THE CRYPTO HANDBOOK

The ultimate guide to understanding and investing in **DIGITAL ASSETS**, **WEB3**, the **METAVERSE** and more...

EDITED BY

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First published in 2023.

Hardback ISBN: 978-1-80409-012-1
eBook ISBN: 978-1-80409-013-8

British Library Cataloguing in Publication Data
A CIP catalogue record for this book can be obtained from the British Library.

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INTRODUCTION

It is a rarity to live through a period in time that has the potential to completely reshape the future of our world.

To exist in a time where we have the tools, access and motivation not only to take control of our existence but to actively shape our present and our future is an immensely powerful thing.

That's what the emergence of crypto assets, decentralised networks, crypto technologies and innovation brings to society.

The rise of crypto in our world has been spectacular. From its beginnings in 2009, there has been an explosion of ideas, innovation and creative disruption on a scale and speed unrivalled in history.

However, what may appear to be an overnight success is a trend that began as far back as the earliest days of the internet.

The seeds of what would become Bitcoin began in the 1970s and 1980s through the cypherpunk movement, which challenged ideas around what money, privacy and freedom are, could be and should be in the future.

Today in 2023, 14 years after Bitcoin's genesis, crypto has changed the way in which society thinks, transacts and interacts. While not yet on a scale to rival the invention of the internet, it's fast catching up.

Therefore, I'm of the view that if we look at economics as a social science, perhaps that's exactly how we should look at crypto as well.

Getting your head around crypto

Fundamentally, the way in which the crypto market behaves, the way in which its cycles boom and bust, and the way in which it progresses and innovates are reflections of society and its changing desires, fears, hopes, needs and wants over time.

But for many people, getting their head around what crypto is, where it's come from, why it's here and what it means today, tomorrow and 100 years from now is a real challenge.

There is a lot of noise, misinformation, lack of understanding and confusion about the emerging industries building around crypto.

And therein lies the purpose of *The Crypto Handbook*.

This book is a timely and valuable resource whether you're just starting out on your crypto journey, are intellectually curious, have been around for a cycle or two or are a key decision-maker in an organisation trying to figure out what it all means for your business.

In Part One of this book I open the door, and hopefully your mind, to an industry that is full of unbelievable innovation, development and visionary talent building out systems and networks for a better future.

I dive into areas of the industry including: exchanges, Bitcoin, altcoins, security, stablecoins, storage, how to spot scams, decentralised finance (DeFi), NFTs, Web3 and more.

In Part Two I take a more analytical look at data from the industry to help you understand crypto cycles, emerging sectors, how the market moves and areas of performance – both within shorter-term timeframes and bigger, long-lasting trends.

Finally, in Part Three, I speak with industry leaders about their perspectives and experiences in crypto. Their first-hand accounts will give you insight into what's really happening in the industry, show you how diverse and fascinating crypto is and the potential it holds for our world.

A little about me

But who am I to tell you about what's what in the world of crypto?

I've been an investor in traditional stock markets since I was 10 years old. My parents were both primary school teachers and taught me the value of learning, information and being an independent thinker. My grandfather taught me about investing and the stock market, helping me invest in the markets as a child.

It's this upbringing that forged who I am today and motivated me to spend my formative years trying to understand how the world works, how companies and industry work, why society behaves in such unusual ways and how technologies form such an integral part of existence in our modern world.

In short, I'm a deeply curious nerd who forever questions the status quo.

I ended up in postgraduate education with a focus on finance and economics. I then spent a good chunk of my early career as an independent financial adviser to private investors. I was for all intents and purposes, TradFi (traditional finance).

I eventually found my way into financial publishing, which gave me the intellectual and professional freedom to write to people about my research, analysis, views and ideas about the big game-changing, society-shaping ideas of our future.

My upbringing and professional background are important because they built a foundation and confidence to look at the world and markets with a contrarian eye, to challenge conventional thinking and to strive to help others achieve financial independence by taking control of their own destiny.

So it made perfect sense that I was to stumble across a weird, but deeply fascinating, online 'money tree' called Bitcoin in late 2010. My curious and contrarian brain was fired into action.

Many of the core tenets of Bitcoin: freedom from centralised authority,

self-sovereignty and unconventional monetary thinking, were right in my wheelhouse.

However, to say I was sceptical in my early experience with Bitcoin is an understatement. I don't think you can come from a TradFi background and not be sceptical when you first encounter Bitcoin and crypto.

But as I took the time to learn, understand, read, research and critically look at what was happening, it was inevitable that I would head down the crypto rabbit hole. I've since devoted my professional career to the industry by learning everything I can about crypto and also helping everyone and anyone I can to learn and engage with it too.

Since 2010 in this industry I've seen what started as little more than an immature thought-experiment go through an incredible transformation, becoming a global phenomenon that's captured the attention of the world (both the good and the bad) and already has an impact on shaping our society.

Personally, from learning how to buy and transact in bitcoin, to mining, losing BTC in exchanges (like Mt.Gox), riding the ICO boom (the many attempts to bring new cryptocurrencies to market through an initial coin offering (ICO) – the crypto equivalent of a traditional private company's initial public offering), buying my first NFTs (CryptoKitties), building a playground in a metaverse, getting rug-pulled in DeFi, seeing healthy profits and debilitating losses through multiple cycles, there's not much I've not seen or done in this market.

I've spoken on panels and presented keynotes at conferences about the crypto revolution. I have travelled the world to meet with industry leaders, and even wrote my first book, *Crypto Revolution: Bitcoin, Cryptocurrency and the Future of Money* in 2016 and published it in early 2017.

But most importantly for me, I've helped hundreds of thousands of my readers over the years to learn about and understand crypto.

A work in progress

The work is not done. It may never be done. It's crucial that people can access the right kind of credible, thought-provoking information about crypto and what it means for the world.

How will it impact you? How will it impact generations to come? What are the key things to know and what is noise? How do you even begin with crypto and then how do you build your knowledge base and take back that control for yourself?

These are just some of the questions that I hope by the end of this book you'll have the answers to and be able to learn from.

The emerging crypto industry is an incredible example of what humanity can achieve under the right conditions with the right freedoms and motivations.

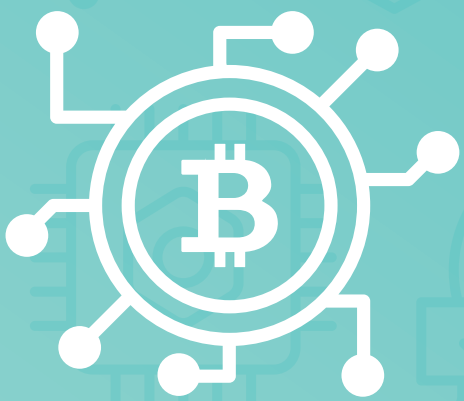
It is nothing to be frowned on, laughed at or lambasted. It is certainly no Ponzi scheme and definitely not 'rat poison' (looking at you Mr Buffett).

We should celebrate that, in its short existence, crypto has pushed the envelope of conventional thinking and made people stand up and fight for the ownership and control of their data, information, independence and wealth.

That is the power of what crypto brings to society and the beauty of what it might help us all achieve in the future.

Sam Volkering

INTRODUCTION TO CRYPTO



PART ONE

What is Bitcoin?

IT IS ONE of the great questions of the 21st century: what is Bitcoin?

Bitcoin is an asset that has gone from a value of just cents in 2009 to, at its highest ever peak in 2021, almost US$70,000 per bitcoin. The numerical return on that stretches into the hundreds of millions of percent.

This astronomical rise also brought an explosion of fame – or infamy, depending on who you talk to – meaning bitcoin is one of the most discussed, analysed, feared and loved assets the world has ever seen.

It also means you could ask any room of ten experts from the crypto industry and from traditional finance "What is Bitcoin?" and you'd probably get 10 different answers.

The fact that defining what Bitcoin *is* causes such debate is what makes it so incredibly unique.

CHAPTER 1

The whitepaper

To even try to answer the question "What is Bitcoin?" we must start with the original Bitcoin whitepaper.

'Bitcoin: A Peer-to-Peer Electronic Cash System', is the title of the whitepaper authored by the pseudonymous author, Satoshi Nakamoto, and published in October 2008.[1]

If you own bitcoin, are looking to own bitcoin or have anything to do with bitcoin, then start with the whitepaper. And if you encounter any sceptics, opponents, critics or anyone who thinks they know what Bitcoin is or isn't, just ask a simple question: "Have you even read the Bitcoin whitepaper?"

I'd hazard a guess that many – most – haven't.

Read the whitepaper and you'll learn that by its most basic definition bitcoin (for clarity I'll capitalise the 'B' when referring to the network, and use lowercase for units of the currency) are intended to be electronic cash. It is a way for you and me and anyone else, peers on a network, to transact with each other without the interference of traditional third-party intermediaries of the financial system.

In several instances the whitepaper refers to the issues of traditional finance and banking, particularly around privacy and trust. Bitcoin is for all intents and purposes an alternative cash network for the world to use.

It is simple, elegant and robust.

While we may never know the long-term vision of Nakamoto, it's fair to infer that the ultimate intention behind Bitcoin was to create a world where the entire supply chain, a fully circular economy, operates using bitcoin as its medium of exchange for transactions.

Think of it as a future global digital reserve currency.

That, in my view, is how we should think of Bitcoin. This of course flies

in the face of how the modern, traditional financial system and fiat currencies operate.

Perhaps Bitcoin oversimplifies how the world can or should work. Maybe the idea of an electronic cash network independent of centralised authority is too optimistic.

But what it absolutely does achieve is to force us to ask questions about the forms that money, as we know it today, can take.

What is money?

Money (as we currently think of it) is a medium of exchange that allows for global commerce and economic activity. It is issued by central banks. To many it is the cash in their hands; for others, the numbers on an app.

According to the Bank of England, 96% of money in the UK is held electronically as bank deposits. Only 4% of money is held physically, in the form of cash.[2]

As depositors we place an enormous amount of trust in our banks – trust that we will always have access to the money we have left in their care.

That is a lot of trust placed by the many in the hands of the few.

The global financial system operates as a fractional reserve. That means the amount of deposited money held in banks as actual, physical currency only represents a small proportion of the money deposited. If everyone were to try to withdraw their money in physical form all at once, there simply wouldn't be enough of it. When too many customers of a bank do occasionally attempt to withdraw too much at once, it's what's known as a 'bank run'.

Only when you understand fractional banking can you truly grasp the extent to which the traditional, centralised financial system lives or dies by our inherent trust that our money truly is ours when we want it.

Not only do we rely on trust in the central bank and retail banks to

keep our money safe and accessible, we also rely on central banks and governments to implement responsible and effective monetary and fiscal policies (respectively).

