the 100 most important people of the 20th century in Time Magazine for his invention.

The rise of technologies such as distributed ledgers and storage on blockchain will allow for data decentralisation and create a transparent and secure environment, overtaking Web 2.0's centralisation, surveillance, and exploitative advertising.

Decentralised infrastructure and application platforms will partially displace centralised tech giants, and individuals will be able to rightfully own their data.

Data is the new power, and the most significant implications of decentralisation and blockchain technology are around *data ownership and compensation*. As we move toward Web 3.0 and the technologies that support it mature and become scalable, the web will reflect its original intent.

The norm in Web 2.0 will disappear as decentralisation also makes possible transparent, opt-in, peer-to-peer communications that allow individuals to take ownership of their precious time due to lower counterparty risk.

On-chain businesses will provide a transparent reliable track record for a transaction's counterparty to assess.

In sum, Web 3.0 will bring us a *fairer* internet by enabling the individual to be a *sovereign*. True sovereignty implies owning and being able to control who profits from one's time and information.

Web 3.0's decentralized blockchain protocol will enable individuals to connect to an internet where they can own and be properly compensated for their time and data.

This marks a move towards trusting all constituents of a network *implicitly* rather than needing to trust each individual *explicitly* and/or seeking to achieve trust extrinsically.

Key Features of Web 3.0

To understand the next stage of the internet, we need to look at the four key features of Web 3.0: Ubiquity, Semantic Web, Artificial Intelligence, and 3D Graphics.

Ubiquity - it means being or having the capacity to be everywhere, especially at the same time. In other words, Web 3.0 makes the internet accessible to everyone anywhere, at any time.

At some point, internet-connected devices will no longer be concentrated on computers and smartphones like in Web 2.0 since IoT (Internet of Things) technology will bring forth a plethora of new types of smart devices.

Semantic - the study of the relationship between words. Semantic Web, according to Berners-Lee, enables computers to analyse loads of data from the Web, which includes content, transactions, and links between persons. Applying semantics in the

Web would enable machines to decode meaning and emotions by analysing data.

Artificial Intelligence - intelligence demonstrated by machines. If Web 3.0 machines can read and decipher the meaning and emotions conveyed by a set of data, it brings forth intelligent machines.

Spatial Web and 3D Graphics - aims to blur the line between the physical and the digital by revolutionizing graphics technology, bringing into clear focus 3D virtual worlds.

Unlike their 2D counterparts, 3D graphics bring a new level of immersion not only in futuristic gaming applications like Decentraland, but also in other sectors like real estate, healthcare, and e-commerce. An example of Spatial Web, as well as the key IT infrastructure, are shown on the next page.

FIGURE 1

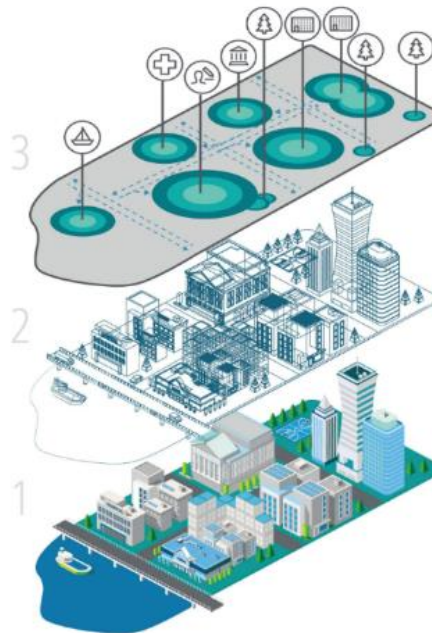## Understanding the Spatial Web

Spatial interaction layer

Through next-generation interfaces (e.g., smart glasses or voice), we will be able to interact with contextual, real-time information that has been called up by intuitive and sensory triggers such as geolocation, computer vision, and voice, gesture, or biometric commands. In effect, this merges the digital and physical layers for the user.

Digital information layer

Through sensorization and digital mapping of the physical world, we will eventually create a digital twin of every object in every place. Today, this type of digital information is primarily accessed via screens and dashboards. In the future, it will be retrieved primarily via the spatial interaction layer.