The issue that now raises its ugly head is what happens if:

a) there's a breakdown in trust between depositors and the banks, and;

b) governments and central banks employ risky, ineffective and incorrect fiscal and monetary policies?

Bitcoin has risen in prominence, popularity and value in part due to the poor decisions and actions of these central points of authority in the traditional financial system. In short, the few (central bankers and government) have failed the many.

Therefore it's fair to assume the timing of Satoshi's 2008 Bitcoin whitepaper was no coincidence. Its release came as the global financial system was in the midst of a cataclysmic collapse, often referred to as the Global Financial Crisis (or GFC).

While the centralised financial system and global markets were in full capitulation mode, the most influential financial development of the modern era – Bitcoin – was just starting. It is the first example of truly decentralised finance, and for many the panacea to all the problems with the traditional financial system.

It is within the very first block of Bitcoin's blockchain that we see the strongest indication of what Bitcoin was intended to be from day one.

The Genesis Block

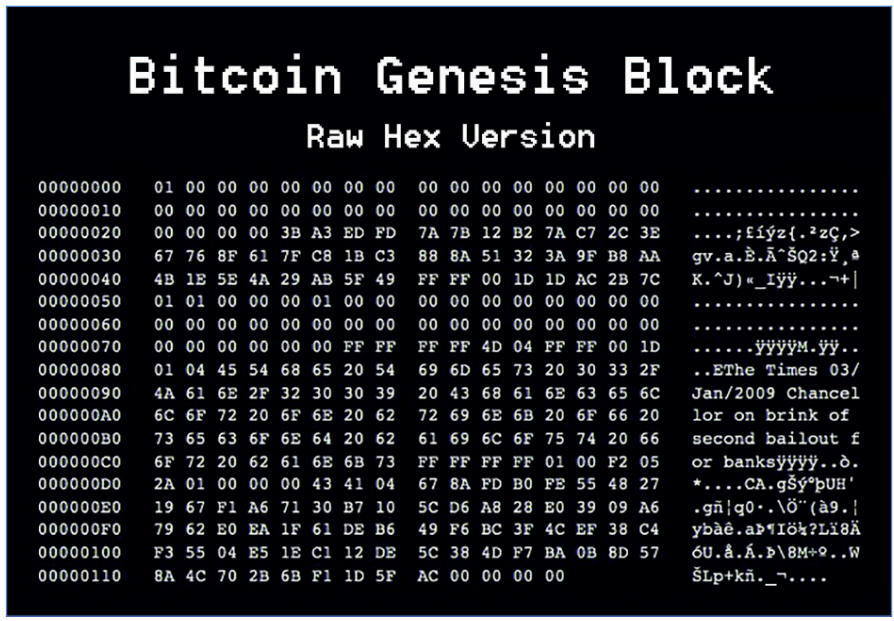
A block is a record of all transaction data during a period of time on a cryptocurrency network. The very first Bitcoin block recorded – its Genesis Block – holds a key piece of data that sums up Bitcoin's essential nature and explains why it's taken on its own lifeforce.

Bitcoin's Genesis Block was mined at 2:54am on 3 January 2009. As

you can see in Figure 1, data contained within the block displays the following text:

"…The Times 03/Jan/2009 Chancellor on brink of second bailout for banks…".

Figure 1: Bitcoin's Genesis Block



Source: Wikimedia Commons

That was the front-page headline of UK newspaper *The Times* on the day of Bitcoin's launch into the world.

By the time Bitcoin's whitepaper and Genesis Block launched, the GFC had led to bank bailouts and the start of the most experimental monetary policy from central banks in history: quantitative easing (QE).

Not only was the timing of Bitcoin's release no coincidence, it was the intentional release of a new global financial system diametrically opposed to the one on the brink of systemic collapse.

Throughout the years since the creation of Bitcoin's Genesis Block in 2009, central bank policy and QE remained. Bank rates headed to

zero, debt (government, corporate, household debt) skyrocketed and central banks flooded the economy, printing infinite supplies of new money.

Meanwhile, Bitcoin's network remained steady, reliable, secure, robust and predictable. As the global financial system became more complex, convoluted, unpredictable and uncertain, Bitcoin remained absolutely dependable.

The global financial system would continue into the depths of a highly inflationary cycle, constantly printing an endless supply of money. By contrast, the rate of creating new bitcoin has always been based on its original code – new bitcoin (or BTC) are created when participants in the Bitcoin network known as 'miners' receive a reward in BTC for validating the blocks and hence 'blockchain' of transactions (more on that later). This process has and always will work towards creating a finite supply of 20,999,999.9769000 BTC (21 million for ease).

In a sense Bitcoin is both inflationary and deflationary by design. It is inflationary in that new tokens are constantly being created, working towards the 21 million end point. At the same time the block reward (the number of new bitcoin minted and paid out to miners for each block 'mined') regularly drops, halving with every 210,000 blocks. This means the rate at which new tokens enter circulation is constantly decreasing, so in this way it is deflationary.

This raises the question of what happens when all bitcoin are in circulation? Not everyone would have the chance to own even one whole bitcoin.

Bitcoin can be broken down into smaller denominations, the smallest of which is known as a 'satoshi' or 'sat'. A sat is the equivalent of 0.00000001 BTC. While we might be talking about a finite supply of 21 million whole bitcoin, the reality is a finite supply of 2,099,999,999,999,999 (2.09 quadrillion) satoshi.

This brings us back to the idea of a future global digital reserve

currency. There are more than enough satoshi to underpin a global financial system with bitcoin as a digital global reserve currency.

Perhaps it's hard to imagine today, and most certainly won't be something that happens in our lifetime, but Bitcoin does present us with an alternative, a new concept of money without the controls and interference of centralised financial authority.

It may mean different things to different people, and there will be some who argue that my description is wrong, but the design of Bitcoin, the nature of its existence and its ability to exist without the need for centralised trust in third parties make it a worthy, and valuable, candidate for the future of money.

Again, I ask…

What is Bitcoin?

What is money?

Perhaps Bitcoin is money, and money is Bitcoin.

However, bitcoin isn't the only cryptocurrency on the market. Some argue that it may eventually be replaced as the most valuable crypto in the world. That makes it worthwhile taking a look at the rest of the crypto market.

Altcoins or S***coins?

CHAPTER 2

Money and wealth can turn even the most placid of investors incredibly tribal.

It's human nature to want to be a part of a tribe, and numerous studies indicate that we carry bias based on the tribes we belong to.

Of course, 'tribe' in this sense isn't the visceral, weapon-wielding early iteration of human society. It's simply referring to a group of people who share common beliefs, ideals and ideas.

By its nature, the investment world is a very tribal realm. It is populated by investors in property, gold, equities, fixed income instruments, foreign exchange and crypto (among other things). Each type of investor belongs to a tribe made up of those who believe that their favoured investment product is the best. Your tribe is an important part of the fabric of your wealth makeup.

This is why you get such heated debates between gold 'bugs' and bitcoin 'maxis'. The arguments on both sides may start off reasoned and rational, but

the inherent belief by the respective tribes that one is better than the other often results in debate descending into chaos.

This tribal approach to investments and investment beliefs is *incredibly strong* within crypto communities as well.

You can have people who genuinely believe the crypto they've invested in is the only solution to all the world's financial problems. Anyone who opposes or questions the values of that particular investment faces the wrath of not just individuals but an entire tribe of believers.

That's why, in crypto analysis, we often talk about the power of the community. What we're really talking about is the strength and devout belief of the tribe. When enough tribe members rally around a collective belief, and that grows, expands and becomes more popular, the tailwinds that can get behind a crypto's rise up the ranking charts can be quite phenomenal.

The first widely recognised and accessible crypto was bitcoin. And for many people that's all we need and will ever need in crypto. For the true bitcoin maxis, everything else that's not bitcoin is simply known as a 'shitcoin'.

A four-letter coin

Apologies for the term, but that's what they're called within the industry. You can go all the way back to the first crypto launches that weren't bitcoin, and you'll find that term readily and widely used to describe cryptocurrencies.

In many instances the term is appropriate. But to take such a narrow view would be akin to believing that we will only ever need Amazon Inc. – and nothing else in the world – to fulfil our consumer needs.

The reality is that the crypto industry has exploded in size, scale and interest, not just because of Bitcoin but because of everything else the industry now brings.

If you look at the price-tracking website CoinMarketCap, you'll see

they track almost 22,000 cryptocurrencies; and Coingecko tracks around 13,000. These are two of the biggest websites of their type, and there is a lot of crossover between the two, but there are also crypto that neither website tracks. So it's fair to say now (although we may never really know exact numbers) there are well over 25,000 different crypto tokens in the wild, so to speak.

If you were to take a close look at all 22,000 crypto listed on CoinMarketCap, you'd come to find that a big chunk of them are either dormant, abandoned, valueless or simply just a scam token. There are swathes of crypto that have market cap values (i.e., the total value of the issuing company's shares) of less than $1,000 and some with no value data at all. When you apply a filter on CoinMarketCap to isolate companies with a market cap of at least $1 million, there are really only 1,366 crypto that data shows up for.

That is more or less the world of investable crypto as it now stands.

What these numbers tell us is the wider world of crypto is, on balance, garbage. When you narrow down the focus – to thousands rather than tens of thousands of currencies – in comparison to traditional markets, crypto is still in its infancy.

Nonetheless, bitcoin is only one of thousands of crypto. It's all these others that have come to be known as *altcoins*.

The term altcoin simply means a crypto that is an alternative to bitcoin.

Thereby, anything that isn't bitcoin is an altcoin.

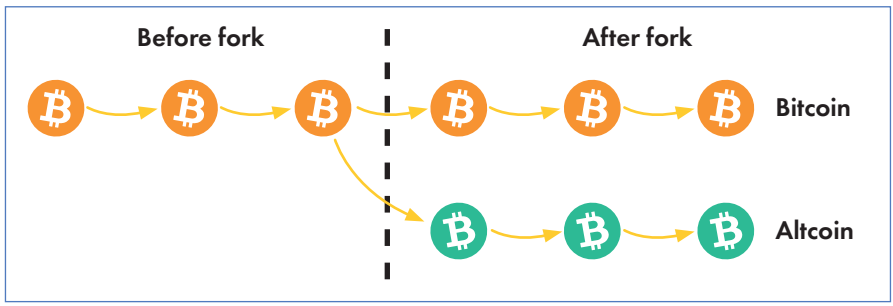
The origins of altcoins go back all the way to 2011, when we first started to see them hit the market – but it was 2013 when we saw the first real altcoin *boom*.