Physical layer

The world as we currently know and experience it through the five senses.

Source: Deloitte analysis.

Deloitte Insights | deloitte.com/insights

FIGURE 2

Three tiers of IT infrastructure and building the Spatial Web

As the technologies and capabilities that compose and connect IT architecture converge, the Spatial Web will mature. The figure below shows how key enabling technologies drive their respective computing eras.

Architectural layer	Web 1.0 (1990s–2000s)*	Web 2.0 (2010s–2020s)*	Web 3.0 / Spatial Web (2020s and beyond)*
Interaction	Desktop browser (click and type)	Mobile touch-screen (touch and swipe)	Wearable AR/VR, voice, and IoT devices (show and tell)
Computation	Situated server (via wire)	Cloud computing (via 3–4G)	Distributed computing (via AI, 5G + Edge)
Information	Structured (SQL)	Unstructured (big data)	Distributed ledger technology (blockchain)

*Note: Date ranges are approximate and meant for directional purposes only.

Source: Deloitte analysis adapted from Gabriel René and Dan Mapes, *The Spatial Web: How Web 3.0 Will Connect Humans, Machines, and AI to Transform the World* (Amazon, 2019).

Deloitte Insights | deloitte.com/insights

Part 3. Digital Asset Investing as an Unknown, Unknowable, and Unique Investing

The 3Us present a life-changing investment opportunity, both up and down

A paper published by Harvard economist Richard Zeckhauser entitled *Investing in the Unknown and Unknowable* examined how certain legendary investors "have earned extraordinary returns by investing in the unknown and unknowable".

Unknown and Unknowable situations describe a condition of general ignorance where the future state of the world is unknown and the probabilities of potential future states are unknowable (i.e., there is no historical precedent upon which to base future projections).

Zeckhauser went on to suggest that certain situations merit a third U; *uniqueness*. These are situations where there is a dearth of professional investor involvement and such 'neglect' can lead to significant mispricing.
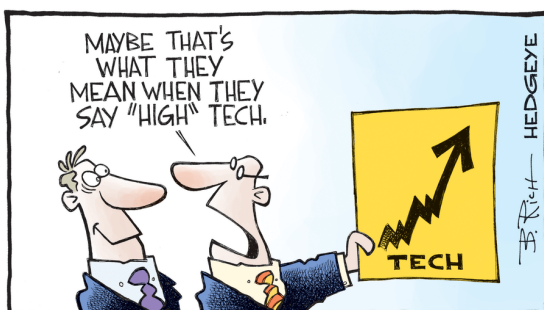
"Life is a series of natural and spontaneous changes. Don't resist them; that only creates sorrow.

Let reality be reality. Let things flow naturally forward in whatever way they like."

-Lao Tzu-

As with all investments, a risk/reward framework is needed in which strategies can be built within it. We hypothesise that digital assets will be the only asset class that matters and therefore it stands for the value of everything that is investable.

However, such development may take decades. Potential investors of digital assets need to be reminded that this emerging asset class is still *Unknown, Unknowable, and Unique* (UUU) when one wants to define and manage its risks.

The digital asset class is the quintessence of the unknown, the unknowable, and the unique.

Historically, that has been how some of the most profitable and successful traders of all time have done it; by focusing on such opportunities. The future of digital assets is *unknown*, it is *unknowable* as there is no historical precedence on which to base a probability-weighted outcome, and it is *unique* because not a lot of people are doing it.

Cryptocurrencies, as we explained in Part 1, are the defining digital asset that has already proved to be extremely profitable by some investors/traders. And it is still largely ignored by institutional investors. Acceptance of virtual assets and decentralised trust has no precedence, as it is unique. Having said that, the evolution from Web 2.0 to Web 3.0 is more observable and predictable.

We suggest investors to focus on the investment space where enablers help promote Digitalisation, Decentralisation, and Democratisation (3D).

These enablers can be the decentralised network itself (blockchain), companies that redefine their business on-chain, as well as companies that make it easier for anyone to connect to the decentralised network.