Names, peers and native casinos

The altcoin boom of 2013 was the first real exponential price explosion of altcoins on the market. To begin with, many of these new 'alt-coins' (early on we used a hyphen) were 'forks' of Bitcoin.

A fork is where a new project takes a network core code, changes it and then continues a new separate blockchain with a new token. Using Bitcoin as an example, it would look something like Figure 2.

Figure 2: Bitcoin fork



Source: Editor's own image

A fork is not exclusive to Bitcoin – any crypto network can be forked – but is a convenient way of bringing an altcoin to market using a crypto blockchain as a starting point.

Forks of Bitcoin had come steadily since 2011, with Litecoin and Namecoin being two of the biggest and most well-known. Then Peercoin came along, and slowly but surely other crypto started hitting the market during 2012 and 2013.

The Bitcointalk forum started lighting up with new altcoins such as Opencoin, NXT, Worldcoin, Quark, Mooncoin, Mastercoin, Feathercoin and Dogecoin. Some promised to be game-changing currencies, some were jokes based on memes, some were pump and dump schemes, while others were launched and quickly abandoned.

When people talk about the 'wild west' of crypto today, there is no comparison to what it was like in 2013. In 2014 things got even wilder. Mazacoin, Cloakcoin, Xcoin, Monero, Blackcoin, Ant Shares, Ruscoin… the list goes on and on.

Some were utter garbage (Mazacoin and Ruscoin are perfect examples). Others like Monero, Xcoin (which become Darkcoin, which became

Dash) and Opencoin (which became Ripple Labs, then just Ripple, then XRP) are still thriving today. It was extreme market irrational exuberance, a healthy dose of fear of missing out (FOMO) and a true market bubble.

Exacerbating the first altcoin boom and bust was the fact exchanges started to hit the market, which made trading these altcoin incredibly easy.

Bittrex, Poloniex, Cryptsy, Mintpal, Kraken, Coinbase – these exchanges were available to either buy bitcoin or deposit bitcoin and trade for altcoins.

The rise of crypto exchanges helped spur the number of altcoin launches, altcoin trading and the first altcoin boom… and bust.

Crypto winters

After the 2013 altcoin boom – and the subsequent bust in 2014 – came the first crypto winter, in 2015, extending to 2016. With its inevitable thaw in 2017, more and more crypto started finding their way into the market. Even when investor sentiment and market values were in the doldrums, new innovations and developments were being released.

For example, in 2016 Zcash launched with an ultimate focus on privacy. In the same year, Ethereum's arrival opened up an entire new world of potential for another altcoin boom.

Where the first altcoin boom was a mix of new networks and a lot of forks from Bitcoin, the altcoin boom of 2017–18 was driven by Ethereum.

Thanks to the nifty technology known as smart contracts introduced on Ethereum's network, developers were able to easily launch a crypto token without its own blockchain, instead existing on Ethereum's blockchain.

Many altcoins launched at this time adopted the token standard on Ethereum known as the ERC-20 standard, meaning they used code

on the Ethereum network for the creation of tokens and were able to deploy new crypto at unprecedented speed.

In 2017 this allowed the industry to quickly open up to new ideas and innovation through the deployment of new projects using ERC-20 tokens. Soon enough we saw crypto launching with everything from CryptoKitties and Crypto Punks (the first wave of NFTs); to Decentraland (a virtual world where you could buy and build on virtual land); Powerledger (a network that would enable renewable energy trading); Chainlink (decentralised data oracles for market makers and smart contracts); Basic Attention Tokens (decentralised internet browsers and advertising tokens); and many more.

These are just a few examples of the hundreds – if not thousands – of crypto that launched in 2017 and then 2018, 2019 and 2020. In reality a lot of the altcoins that made it to market were scams, get-rich-quick schemes by savvy digital natives that burned regular investors and pump-and-dump schemes that played on people's FOMO (fear of missing out) in a raging bull market.

Altcoins of the first boom often forked from Bitcoin's network leading to hundreds of new crypto. This continued in the second boom, but now altcoins also forked from other networks, such as Ethereum, leading to *thousands* of new crypto. In both altcoin booms we also saw a whole lot of copy-and-paste code just to quickly launch an altcoin that was more or less vapourware.

This is where a new token issuer would copy code (as most crypto are open source) then change a few parameters, such as the number of tokens in issue, the name, website, etc. They would then launch the token into the market, get it trading on the many sketchy exchanges that were by then available, pump the price, dump tokens to unsuspecting retail investors driven by FOMO, and then abandon the project.

Unfortunately, this is process is endemic to the altcoin world. Due to the open-source nature of its code, the accessibility of crypto and

the ease of launching a token into the market, scams and nefarious activity are a troubling part of *every* cycle.

Endless innovation

However, with every cycle, every altcoin boom also brings something new – something exciting that has longevity, utility, impact on society and creative, disruptive potential.

Over 2019, 2020 and into 2021 we saw it happen again. This time with the explosion of decentralised finance (DeFi) protocols, platforms, and market makers, of lending and borrowing protocols and a whole range of innovative crypto-finance use cases.

It wasn't until late 2020 – and then into 2021 – that innovative platforms such as Uniswap, AAVE, Compound, Sushiswap and Synthetix became the darlings of the 'DeFi summer' of 2020. Many of these innovations had origins going back to the 2017–18 boom and bust, but had since adapted, launched new offerings and pushed the industry into its latest cycle.

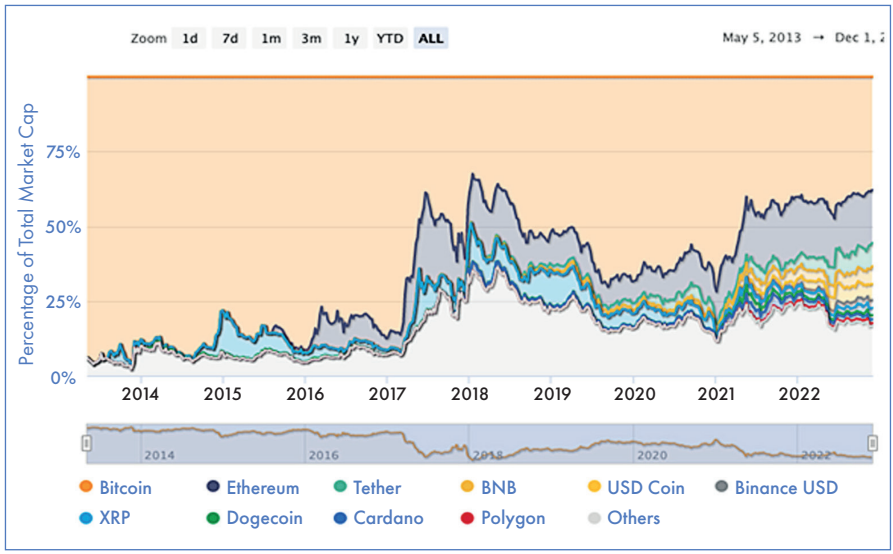
Therein lies the key takeaway from the altcoin market.

Not all altcoins are shitcoins. While many are, and many more to come will be, there are some that offer real game-changing, industry-disrupting potential.

They now make up a huge part of the overall crypto ecosystem. Bitcoin is dominant, but over time the sheer weight of numbers of altcoins that have purpose, longevity and potential begins to stack up.

As you can see in Figure 3, Bitcoin's dominance in terms of overall market cap is already diminishing. That's not to say Bitcoin's *importance* is diminishing, but that altcoins are becoming more and more relevant to the market.

Figure 3: Bitcoin's dominance



Source: CoinMarketCap

During the crypto 'winter' that follows each and every cycle, the best altcoins end up in development. It's then that the market sentiment is at its worst, fear and uncertainty are at their peaks, and the best altcoins find their way into existence.

Altcoins will forever be a part of crypto and our world. Tribal as the industry may be now, and may continue to be in the future, the reality is that all crypto – bitcoin and altcoins – can, should and will coexist.

Altcoin is not a dirty word, and if you take the time to filter the real shitcoins, you'll find a huge, diverse range of quality projects, exciting new protocols and ways to build and accumulate crypto wealth over the long term.

As with all things crypto, the range of tokens available is ever expanding. Next we'll look at one of the more recent developments: the stablecoin.

The Rise of the Stablecoin

CHAPTER 3

First and foremost, understanding what a 'stablecoin' is sets the foundation for understanding their role in crypto finance and the global financial system.

The clue is in the name.

A stablecoin is intended as a crypto token which maintains 'stability' – typically adhering to a fiat currency peg.

For example, the USDT (Tether) or USDC (Circle) stablecoins are both pegged to the US dollar. Their target is to maintain a stable one-for-one value against the US dollar.

That means 1 USDT or 1 USDC will keep stability with 1 US dollar.

These two particular stablecoins maintain this stability by keeping reserve assets that allow every stablecoin they issue to be redeemable for the equivalent fiat currency, in this case the USD.

Tether, for example, uses a mix of cash, cash

equivalents, commercial paper and short-term deposits.[3] Circle – who issue the USDC – keep a mix of cash and short-duration US treasuries.[4]

Today the top three stablecoins – USDT, USDC and BUSD – issued respectively by Tether, Circle and Binance, collectively have more than $130 billion worth of US dollar stablecoins in circulation.[5]

The rise of the stablecoin in crypto markets has been phenomenal. The concept and creation of stablecoins only came about in 2014, but their incredible rise from nothing to a value well over $100bn has taken place only since 2018.

No doubt this raises questions: how did this happen so fast? What role will stablecoins play in the future of crypto? Are stablecoins useful or a hinderance to the progress of the crypto revolution? Let's dig a bit deeper and find out.

From nowhere to everywhere

In short, there is one primary explanation for the immense rise of the stablecoin: speculation – a risky trading strategy that aims to turn market fluctuations into quick profits.

Of course, I don't mean speculation in the stablecoins; they are (mostly) after all, *stable*.

I mean speculation in crypto trading markets.

To understand speculation in this sense, you have to look at the rise of Bitcoin.

The intention of Bitcoin was as a peer-to-peer version of electronic cash. By its nature, Bitcoin's origins were to replace fiat-currency cash. From a wide-reaching philosophical view, that means a future world with an entire circular economy – one where the underlying medium of exchange is bitcoin.

However, over the years, bitcoin has become a speculative asset, as its value relative to fiat currencies (like the US dollar) has grown in size.

In its earliest days, bitcoin's fiat-currency value was measured in cents. In more recent times, it's in tens of thousands of dollars.

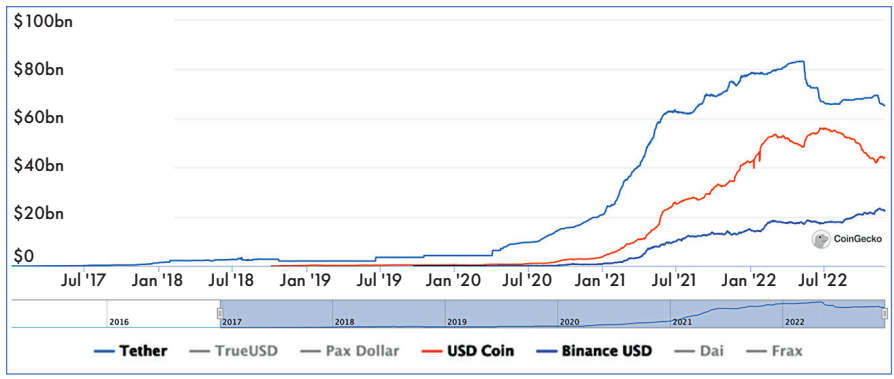
At its peak in 2021, more than $42bn worth of bitcoin was traded every 24 hours. For comparison, Apple Inc. (NASDAQ:AAPL) does on average of around $12.5bn in 24-hour volume.

The trading of bitcoin – and of new altcoins introduced to the market – as a means of speculative investment return has intensified over the years and with every major crypto cycle.

This has created a huge demand for a stable asset to provide a trading pair for crypto assets. The market has demanded the ability to easily sell into a stable fiat currency. A self-fulfilling prophecy, the larger the money flows into crypto, the bigger the trade values and the greater the need for stablecoins.

Take a look at Figure 4, which shows the rise in percentage of market cap of the three biggest stablecoins: USDT, USDC and BUSD.

Figure 4: Stablecoin market cap



Source: Coingecko

If we look at the data from early 2017, there are a few key inflection points that indicate the rise of stablecoins and the rise of crypto fiat-converted values.

Pre-2017 stablecoins were virtually non-existent: Tether had barely $10m of circulating stablecoins before 2017. But midway through that year, a bull market emerged. It peaked in January 2018, by which point Tether had around $2bn in circulation. At the time, bitcoin was trading at around $20,000.

As the market continued to fall through 2018, Tether saw its circulation *increase*. This was a by-product of crypto investors *exiting* positions, but now with the option to sell into a fiat-currency stablecoin: the USDT.

Around this time the potential of stablecoins in a speculative bull market was realised by Circle and Binance. As the crypto winter of 2019 set in, they brought their stablecoins to market in preparation for the next cycle.

It was a shrewd move. As the market bottomed around March 2020 (the earliest stages of the global pandemic), then kicked into a massive bull market in 2021, the volume and value of stablecoins in circulation exploded.

A similar patten emerged to that of 2018. The market peaked around October and November 2021. Yet as crypto asset values tapered off, stablecoin issuance continued to explode, lagging the market as investors and traders continued to flee from crypto assets into stablecoins.

This is best understood in context with the overall market cap of the total crypto ecosystem, as seen in Figure 5.

Figure 5: Total crypto market cap

Source: CoinMarketCap

What this tells us is the stablecoin market provides all the usefulness of a fiat currency, in terms of real-world stability for investors and traders looking to trade on the fiat-currency speculative values of crypto assets.

What makes stablecoins particularly useful, though, is the ability to retain that value within crypto networks.

There is no need to funnel wealth to and from the traditional financial system, so it is possible to avoid the frictions of intermediaries and the unpredictability of banks in dealing with exchanges.

By simply shifting the value of crypto assets into a stablecoin, the ability to move back into a crypto becomes substantially easier, and faster.

Hence the stablecoin has become hugely relevant for trading, lending, borrowing, and the increasing complexities of the crypto ecosystem.

However, for all the benefits that brings, there is an inherent flaw in what stablecoins represent and in what they even are.

Perils of the stablecoin

A stablecoin is a crypto asset that represents – and pegs to – a fiat currency. The problem with this is that *it's pegged to a fiat currency*.

This means it's still at the mercy of the manipulations and machinations of global central banks and the traditional financial system. In real terms, your stablecoins still suffer from inflation.

Hence I use the term 'stable' with caution, because the reality is that if inflation is running at 10% then stablecoins are losing 10% of their value per year, just like your TradFi cash in the bank.

There's an argument that stablecoins – by their very existence – are the antithesis of what crypto is aimed to be, which is independent of centralised control and authority. While stablecoins might be *issued* by organisations like Tether, Circle and Binance, they are still influenced by government and central bank policies that impact fiat currency.

The only *real* stability of a stablecoin is the representation of the equivalent fiat currency. Even in that respect, not all (arguably, not any) stablecoins are made equally.

In 2020 we saw the implementation of what are known as 'algorithmic stablecoins'. These are stablecoins that do not have underlying reserve assets to support their value. Instead, algorithms are deployed to manipulate issuance and burning (removal) of stablecoins in circulation in real time, to maintain a peg to a particular fiat currency.

Sounds complex? That's because it is. These stablecoins implement demand and supply theory – and a lot of complex mathematics – to maintain their fiat-currency pegs. The only problem is these are *highly experimental*, and on numerous occasions the protocols behind these 'algo' stablecoins have failed.

The most significant of these was the $60bn Terra Luna UST collapse in 2022. Through a series of significant (tens of millions of dollars) trades, the UST algo-stablecoin lost its peg to the US dollar. This

resulted in the collapse of its related token, LUNA, and the subsequent collapse of yield and lending protocols such as Anchor (ANC).

It's important to note that with an algo-stablecoin you are inherently trusting the performance of the technology behind the asset. It is the pure definition of 'in maths we trust'.

And even the stablecoins that do have fiat-currency (and related instrument) backing, they are only as reliable as the transparency of their reserve holdings. Furthermore, the industry is seemingly always plagued with accusations of poor accounting, non-transparent reserves, fractional holdings and lax corporate governance.

In addition to this, stablecoins attract criticism from those who believe they act in a similar way to central banks, flooding the crypto ecosystem with money that unnaturally inflates the values of crypto assets.

Whether this plays out to be true or not is somewhat irrelevant.

It's clear stablecoins are here to stay, and also clear they will come under greater regulatory scrutiny. They can be very useful, so long as you know what your stablecoins actually represent.

And after *all that* you still must face the fundamental question of whether stablecoins are good for the long-term potential of crypto, or whether they're just an intrusion of the TradFi world into the world of crypto?

The answer? Only time will tell. But rest assured, the crypto ecosystem will continue to function perfectly fine – with or without stablecoins.

Now that we've covered what the different kinds of crypto assets are, let's have a look at the simplest way of getting your hands on them.

Exchanges: The Big, the Bad and the Bankrupt

CHAPTER 4

Wind back the clock to 2013…

Bitcoin – still relatively unknown to the masses – has boomed from about $13 per BTC at the start of the year, peaking at over $200 by April before halving in value to around $100 by the middle of the year.

It's enough of a wild run to get a bit more attention among the already crypto-native, but not yet enough to branch out into the mainstream.

By now developers had built marketplaces to trade bitcoin as its popularity grew, its value increased and it became clear the user experience of buying and selling needed to improve.

In much the same way as you might use an online trading platform to trade stocks, crypto exchanges were built enabling the buying and selling of bitcoin – and eventually other crypto assets.

The two biggest crypto exchanges at the time, Mt.Gox and Bitstamp, were doing daily trading volumes in July 2013 of around 8,200 BTC – around $820,000 in daily trading volume for bitcoin.[6]

At the time, this was a huge amount. Things would get more exciting later in the year, against the backdrop of a partial US government shutdown due to the 2013 debt-ceiling crisis. Soon after, the price in USD of one bitcoin surpassed the USD price of one ounce of gold for the first time ever.

But 2013 was a year where bitcoin was the primary trading asset, altcoins were *just* starting to become a thing and crypto exchanges were just starting to find their feet.

Ten years later, according to volume data from CoinMarketCap, there are around 175 different crypto exchanges that do *more than $800,000* in daily trading volume.[7]

Most exchanges are known as centralised exchanges (CEX). This means they are structured like a company, operating under the control of centralised parties (CEO, COO, CFO, etc.). It also means they ultimately control and take custody of the crypto wallets and assets of the exchange's users.

More recently, decentralised exchanges (DEX) have come to market built on code where the platform allows users to connect self-custody wallets that allow trading of crypto assets without handing over control and custody of the assets to a centralised third party.

As of November 2022, CoinMarketCap was tracking 243 centralised spot exchanges (CEX) with a total 24-hour volume of $188.93bn. In addition to these, there were another 282 decentralised exchanges (DEX) they were tracking and ranking.

Binance, the largest exchange (Binance operates both a CEX and DEX) by volume, did around $13bn in trading volume per day and had more than 500 different altcoin trading pairs – each doing more than $800,000 in daily volume.[8]

The rise and strength of exchanges in the wider crypto industry is undeniable. Their importance cannot be understated. They are the conduit between the non-crypto person and the crypto world.

It is crucial that exchanges remain a key component of crypto, but also remain robust, reliable, resilient and – importantly – solvent.

What role do exchanges play?

There are typically two ways in which you can get crypto assets:

1. Participate in a particular network or blockchain as a node, peer, miner or validator – whatever is needed to unlock network rewards.
2. Buy some through an exchange, either directly via a CEX or connecting to a DEX to trade crypto assets.

The first method is typically too big of a stretch for people. It requires a reasonably high degree of technical competence, which – in all honesty – most people have neither the time nor aptitude for.

That means it's option two for most. Of those, most people will come from fiat currency to crypto via a CEX.

Most people will take their fiat currency (GBP, USD, AUD, JPY, EUR, etc.) and use it to buy crypto on one of the bigger CEX markets.

Coinbase, Binance and Kraken are three of the biggest and longest-standing exchanges. They are also the three highest ranked exchanges on CoinMarketCap.

However, as big and as user friendly as many exchanges have become over time, the idea of using an exchange to get crypto with your fiat currency can be intimidating to newcomers.

The irony is that crypto exchanges are easy to use. In fact I'd strongly argue they are easier than using a traditional stock broker to buy stocks. In my experience the main frustration with the process is that retail TradFi banks won't let people send funds to crypto exchanges.

From a practical perspective, the process of buying crypto on an exchange looks something like this:

a) Register an account with one of the bigger, highly ranked crypto exchanges.

b) Deposit money (as an example $100) from your bank into the exchange. This part usually requires some form of identity verification but is often easily done online or via a smartphone.

c) Once your money has cleared into the exchange, you swap the money for a crypto like bitcoin.

d) The settlement is *instant*. You are then holding $100 (as an example) of crypto on that exchange.

Sounds simple, right?

That's because it *is* simple. Exchanges today – particularly CEXs – make the process easy.