A personal investment journey on technology investment

Simon Chan, Chief Operating Officer of Heyokha Brothers

Simon Chan has over 27 years of experience in the asset management business, covering both traditional and quantitative strategies. Simon is a seasoned tech investor, including FinTech and expanding to Crypto.

Before joining Heyokha, Simon has experienced various top-level roles such as Associate Director at Barclays Global Investors, Director of Investment at BNP Paribas Asset Management, Head of Equities at Generali Investments Asia, General Manager at Angbang Asset Management, and acted as CEO and CIO of Frontier Financial Group.

Simon received his honoured degree in Accounting from the Hong Kong Polytechnic University in 1991 and Master of Business Administration in the Chinese University of Hong Kong in 1993. Simon is also one of the earliest of CFA charter holder in Hong Kong, 1998.

Q: Many regard blockchain to be the most impactful invention after the internet, what is your opinion on that?

Blockchain can be so disruptive that it reminds me how the Internet has changed the world for the last 20 years. Back in 2000 I was interviewed by the Economic Journal in Hong Kong (there were no social media) on a technology fund I was launching and the underlying theme I had was 3C. Communication, Content, and Commerce, in the expected sequence of development for the coming decade. Subsequently, we saw ADSL, VDSL replaced totally by FTTX. Those are legacy network technology from compressed-data telephone cable network to fibre of network.

We also saw limited WiFi 20 years ago to free WiFi today after going through 6 generations. We witnessed the auction of USD10 billion worth of bandwidth to develop the dreamed single 3G standard (which still ended up splitting in GSM and CDMA), and afterward, 3.75, 4, 4.5, LTE quietly crept in, before the talk of the town today becomes 5G that also aims to replace broadband. To invest in the communication space, one just snapped up cable, telco, equipment (still remember CISCO?), and silicon chips companies.

Things move fast and quietly in the technology space. Tech investors need to set high awareness to their surroundings to remain relevant.

Q: Can you elaborate more on the 3Cs trend and the investment implications back then? How does this intertwine with blockchain invention itself?

Content existed first in the form of portals that put everything on without consuming too much bandwidth. Specialisations only came later when people differentiated between horizontal and vertical portal contents. The investment implications were snapping up portal 'sites', web creators, newspapers, data compression technology, as well as browsers.

E-commerce did not exist in a significant way back then, largely because one essential element was missing - trusted payment. So, E-Bay style at your own risk was possible, but online merchants were not popular. But from 2011, the second decade saw a flux of proven enablers to make today's content and commerce so vibrant. Among them iPhone, FB, WhatsApp, YouTube, Google, PayPal, Dell, Amazon which changed the landscapes dramatically but not unexpectedly.

Today few people talk about online vs offline business, nor are people keen to know if you are using cloud or not, as they are becoming norms. This is how in just 20 years the world advanced with the Internet and the first glimpse of what network effect and ecosystem meant, which equally applies to finance.

All these have been exciting developments which brought a positive feedback loop to further advancement of technology. When connection speed is lightning fast, digital data is everywhere, and e-commerce going to take over all commerce, it is only natural that AI and Big Data came to the scene, and together with it 'smart 'everything: phone, car, house, storage, city and then the world.

Incumbents saw the future or felt the pain and a big wave of catchup has been taking place. Digital transformation by corporates, data-centric business models, and availability of open platform (XaaS) that IT outsourcing takes on a new definition. Just when everything becomes smarter, the world failed to avoid two huge financial crises. And in 2009, right after the second crisis, bitcoin quietly came to the world and at the same time its underlying technology - blockchain - was revealed openly to the world (although only computer geeks were more aware of it at that time).

This was not the first time of an open-source movement. The first wave of open-source computing - Linux - made its mark in history by showing the possibility of decentralized programming. This was followed by peer-to-peer networking (heard of BitTorrent?). But that was largely for data sharing and decentralised storage. Both did not take off to the mainstream financial world. Then came blockchain together with its first application bitcoin, and everything starts to change.

Q: Your connectivity, content, and commerce thesis in the early 2000s has been fruitful, what would be your theme on tech investment today?

I am a keen supporter of applying technology to the financial industry to help drive down the unnecessary costs (of time, efficiency, regulation, and trust). In 2016, I came across a question about bitcoin which I did not understand: is it real? It was of course virtual. But the real question was: is it a real alternative to something it intends to replace?

Bitcoin is intended to be "peer-to-peer electronic cash". Peer-to-peer and electronic (digital) parts are real. The remaining question for me is the 'cash' part. Or more generally, can bitcoin replace money? In particular, money in the form of cash (vs. check or credit). Today's 90% of payments are not done in cash.

So, replacing cash did not seem unthinkable for me. It was only four years later, in 2020, that I took a more serious look at bitcoin and blockchain when I had the same shocking feeling as when I first learned about the Internet.

Since then in 2020, my new investment thesis is 3D: Digitalisation, Decentralisation, and Democratisation. And I expect the same, if not more fundamental changes in the coming two decades to be brought by blockchain. Unlike 3C, where one C preceded the other, **3D is simultaneous.**

Blockchain is the technology that performs the digitalisation and at the same time permits decentralisation in the form of a democratisation governance process. Its first application, bitcoin, has spent 12 years in the wild and no one could refute it, but only to attempt to deny it. And yet it stands.

To me, bitcoin is providing a network of trust that current fiat money is losing. You are free to own, dispose of or hold bitcoin at virtually no sacrifice (of privacy) and no (unnecessary) cost. **Bitcoin is an invention that incorporates cryptography (security), thermodynamics (from energy to network) as well as game theory (incentive to support) that trust is fundamentally redefined.**

This is huge. No matter how complicated finance seems, it is all about trust. When you want availability (credit), quickness (electronic), convenience (digital wallet), security (2FA), transparency (consolidated statement), and privacy (trust structure), they all cost you dear. Are these the only ways to provide trusted utility? Bitcoin

challenges it and provides an answer, no longer as a concept, but **the greatest experiment for the decades to come.** And I believe this new financial infrastructure will succeed.

Digitalisation
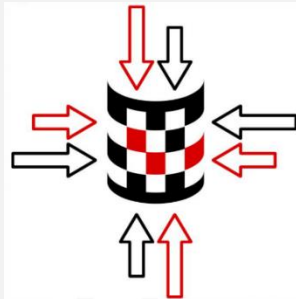
Digital refers to the electronic storage and transmission of data that in the field of finance often also means value. Digitisation (i.e. transforming non-digital data and records into digital format) has been going on for years and is still happening.

Daily examples include documents, signatures, ID's, books, phone calls, videos, classrooms etc. Digitalisation, on the other hand, is the creation of digital (and virtual) data without a transformation process. Virtual land and property, virtual concerts and singers, virtual games and items are familiar to most. Virtual assets in the form of money such as bitcoin is an invention.

Digitalisation is not a product. It is a network of processes in which only digital data is created, processed, and stored. In theory, there is no need to regularly keep records and take snapshots (accounting) as unique full history can either be reproduced easily, or in the case of blockchain, a full chain of historic records is a default output. When the digital data created represents a contractual relationship between two parties, it represents a value transfer.

Digitalisation suggests that all such contractual relationships can be created digitally. And if blockchain is used, it will also be secured and trusted, without the need of third parties to verify, approve and register them. The execution of the digital contracts will be enforced by the whole network (checking and verifying) and not subject to manipulations. Therefore, it is trustworthy and secured.

Decentralisation
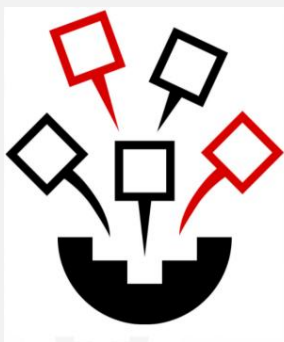
In the field of finance, centralisation is the norm rather than the exception. Cases in point: central bank, central registry, central depository, central clearing bank, central regulators, etc.

During the Financial Crisis of 2008, insane risks taken by big financial institutions were blowing up in their faces and the US government came to their rescue to the order of many billions of US dollars. At the same time, average US citizens were losing their jobs and being evicted from their homes, while the large institutions that created this crisis were being backstopped by government money.