The speed and ease of getting crypto through an exchange makes them an important part of 'on-ramping' (allowing people in) to crypto, but also allow people to sell and exit – 'off-ramping' crypto – if they choose.

However, while exchanges are *very* important for getting into and out of the crypto ecosystem, they can also be a risky part of operating in this emerging world.

Bankruptcies and corporate failures

As mentioned earlier, in 2013 Mt.Gox was the biggest bitcoin exchange in the world.

In February 2014, Mt.Gox failed. It went bankrupt. One day you could log into Mt.Gox, the next day you were faced with a blank screen and no way of accessing your account.

The collapse of Mt.Gox is a long and complex story. At the time of writing, users have been attempting to recover funds from the exchange for over nine years. Suffice to say that when Mt.Gox failed, all bitcoin on the exchange disappeared with it. People lost every one of the bitcoin they held there.

I was one of them.

This was the first major exchange collapse in crypto. The scale of the failure had the industry fearing that this could be the death of crypto.

Clearly, it wasn't. But it taught us a valuable lesson. Never hold your crypto assets on an exchange. Always ensure self-custody of your crypto assets. It also introduced an important phrase: "Not your keys, not your crypto."

In essence, that means if you don't hold the private keys to your crypto wallets, you don't *really* own – and certainly don't control – that crypto in the way you think you do.

Fast forward to January 2016. A hugely popular exchange that had risen to fame in the 2013–14 altcoin boom also found itself on shaky ground.

Cryptsy was a huge altcoin CEX. Suddenly users started reporting that withdrawals from the exchange were frozen. Some users were unable to access accounts. Fear began creeping into the community.

Soon after, Cryptsy announced its failure and bankruptcy, blaming a security breach and the theft of crypto assets. Again, the full story is long and complex. And again, everyone holding assets on the exchange lost everything – just like Mt.Gox.

These are two – of many – examples of failed exchanges where it's not just the exchange that fails and loses, but all users holding assets on the exchange too.

Time and time again exchanges fail, people lose assets and wealth, then the cycle repeats.

More recently, in late 2022 the biggest exchange collapse ever –

FTX.com – reminded us all that no exchange is too big to fail. It again brought to mind the phrase: "Not your keys, not your crypto."

FTX was many times bigger than Mt.Gox, Cryptsy or any other failed exchange. At its peak FTX.com had a reported valuation around $32bn.[9] Reports suggest that when FTX failed it had *billions* of dollars' worth of user funds held on the exchange. Due to its centralised nature, the process of recovering and returning user funds will no doubt end up as a long, complex drawn-out process that may take years to conclude – if ever – much like Mt.Gox.

It's worth noting that these massive corporate failures do share a common thread: they happen to poorly run companies with lax corporate controls, no checks and balances, no accountability and no oversight from regulatory bodies.

The good and the bad

After repeated exchange failures, clearly the "Not your keys, not your crypto" message still doesn't get through to crypto investors. You'd think the industry would learn from these mistakes over time. But collapses continue to happen, and people continue to lose assets. Perhaps that will change after the collapse of FTX.

I anticipate we'll see a rise in popularity of DEXs, which allow investors to retain custody of their assets in a crypto wallet, connect to the DEX, make trades without worrying about third-party risk.

In essence, DEXs employ and respect "Not your keys, not your crypto." They typically have no traditional hierarchy or organisational structure, but are merely an automated market to allow for trading. As such they have risen in importance and use particularly since the 2019–20 crypto winter.

We're now seeing DEXs appear on different blockchains. Some are better than others, while more are just copies of the better ones. All in all though, a DEX provides a different – and arguably better – way

for investors and traders to exchange. Most importantly it puts control and custody of assets in the hands of the investor, not a centralised third party.

Exchanges (both CEX and DEX) are important to crypto. They are a connective fibre providing links between TradFi and the crypto assets world.

They are useful, easy to access and easy to use; but they also face risks around transparency, corporate governance and the protection of both customers and, ultimately, retail investors.

That's why it's important to know the advantages and disadvantages of using them.

Advantages

- Ease of use: setting up your account on an exchange is often easier than setting up an online bank account or an online stock broking account.
- Access from anywhere, anytime: crypto trades 24/7, 365 days a year. If you've got an internet connection, you can access and trade your crypto.
- Instant settlement and access: when you trade you have instant access to your assets.
- You can buy crypto directly using your fiat money (pounds, dollars, euros, etc.) with certain exchanges.
- You can sell and exit crypto easily and quickly back into fiat currency.

Disadvantages

- Security: just like any other online account, they're often targets of attacks. However, an exchange hack can result in your assets being stolen too.

- Control of wallets: assets held on exchanges are in the control of the exchange. They hold the private keys to all wallet accounts.
- Overly complex: while some exchanges are incredibly simple, many are overly complex, with an array of trading tools that can be intimidating.
- Transparency: as most aren't publicly listed companies, there's a great lack of transparency as to how they're run, where customer assets exist and the solvency of the exchange.

For most people, using a DEX may be a step too far, as they require more in-depth knowledge of transacting in crypto, The first step into crypto will typically be through a regular CEX such as Coinbase, Binance or Kraken.

The most important lesson to be learned from all exchanges – good, bad and bankrupt – over the years is to ensure self-custody of your assets.

Use exchanges, take advantage of their benefits. But always be cautious, careful and in control of your assets.

Next we'll take a look at what you can do with your crypto assets once you've acquired them.

How to: Buy, Send, Stake, Swap and Sell

CHAPTER 5

You know what a crypto asset is. You know the role of the exchange in on-ramping into crypto. But now you wonder, well how exactly do I buy crypto? Not only that, what about if I want to sell it? Everyone talks about self-custody – how do I do that, and how do I get my crypto to a wallet? You hear a lot about staking… what's that too?

These are questions that I've heard repeatedly throughout the last decade, asked by people trying to get their heads around the concept of crypto and then wanting to understand how the practicalities of it work.

What's exciting today is that the practical aspects of getting into crypto have never been easier. And while there's an assumption that a lot of the industry is like the Wild West, this actually couldn't be further from the truth.

You only need to look at a big exchange like Coinbase,

which is now a publicly listed company on the NASDAQ stock market, to see how far things have come. You can't exist on the NASDAQ without meeting listing requirements, having audited accounts and submitting ongoing financial reporting. Coinbase also has licences (and regulatory approval) to operate all over the world, including the US, UK, Netherlands, Germany, Singapore and a huge number of other countries.[10]

This is not the Wild West, this is an example of crypto becoming a more mainstream financial asset and a tool for people to invest, trade, build wealth and operate financial independence.

However, the basic practicalities of how to buy crypto, how to send it, how to use it (such as staking) and then how to sell it are foreign concepts to a lot of people, so let's unpack it all and see how easy it actually can be.

How to buy

I won't sugar-coat it, there may be one major problem you face when buying crypto. It's nothing to do with crypto, crypto exchanges or any part of the crypto ecosystem.

It's your bank. Your traditional, high-street bank.

Not all banks are the same, but time and time again feedback I get from people wanting to buy crypto is their bank has blocked them from transferring or depositing funds to an exchange, or the bank now has a blanket policy of not allowing transactions to crypto companies.

This is not the same for every bank. And not the same for every country in the world. But if you're going to face a hurdle when it comes to buying crypto, it's likely to be this one. The best thing you can do if your bank blocks you is to call them, explain you know what you're doing and have them unblock the transactions.

If they refuse, you'll need to find another bank.

Once you're past that frustration, buying is easy.

Go to an exchange and register an account. CoinMarketCap rates exchanges based on criteria such as web traffic, liquidity, trading volumes and confidence in the legitimacy of trading volumes reported.

Their top ten rated exchanges at the time of writing (these do move order a bit) are:

- Binance
- Coinbase
- Kraken
- KuCoin
- Bitfinex
- Bitstamp
- Gemini
- Gate.io
- OKX
- ByBit

I have used all of these exchanges before to see what their setup process is like, what their user experience is like and how easy it is to deposit, transfer, access and withdraw from their sites.

Any one of these is a perfect starting point to buy crypto, but always check within your own country as to whether they provide access to their platforms. Not all exchanges are accessible in all countries. Most deal with major fiat currencies: GBP, USD, EUR, AUD and most major crypto. They all have hundreds of trading pairs so it's likely that any cryptocurrency you're looking for can be found on at least one of these exchanges.

What you will also find is that you'll likely set up accounts with at least two or three of them. There is no ultimate exchange that does everything for everyone. Use a few of them. There's nothing wrong with having accounts with multiple exchanges.

Every exchange in CoinMarketCap's top ten is intuitive, with a straightforward process for setting up an account. However, if you find working with an exchange to be challenging, there are always others to choose from. Three I've found to be among the easiest to set up are Coinbase, Gemini and Kraken.

Once you've created your account, the next step is to deposit fiat currency. Again, you'll find they all have very similar user interfaces. This makes buying very straightforward.

I've found that Coinbase and Kraken are the most intuitive when it comes to buying crypto, with very user-friendly websites and mobile apps. For example, once you've set up a Coinbase account, and you've set up a linked bank account or debit card, there's a big blue button in the top corner of your Coinbase account that says, 'Buy & Sell'.

It doesn't get simpler than that.

When you click the button, you're taken to a screen that lets you choose which crypto – and how much of it – you want to buy. You can choose from a huge array, ranging from bitcoin to Ethereum, Dogecoin, Cosmos Hub, USDC and USDT… it's a big list.

Complete the process, and that's it: you've bought crypto.

The next steps are to then transfer your crypto into a wallet that *you control the private keys to*. As already noted in earlier chapters, the importance of self-custody in crypto can't be overstated.

With exchanges, withdrawing crypto is straightforward too – so long as you're set up to make that transaction.

How to withdraw and transfer crypto to your own wallets

Before you withdraw your crypto to your own wallet, you need to have a wallet ready to receive your crypto.

That means you will need to have set up a self-custody wallet – maybe a Ledger, Trezor or Coldcard hardware wallet, maybe a MetaMask or TrustWallet wallet.

Comparison website Finder.com has useful resources for helping to decide between wallets.

Whichever you've decided on, you need to make sure your wallet is appropriate for the crypto you want to buy.

For example if you are buying bitcoin, then you'll want to have a bitcoin wallet address waiting to receive the tokens. A bitcoin address would look something like this:

3ByfWTFGGME1DhwCKLC5rw4sMNd33HSY7O

Of course, this is a made-up address, but it demonstrates what it would look like when it comes to withdrawing your bitcoin.

Your address is important because that's where you send your crypto.

Once you've bought some crypto in your exchange account you can go to your assets or portfolio section and use the withdrawal or send function. Using Coinbase as an example again, theirs is a big button that says, 'Send & Receive'.

Easy. When withdrawing assets, you get the option to choose how much you want to withdraw, which crypto you want to withdraw, and then you're asked for the address to send to.

When putting in the address, *this is a very important step to get right.*

The responsibility is on you to make sure you put the correct address in when withdrawing and transferring assets. If you get it wrong and the crypto goes to an address you don't control, it's going to be hard – perhaps impossible – to get it back.

Always double and triple check the address you're sending to.

When sending to a new wallet for the first time, or doing any sort of transaction for the first time, it's a good idea to send a small test transaction first to make sure you've done it all properly.

That might seem a bit ineffective, but in my experience, knowing that what you're doing works as it should adds a level of certainty and confidence.

Once you decide to send the crypto, you'll typically need to meet two- or three-factor authentication to confirm the withdrawal. When that's done and it sends, you wait for the transaction to confirm and complete on the relevant blockchain and then wait for the crypto to appear in your wallet.

Once you've done a few withdrawals from and transfers to your wallets, you'll realise that this is the same process for any crypto network you're using. The time taken to get to your wallet varies from network to network, so don't stress if it doesn't clear immediately. You can always see your pending withdrawals in your exchange account, which usually tells you if a transaction is pending or completed.

It doesn't matter what crypto you're doing all this with, the process is more or less the same.

One key difference is that the wallet address for each cryptocurrency will look different. An Ethereum address is different from a Solana

address, or a Tezos address or a Cosmos address. You will find that the process is the same, but there are variations in the addresses you use.

Examples of what different network wallet addresses look like are:

- Ethereum address:
  0x428C2ea0442c9727408aF4558d880b8E73054B54
- Solana address:
  2e2medSdtumeQJ1ZA8zJGPArc5R52jYqCqg8uHrAs8Lt
- Tezos address:
  tz1KobNSbpSJgiqEcQRPs6bdJs6xmcb2QnJx
- Cosmos Hub address:
  cosmos140lf6yaxjk7jzaslka8jy20fjttrdpg5z6gl7k

So by now you've bought crypto, sent it to a wallet and have it comfortably in control and self-custody.

Now you 'hodl' ('hold on for dear life' – a term meaning that you hold your assets for the long term). Or if you've got a staking crypto, such as Ethereum, Solana, Tezos or Cosmos (among others) you can put it to work by staking.

Staking (where you can)

When 'staking' crypto, you still hold it in a wallet you control, but also take advantage of the way that crypto networks offer staking rewards to network participants. Staking rewards are gained for either being a network validator (which is someone who helps operate the network code and keep the network functioning) or delegating to a network validator.

Being a validator requires a degree of technical competency, hardware and constant connection to the internet. What is needed varies from blockchain to blockchain, so it's always best to check with the developer community if that's something you wish to pursue.

For what it's worth, most individuals aren't validators, because of the comparative ease of delegating to validators to earn staking rewards.

Ethereum, Solana, Tezos and Cosmos are all proof-of-stake (PoS) staking crypto. Bitcoin, however, is not. Some PoS networks are easier to stake with than others. Most allow for staking within the native wallet applications that you're holding your crypto in.

For example, it's easy to stake Solana with the Atomic wallet, all done through the wallet itself. Tezos can be staked (delegated) through the Temple wallet. All tools needed to do so are in the wallet. Cosmos can be staked through the Keplr wallet. You get the idea.

When it comes to staking, three things remain important:

1. Retain your assets in your own wallet – all you're doing is delegating to a validator, not sending your tokens.
2. Understand the risks of staking. When you delegate, you are trusting your validator to behave appropriately on the network (100% up time, no missed block, etc.). Know the penalties you incur if your validator isn't performing as they should.
3. Understand the network you're staking on and how staking impacts the token distribution and potential long-term value of the crypto.

By its nature, staking is an inflationary mechanism. That means more and more tokens are released over time. That actually dilutes a network and potentially dilutes value. Often the assumption is that over time the value of the tokens increases, mitigating the inflationary supply pressures. That doesn't always happen. In fact, usually, the higher the inflation, the greater supply-side pressure is put on a token price, pushing it lower.

Very importantly, there are always tax complications when buying, selling and staking crypto, *so you must ensure that you remain tax compliant in your tax jurisdiction*, as it's possible that staking is treated as income, which requires different reporting in many countries.

Always ensure you get appropriate tax advice before embarking on

any investment, and particularly when it comes to crypto investment, trading and staking.

Many forms of crypto can now be staked, though some are better for it than others. Several have huge yield potential, while others have remained steady and constant over time. Knowing your investments, taking the time to understand what wallets you can use, where you can stake or delegate tokens and the rewards you can earn are all things you need to further investigate before embarking on staking.

But if you can, and you're up to speed with your particular crypto, it's a pursuit worth looking at.

Doing it all again, but in reverse

At this point, you've set up an exchange account, sent in fiat currency, bought crypto, transferred it to a wallet, practised some longer-term hodling, maybe staked some crypto – and you've figured out that you're sitting on some healthy returns.

So let's say you've made the decision to sell some crypto, realise some profits in fiat currency and use them for your other plans and goals.

How do you sell?

The good news is that if you've made it this far, getting out is the easy part. All you need to do is everything you did to get here, in reverse.

You need to send your crypto from your wallet into an exchange. That means when you log into your exchange account, you'll either need to deposit or receive crypto to the specific crypto wallet you're sending in.

For example, let's say you're sending in Ethereum to your Coinbase account. You'd go back to your Send & Receive button on Coinbase and go to the 'Receive' section.

Choose the asset you want to receive – in this example let's say Ethereum (ETH). You're then given an Ethereum address to send your crypto to and possibly a QR code that you can scan.

Important: the address to receive the crypto won't always be the same. Always double and triple check the receiving address.

Make sure the network you select is the same you're sending from. Without complicating things too much, this just means if you've got ETH on an Ethereum wallet, the network is Ethereum.

For some crypto you can use multiple networks (bridges, sidechains, etc.) to send tokens. But most of the time, you'll need to make sure you're sending your crypto on the correct native network.

You then copy the receiving address, and in *your* wallet, go to 'Send'. This will give you the choice to input the wallet address you just got from your exchange. Again, double, triple check it's the correct address.

Some exchanges may require extra data (like a dedicated customer number) for certain crypto. Cosmos Hub for example requires a 'memo' – which your exchange will clearly indicate, if that's necessary.

Once you've input the address, checked it and are ready to go, send your crypto back into the exchange. Wait for the network to confirm it and for it to clear into your exchange account. This can take anything from seconds to minutes to hours. Be patient.

You can always check and confirm the transaction on the native blockchain explorer for your particular network. A blockchain explorer is a bit like a library catalogue. You can use these to check wallet addresses, transaction histories and all activity on a particular blockchain.

For example, with Ethereum you can check transactions on Etherscan; with Cosmos ecosystem and Interchain crypto you can check transactions on Mintscan.

Once your crypto has cleared into your exchange, you then sell it back into whatever currency you want that's available. And then you withdraw that amount to your linked account or card.

Job done.

Of course, there's one more thing here that is worth noting too – once

you've got your crypto back in the exchange you don't *have* to sell it for fiat currency. You can trade or swap your crypto for another crypto.

The choice is yours. To trade and swap for other crypto is as easy as buying or selling for fiat currency. You just choose your trading pairs, make sure your account has funds and process the trade.

All the exchanges noted earlier have easy interfaces to facilitate these trades and swaps. Of course, again, make sure you remain tax compliant and keep records of your trades.

Also, once you're done trading, make sure to retain self-custody of your assets by withdrawing them from the exchange.

If you want to level up your exchange game further, you can always connect your self-custody wallets to a decentralised exchange and trade for other crypto directly from your own wallet.

Some of the biggest DEXs include:

- Uniswap
- dYdX
- DODO
- Sushiswap
- 1inch
- PancakeSwap
- Raydium
- Osmosis.

There might seem to be a lot of steps here and a lot of information. But the ease of doing all this is surprising to people when they just get in and try. And that's important. Test, try, experiment and experience. It all starts to get very familiar very quickly once you've done things a few times.

That's the beauty of crypto. Downloading wallets like MetaMask is easy and free. Setting up a Coinbase account is easy and free. Connecting

to a DEX is easy and free. Anyone can do it; in fact I think it's easier than setting up bank accounts or stockbroking accounts.

The key things to remember are:

- Always double and triple check wallet addresses.
- Always protect your own wallets and ensure self-custody of your assets outside of exchanges.
- Make sure that you have enough residual crypto in your wallets to cover transaction fees on the network.
- Make sure you know what network you're transacting on.
- If doing things for the first time, send test transactions to ensure you've nailed it. It's worth it in the long run.

Keep some of those basic principles in mind, and you'll see just how easy it can be to buy, send, stake, swap and sell your crypto.

If you're going to be undertaking all this activity, arguably the most important thing of all is to ensure you get your security right, know how to store your crypto safely and how to avoid getting scammed. Let's look at how to do all that.

CHAPTER 6

Security, Storage and Avoiding Scams

THINK ABOUT GOING to log into a stockbroking account online. You punch in the URL, head to the website expecting to see everything as usual…

Except you don't.

In fact, you're just facing a blank, white screen.

You double check the URL is correct. You're definitely on the correct site. There's just *nothing there.*

Then you get that sinking feeling in the pit of your stomach. That feeling you get when you think you've lost your wallet. Except this is magnitudes worse.

You cannot access your investments. There's *nothing* you can do.

A short while later a message appears on the screen saying that all trading, deposits, withdrawals have been stopped.

A short while after, the broker files for bankruptcy. Gulp. Now what?

Fortunately, in the traditional financial markets, there are some fallbacks. There are *some* protections in that situation, such as segregated assets and ring-fencing. Your broker might go under, but that doesn't necessarily mean you do too.

In crypto, however, it's a different ballgame.

Historically, crypto exchanges managed custody of crypto assets using exchange wallets. Exchanges that failed often resulted in complete loss of assets for anyone holding crypto on the exchange.

As discussed earlier, the most infamous (until recently) was the Mt.Gox exchange, which halted withdrawals in early February 2014. A few days later, the site went offline. Just a blank screen. Shortly after that, a message appeared to say Mt.Gox was working through difficulties. Next: complete collapse.

The big problem was the *hundreds of thousands* of bitcoin held on the exchange.

Over nine years later, those with bitcoin on the exchange are still trying to get some of it back through Japanese courts – a process involving years of filings and claims.

I am one of them. Trust me, this is not a situation you ever want to be in (see Figure 6).