The initial creators of Bitcoin did so explicitly with the intention to offer an alternative financial system that would be more **democratic and governed by the truly immutable laws of cryptography and computing power, rather than the oft-bending laws of man**. The flight to bitcoin heightened when, in 2012, the Cyprus Financial Crisis started to drive mass adoption of the virtual currency when the government of Cyprus literally took money out of their citizens' bank accounts to pay down their debts or outright confiscation.

The need for a fairer and more trusted system has never been clearer. Fast forward 10 years, in 2020, when the pandemic hit the globe, causing the loss of millions of jobs once again, the risks of the existing financial systems were totally exposed to every corner of the world and every walk of life. And bitcoin has entered the main street as an alternative financial system that cannot be manipulated by central agents. This is a strong anchor of decentralisation, a process which can only be delayed but not reversed.

Democratisation

Democratisation is the process of introducing the democratic system and principles to the financial infrastructure. This is in stark contrast to centralized financial infrastructure. The creation of blockchain has not

only made decentralised finance possible, it has a wider implication of making decentralized property, arts, music, and lots of tangibles and intangibles possible.

Under this system, there is **no dispute to fractional ownership, property rights, and legitimacy of creations and transactions.** This is significant, as it greatly levels the playing field with extremely trustworthy and transparent value and allow peer-to-peer to directly engage in such transactions without huge costs of discovery, verification, and transactions.

The ability to own a fraction of something that is not represented by securities but the asset itself is something that will change the world under this democratisation process. **When governance is truly decentralised and cannot be manipulated or faked, it represents the real value of trust.**

Bitcoin and DeFi would take on at least half of the world in the next decade if not more. Today's Google and Facebook who monetise users data will also be challenged. Decentralised system will not provide any data of great value to you unless with self-consent, on an active basis. Without the ability to unknowingly collect your metadata, Big Data will not be worth it as it claims, and tougher with it, AI will have much less applicable values. Limited data feed handicaps the machine's learning ability.

Democratisation is in a sense returning financial power to the commons but not needing to use the centralised financial systems, if not corrupted.

Part 4. Portfolio Strategy

Investment scope in Web 3.0

The Web 3.0 investment implications will be huge and we are in the early days. We have seen the network effect brought by the Internet 20 years ago. It might take a bit of time to change the majority investors' mindsets to speculate about the Web 3.0 future. The prospects outweigh the uncertainty.

While the scope of investment can be huge in the future, digital assets still represent a relatively small investable asset class compared to the traditional asset classes such as equities, fixed income, commodities, and currencies.

A practical strategy to invest in the new landscape is therefore to look at both virtual assets, tokenised assets as well as the technology space under the expanded definitions of Web 3.0.

We believe that the high investment value can be found at:

- Equities of decentralised network enablers, custodians of tokenised asset, and web-3.0-convergence tech companies.

- Utility token for decentralised finance, smart contracts, and chain integrators.

"All I want to know is where I'm going to die, so I'll never go there"

-Charlie Munger-

In respect to the value proposition offered by Web 3.0, we believe that the financial sector would be the prime market for disruption.

For instance, the emergence of decentralised finance (De-Fi) facilitates financial transactions and settlements on peer-to-peer basis with smart contracts (instantaneous self-executing obligation settlement) without the presence of a middle-man, higher financial inclusion, reduced asymmetric information through reliable records, and lower frictional costs.

Furthermore, we also would see an improvement in transactions discovery, higher user privacy control, and lower frictional costs. Such forces would disrupt a part of AI-driven technology as data would be scarcer and more expensive to be acquired.