Figure 6: Claiming from Mt.Gox

別紙/Attachment

再生債権認否書（自認債権を有する取引所関係再生債権者（破産債権届出なし））
Statement of Acceptance or Rejection of Claims (For Exchange-Related Rehabilitation Creditors Who Have Claims That Rehabilitation Trustee is Aware Of And Who Did Not File Proofs of Bankruptcy Claims)

平成31年3月15日
March 15, 2019

事件番号/Case No.	平成29年(再)35号/2017 (Sai) No.35
再生債務者/Rehabilitation Debtor	株式会社MTGOX/MtGox Co., Ltd.
再生管財人/Rehabilitation Trustee	小林信明/Nobuaki Kobayashi

民事再生法101条3項に規定する債権（自認債権）/Claims described in Article 101(3) of the Civil Rehabilitation Act (Claims that the Rehabilitation Trustee is aware of)

債権者番号 Creditor No.	債権者名 Name of Creditor	国名/Country	住所/Address	債権の種類/Claim Type "遅延損害金" means Delay Damages	債権額 Amount of Claim	備考/Remark
2	Sam [redacted] Volkering	Australia	[redacted]	BTC	[redacted]	
				BCH		

Source: Editor's own image

But it happens – a lot. Crypto exchanges regularly fail, more so in the depths of a crypto winter. The biggest ever, in 2022, was the failure of the FTX group of exchanges and companies. It was like Mt.Gox on steroids.

The problem in crypto isn't these failures. Arguably, this is a free market working as it should, weeding out the bad actors.

The problem is the innocent people who get caught up in the failures, losing assets and wealth – sometimes lifechanging amounts. Frustratingly, there is an incredibly easy way to protect yourself from having to lose assets held on an exchange. It's a lesson I learned in 2014, and sadly – as much as you tell people about it – time and time again people still hold assets on exchanges.

Let me be very clear: don't ever hold your crypto assets on an exchange longer than you have to. In fact don't even hold your crypto assets with any third party for any extended period of time.

The safest way to hold your crypto assets is to take self-custody of them, which means holding them in a crypto wallet which you control the private keys to. Remember, the saying in crypto is: "Not your keys, not your crypto." Every time an exchange fails, it's a stark reminder just how important that phrase is.

The best way to retain self-custody of assets is using what are called 'hardware wallets'.

Hardware wallets

Hardware wallets are essentially tiny computers cased inside USB sticks, designed with the specialisation of holding crypto assets. That's an overly simple explanation, but justified.

The two leading companies that have been around longest and have proven to manufacture robust hardware wallets are Trezor and Ledger. They are both very highly regarded in the industry.

Others include Coldcard and Opendime from Coinkite, but they're only for bitcoin.

Hardware wallets give you all the advantages of top-level security, with the speed and flexibility of a desktop or mobile wallet. Often desktop and mobile wallets (see below) will allow a hardware wallet to connect to them for greater security.

Prices vary for this kind of product, but you can expect to pay anywhere from around £60 to as much as £260.

Your private keys are stored and encrypted on the device. So no one can see them – not even the computer you connect your wallet to when you use it to trade.

In theory, hardware wallets are as safe as it gets for self-custody. And if you lose one, or even if someone steals it, it's not the end of the world. The important part is to ensure you've safely protected the 'seed phrase'.

When you set up your device, you create (or are given) a passphrase of several words, typically 12 or 24. You write these down and store them somewhere secure and retrievable. This is your seed phrase.

If someone steals or finds your Trezor or Ledger wallet, they still need a lengthy pin code to open it up. With every failed access attempt, the time they need to wait before they can try again doubles. After a few failed attempts, they are locked out (in some cases for years).

Regardless of whether you retrieve your wallet, your seed phrase can be used to restore access to your crypto. Honestly, if you are going to be investing in crypto markets, you really should get a hardware wallet and make sure you properly ensure self-custody of your assets.

One secure way to store your seed phrase is on a near-indestructible accessory like a Billfodl wallet. Fire, explosions, freeing temperatures, water, electrocution – these accessories can take it all and keep your seed phrase safe. That way ultimately all your crypto will be safe, even if you lose your hardware device or it's stolen or destroyed somehow.

They are faster, easier to use and safer than all other methods, and they

can store a large variety of different crypto. Therefore, you don't end up trying to keep track of multiple different wallets for your multiple different holdings.

Both Trezor and Ledger are great – both have multiple models to choose from, at different price points. And if you only want to store bitcoin, Coldcard and Opendime are simple, affordable and fantastic.

I'd say pick whichever supports more of the currencies you hold and works for your approach to storing and managing your assets.

It's also worth noting that, while you can use these devices to store your crypto, you will often need to manage it through an interface – to send or receive tokens, for example.

Ledger predominately uses the Ledger Live application to manage your crypto on the device. Such devices and interfaces need periodic software and firmware updating, but this is very intuitive and straightforward if you follow the steps as instructed.

Other wallets in the crypto space, such as web wallets and desktop wallets, will also enable interaction with your hardware wallet. In a wallet's list of supported crypto there is often information about how to use and interact with certain crypto and different interfaces.

Desktop and mobile wallets

Web wallets, desktop wallets, browser extension wallets and mobile wallets are programs or apps that run on your computer or mobile phone. Desktop wallets are considered one of the most secure of these types as they operate on your own hardware (computer), rather than within a browser or website. A number of mobile wallet providers are also now improving their security and safety by storing private keys directly with your device. These wallets are typically either built by the crypto company you're investing in, may be multi-chain wallets (such as MetaMask, Trust Wallet or MathWallet) or come from some of the larger exchanges (such as the Coinbase Wallet).

Advantages

- Accessibility: you have the wallet on your own computer or phone and can access it with speed.
- Ability to keep the seed phrase/private key secure offline.
- Easy to use for multiple crypto.
- Easy and quick to connect to aspects of the crypto ecosystem like decentralised exchanges.
- Can import the wallet to other devices or other wallets with the correct seed phrase/private keys.
- Usually free.

Disadvantages

- Can get hacked by malicious software on your computer or phone.
- You need your computer or phone on you to access it.
- Can get confusing if you need multiple wallets for multiple chains and crypto projects.
- Connecting to malicious sites or links.
- If you lose/break/change your computer/phone and haven't backed up your security private keys, seed phrases or passwords, you lose all your crypto along with your device.

The main thing to watch out for with these wallets is malicious software on your devices, or spoof apps or sites that pretend to be legitimate but really are phishing/scam apps and sites. Many people end up losing their crypto to hackers in this way, through basic carelessness in navigating the digital world.

The best thing is to avoid links you don't recognise, links to sites in emails and the temptation to download apps from unverified places.

Still, these wallets are relatively safer than a web wallet because you're

not relying on a third party to secure your crypto and you still control the private keys.

Again, you should write down your private keys and seed phrases when using these wallets. It's also possible to use the extra layer of security offered by an indestructible seed-phrase device, like Billfodl.

That way, if your computer or phone breaks or gets stolen, you can restore your wallet.

Finally, when it comes to your security and privacy there are some basic rules to stick by to ensure you don't fall victim to the many scams that are in the marketplace.

Avoid 'all-inclusive' and imposters

First, never ever give anyone your private key, seed phrase or passwords that grant access to your crypto wallet and the holdings within.

Never.

Even if you think it's a reputable person or organisation, the truth is that no reputable organisation will *ever* ask for these details. Just like you wouldn't give your debit card PIN number to a stranger, apply a little common sense and always keep your private keys, seed phrases and passwords secret.

There are loads of imposters who've copied people's social media accounts to try to scam people. I've had my social media copied on LinkedIn, Twitter, Instagram… just about everywhere, by people who have used these accounts to try to scam family and friends.

- Never trust anyone who comes out of nowhere asking for details like passwords or private keys.
- Never trust anyone who asks you to send them some crypto out of the blue.
- Never trust anyone who sends you unsolicited links to websites.

- Never trust emails that ask you to connect your wallet by clicking on a link. In fact never click on a link in an email – always go to a website independently through your own browser window.
- Never trust anyone who wants to remotely connect to your computer.

In short, when it comes to your crypto assets, never trust anyone.

Second, if you want to buy crypto, *just go and do it yourself* through one of the big exchanges like Coinbase, Binance or Kraken.

These platforms and brokers that promise to invest for you and manage your funds – pitching themselves as 'all-inclusive' – so many of them are scams. While not all are, there is absolutely no reason why you can't do the things they claim to offer yourself. You can get advice, you can seek information, but the actual process of getting and investing? *Do it yourself.*

Often, they entice you with 'VIP packages' that require you to deposit funds. They treat you like royalty, even though you might have only invested a couple hundred quid. This is all just to butter you up.

What you also see a lot is these scams linking from what appear to be reputable news reports, suggesting some kind of celebrity endorsement.

Popular names that have been used (without authorisation) on many of these scam news reports include Martin Lewis, Richard Branson, Holly Willoughby, even Bear Grylls. No celebrity worth their salt would endorse these platforms. The system and process of the scam is always the same though:

- You see a news report (it's really a fake) from a major news outlet like the BBC or CNN, which says that celebrity X has made loads of money from this trading system or platform.
- All links direct to the account registration page of an investment website. Signing up is easy and looks slick. It requires a deposit of funds when setting up the account. You deposit and set up.
- Soon your account is worth a huge amount more than your initial deposit… or so it seems.

- Next thing you know a dedicated account manager is calling you encouraging another deposit. Then another. The profit number keeps heading higher, building the FOMO.
- Then they upgrade you to the VIP package and ask for more money to really maximise your gains. The numbers in your account keep going up – this is too easy!

But it's all fake.

You can't get your money out. In fact the numbers you see in your 'account' don't even exist. It's a scam. None of it is real.

You try to withdraw money, and they tell you more money is needed to release the funds to cover fees and capital gains. Again, more scam to get more money from you.

The reality is that every penny you sent in is gone.

This is the most common way I see people getting scammed out of their crypto. These scams are *everywhere* and don't seem to be going away. But there is an easy way to avoid them.

If you want to get crypto, do it yourself – and none of this becomes a factor.

Self-sovereignty

Considering the responsibility of self-custody, understanding the basic principles of operating in crypto, avoiding scams and keeping safe, it can be a daunting experience. But I raise these points so you have all the necessary information on the table.

In practice none of this is overly onerous. None of it is that scary when you're aware of it all. Truthfully, it is significantly easier than most people would initially credit.

With crypto you have the ability to retain control and power over your assets in a way that was previously in the hands of a third party. You have the power to be self-sovereign. Now, the security and privacy of

your data, your information, your identity and your assets reside with their rightful owner: you.

Exactly the way all assets should exist.

Now that we've covered the things you can do with crypto and how to keep your assets safe, let's develop our understanding of the core concepts that underpin how cryptocurrencies work – starting with blockchains.

Blockchains

"Software is eating the world."