Key technologies that grow convergently with Web 3.0

We believe that several major technology trends are about to reach a new level of maturity at the same time. The simultaneous maturity of these trends is mutually reinforcing, and collectively they will drive the third-generation Web. From this broader perspective, Web 3.0 might be viewed as the convergence of key technology trends:

Ubiquitous Connectivity

- Broadband adoption

- Mobile Internet access

- Mobile devices

Network Computing

- Software-as-a-service (SaaS) business models

- Web services interoperability

- Distributed computing (P2P, grid computing, cloud computing)

Open Technologies

- Open APIs and protocols

- Open data formats

- Open-source software platforms

- Open data

Open Identity

- OpenID

- Open reputation

- Portable identity and personal data (for example, the ability to port your user account and search history from one service to another)

The Intelligent Web

- Semantic Web technologies and statement-based database

- Distributed databases (wide-area distributed database interoperability enabled by Semantic Web technologies)

- Intelligent applications (natural language processing, machine learning, machine reasoning, autonomous agents)

We see that a tide of tremendous changes have just started to roll out. It is attempting to decentralise a centralised structure. It disrupts well-established institutions from corporates to governments. Identifying opportunities and risks early would provide an edge for investors who seek to be the winner in the upcoming technology evolution.

Elon Musk's Midas tweets fuelled a FOMO and FUD showdown in the crypto market

Elon Musk's tweets have been gaining enough significance to move markets as many investors are getting richer because of Tesla stocks (TSLA.US) that generated 750.8% gains for the year 2020 and his 'blessing' on GameStop (GME.US) that became the infamous short squeeze by retail investors.

His tweets on Tesla's development of nickel-based batteries also triggered a frenzy that drove commodity- and nickel stock prices upward. It creates a halo effect that Elon is on the retail investors' side.

Recently, Elon directed his Midas tweets to Bitcoin and DogeCoin. Bitcoin's price rose approximately 50% within weeks after Tesla announced that it purchased the coin worth USD 1.5 bn and accepted the coin as a form of payment in February 2021.

Lately, his tweets on DogeCoin had successfully boosted the coin's market capitalisation from virtually nothing to USD 87 bn, bigger than that of British Petroleum.

However, he posted a sudden u-turn tweet on 13 May 2021. He withdrew Bitcoin from Tesla's terms of payments due to concerns over the rapidly increasing use of fossil fuels for bitcoin mining. Four days since, the Bitcoin price fell 20%. DogeCoin, was dragged along, declining by 32% within the same period.

With such global herding behaviour fuelled by FOMO and FUD, is the crypto asset market becoming a greater-fool game?

Enjoy reading our reports?

Check out our website for more!

-The End-

References

Allen, J. G., Rauchs, M., Blandin, A., & Bear, K. (2020). *Legal and Regulatory Considerations For Digital Assets.* Cambridge Center for Alternative Finance.

Binance. (2021). *2021 Global Crypto User Index.* Binance.

CFTC. (2020). *Digital Assets Primer December 2020.* CFTC.

Cipolaro, G., & Stevens, R. (2020). *The Power of Bitcoin's Network Effect.* NYDIG.

Crypto Compare. (2018). *Cryptoasset Taxonomy Report 2018.* Crypto Compare.

Crypto Compare. (2021). *Crypto Compare Digital Asset Management Review April 2021.* Crypto Compare.

Crypto Compare. (2021). *Crypto Compare Exchange Review March 2021.* Crypto Compare.

Deloitte. (2020). *The Spatial Web and Web 3.0: What business leaders should know about the next era of computing.* Deloitte.

European Parliamentary Research Service. (2020). *Digital finance: Emerging risks in crypto-assets-Regulatory and supervisory challenges in area of financial services, institutions and markets.* EPRS.

Graham, B., Dodd, D. L., & Tatham Jr., C. (1951). *Security Analysis: Principles and Technique, 3rd Ed.* McGraw-Hill Education.

Holovatiuk, O. (2020). Cryptocurrencies as an asset class in portfolio optimization. *Central European Economic Journal Vol.74. Issue:54.*

Hougan, M., & Lawant, D. (2021). *Cryptoassets: The Guide to Bitcoin, Blockchain, and Cryptocurrency for Investment Professionals.* CFA Institute Research Foundation.

KPMG. (2021). *Investing in Virtual Assets.* KPMG.

OECD. (2020). *The Tokenisation of Assets and Potential Implications for Financial Markets.* OECD.

Shapiro, C., & Varian, H. R. (1999). *Information Rules.* Harvard Business Press.

Zeckhauser, R. J. (2006). Investing in the Unknown and Unknowable. *Capitalism and Society, Vol. 1, Issue 2, Article 5, 2006.*