Marc Andreessen, 2011[11]

"Blockchain is eating the world."

Sam Volkering, 2022

CHAPTER 7

Over the years, I've had the pleasure of travelling the world to speak with and hear from industry leaders in sectors ranging from self-driving cars and quantum computing to innovative FinTech – and of course crypto.

Back around 2013 and 2014 mainstream coverage was just starting to pick up around bitcoin. The wider crypto market was still relatively unknown to many.

As the mainstream picked up on the crypto story (as bitcoin's price had passed the value of an ounce of gold for the first time in 2013), there was more and more attention paid to it by those in TradFi.

I remember being at corporate events like SIBOS and Finnovate around this time. All the buzz was raging for hot FinTechs (financial technology companies).

Anything crypto related was shunned, pushed to the

dark corners of exhibition spaces. It was seen as a world for criminals and illicit activity.

Even though the idea of crypto repulsed many, it did lead to a little more research and understanding of the underlying technology and mathematics known as 'blockchain'.

Blockchain – or distributed ledger technology (DLT) – caused an 'a-ha!' moment in TradFi circles. After all, it was really a piece of FinTech, and it was a new buzzword to jump on to.

Blockchain and DLT fast became TradFi's latest hot property and one of the most innovative discussions at FinTech conferences and around innovation boardrooms.

Also around this time, the phrase, "We don't like crypto but we like blockchain," started doing the rounds.

Soon enough, giant organisations were launching entire blockchain divisions to understand and unpick what this new technology could do for their business.

For example, at the end of 2015, The Linux Foundation launched the Hyperledger project. Its vision: to be a "New open ledger project to transform the way business transactions are conducted around the world."[12]

Hyperledger's early commitments came from global giants of industry such as IBM, Cisco, ANZ Bank, Intel, JPMorgan, London Stock Exchange Group, SWIFT and Wells Fargo.

Ironically, this happened around the time that Jamie Dimon, CEO of JPMorgan, said that virtual currencies should be stopped, and no government would support a virtual currency that goes around borders.[13]

It was the ultimate "We don't like crypto but we like blockchain," position to take.

In the years since, software has indeed eaten the world – in that it has irrevocably disrupted traditional industries. Andreessen was right. But

the question now on the lips of industry is: "Will blockchain eat the world?" For me, the answer is yes.

What *is* a blockchain?

A blockchain is simply a digital, decentralised ledger that records transactions.

You could think of it like a big accounting ledger, where an invisible accountant infinitely records *every single transaction that ever takes place.*

When fresh transaction data is validated by network participants, called nodes, and added to the network, a new 'block' is created and attached to the existing 'chain' of blocks, hence the name.

A blockchain can exist as either a public (open-source) network, a closed private network, or a hybrid of both open and closed networks.

While many global organisations are interested in the benefits of blockchain technology, there's still reluctance to engage with public blockchains. Hence a lot of development happens on closed, private blockchain networks.

Over time we can expect the greater trend of decentralisation to lead to increased use of public blockchain networks.

In these peer-to-peer (P2P) open networks, blocks are validated by peers (other participants) on the network. The process by which they confirm the blocks can vary from blockchain to blockchain, but on balance most use a form of *consensus mechanism.*

This is a cryptographic solution that agrees on the block data (transactions) and is a key component of the security and stability of any given blockchain.

All validated transactions on a blockchain are immutable and irreversible. Attempts to disrupt the blockchain can be easily spotted by nodes if there is a discrepancy of block data across different nodes.

Hence the consensus kicks in and determines the correct chain of blocks as the next block is added.

In a traditional blockchain, transactions are typically encrypted. The identity of those conducting transactions is anonymous to the network – at least in part.

This means anonymity of transactions is a feature. However, it's important to know that anonymity does not equal privacy.

Due to the transparency of all transactions on a blockchain, you can make a transaction and remain anonymous. That transaction will be openly visible on the blockchain, but there is no personally identifiable data within the transaction.

However, if you can somehow be linked to a particular transaction, then *every* transaction linked to it can be traced back to you. With vast improvements in forensic blockchain analysis techniques, blockchains are fast becoming a rich data source and the most transparent networks in history.

That's also why it's ridiculous for sceptics to push the idea that crypto is a safe-haven for criminal activity. In reality it's the *worst way imaginable* for criminals to conduct business.

As Ben Brophy, head of Fidelity International's Blockchain Centre of Excellence, recently emphasised:

> Think about it like this: you'd have to be a fool to try and commit anti-money-laundering breaches on an open ledger. I'd say well done for leaving a perfectly visible trail for law enforcement to track. Everything you've done, all your co-conspirators: law enforcement must love open ledger technology.
>
> An open ledger is fantastic for security and stability of the system; it really is. From that point of view, the risk to an organisation is an order of magnitude less and the ability to forensically analyse behaviour is of an order of magnitude greater.

The principles on which blockchain is based: security, stability and transparency, are critical to its rise from relative obscurity to something that has a lot of industries excited by its potential.

Blockchain eats the world

There's no doubt that blockchains are here to stay. According to Blockdata, 81 of the world's top 100 companies now use blockchain technology.[14] That's a clear sign of excitement quickly turning to practical application.

And as for the whole, "We don't like crypto but we like blockchain," stance, the two aren't mutually exclusive – at least not if organisations want to truly embrace the power of decentralised networks.

Not only will we continue to see more organisations rolling out blockchain tech and services, but I expect we'll see greater adoption of the cryptocurrencies that exist at the core of many of these networks.

We will see blockchain technology used in everything from trade, transport and logistics to cybersecurity, web and cloud services, energy and (most obviously) global finance.

Blockchain has all the potential to eat the world. And in the 2020s we'll see just how much it will. Either way, what we know for sure is it's here to stay and will certainly be a critical part of our digital infrastructure in the coming years.

Next we'll move on to another topic that is fast becoming an important part of day-to-day life: decentralised finance.

Decentralised Finance (DeFi)

'Finance' is an all-encompassing term that describes our interactions with capital. How we access capital, how we use it and how we manage it are all aspects of finance.

Within the remit of finance, however, are the products and tools that are part of it. Things like managed investments, stockbroking accounts, savings and individual investments, borrowing and lending, trading, and even just good old-fashioned deposit and debit accounts.

There is often a misconception that having something as simple as a bank account should be commonplace. Surely everyone has access to this most basic component of finance?

In reality, it's not that simple at all – even in developed countries like the UK or US.

In the UK, for example, the Financial Conduct Authority (FCA) estimates there are still around 1.2 million 'unbanked' – that is, adults without bank accounts – as of February 2020.[15]

CHAPTER 8

The World Bank recently estimated that only 76% of adults globally have an account at a bank or regulated institution.[16]

This of course means 24% of adults do not. Quite quickly, you realise this means *billions* of people don't have access to what you and I would consider basic finance.

The problem is that our world is built on the machinations of the global financial system.

It is not a playground for the individual. It is complex, convoluted, and often corrupt. It is also controlled by giant financial institutions, high-ranking financial power brokers, central banks and governments. It is ringfenced and protected by gatekeepers and is simply not built to provide access to all.

One of the big problems with access to finance is the structure of it. Its nature is that of centralisation. Centralised power, centralised control and centralised wealth.

It is this idea of centralised power and control in traditional global finance that was the spark that lit the fire of *decentralised finance (DeFi)*.

DeFi is the antithesis of the traditional global financial system. It is about shifting the balance of control, power and access away from centralised power brokers and institutions to individual market participants.

Underpinning the rise of DeFi is, of course, decentralised (crypto) networks and the tools that come with their radically different set of ideals.

What makes up the DeFi world?

When you break down what DeFi is and what it's trying to do, it's really quite similar to the traditional financial system.

The key difference to appreciate is found in the fundamental ideals

of power, control, access and wealth. It's the shift of those ideals from centralisation to decentralisation.

When you drill into many of the DeFi protocols and products that exist today (and are in development), you can see that we're talking about the growth of a fully functioning financial system.

This includes financial tools you're likely accustomed to, such as lending and borrowing, deposit accounts, various investment structures, insurances, market makers, exchanges and trading, remittance and payments.

These aren't new financial tools. However, the beneficiaries of their operation aren't the giant multi-trillion-dollar financial institutions of the world, the central banks or governments.

This is a system built for – and to benefit – people like you.

That's what DeFi sets out to achieve. It is an alternative financial system that does not restrict access to *anyone* and enables everyone to participate in the function of the system and benefit financially from that participation.

For example, when you deposit your money in a traditional bank, you would expect some kind of return. After all, banks are making billions on the money they loan out, which is (partially) predicated on the deposits they hold.

But you don't get anywhere near the reward you should.

DeFi changes that concept. You can deposit funds into a DeFi protocol, which you can then choose to lend out. The bulk of interest paid by the borrower flows to you. Not to an intermediary, not to a financial institution, but to *you*.

Of course, this is a basic example of what, we should acknowledge, is becoming an increasingly complex world.

DeFi is not meant to be simple. Finance is not simple. We're talking about the construction of an alternative financial system, based on

decentralisation, that poses some risks and threats itself. But it is an emerging area of crypto which everyone should pay attention to.

If we look at DeFi at its most basic level, it represents the power and control to BYOB – *be your own bank.*

You get to be your own banker. You get to be your own depository institution. You get to be your own broker/lender/market maker… you get to be your own central bank.

In its relative infancy we've already seen DeFi tools and products emerge such as:

- High-yielding stablecoin accounts that can deliver double digit yields.
- Lending and borrowing platforms where lenders can set their own rates.
- Exchanges that allow self-custody and peer-to-peer trades.
- Market-making and liquidity pools from *any* willing participant.
- Insurances.
- Remittance and payments.
- Synthetic and 'mirrored' traditional financial assets including 'real-world' stocks and shares.

These are just examples of some of the innovation taking place in DeFi. I expect we'll see further development in the coming years, including everything from tokenised ownership of physical assets, new capital structures, tokenised managed investments, crowdfunding mechanisms and more.

However, this also raises more questions…

Is DeFi the future of finance, and what about TradFi?

DeFi certainly has the potential to become a widely recognised and used alternative financial system. As crypto adoption and acceptance accelerates, it's likely that DeFi use will grow alongside it.

Will it kill off TradFi?

No, it won't. But we will end up with two parallel financial systems. A centralised system (TradFi) and a decentralised system (DeFi).

However, DeFi still has a long way to go, and has a lot to answer for in terms of its usability and financial stability. The blurring of the line between TradFi and DeFi is also a threat to DeFi realising its full potential.

DeFi can be complex for the crypto novice and brings several unknowns. There are many threats, risks and scams in the space as it emerges from embryonic status.

As with TradFi, it is not a playground for beginners. Its fast-increasing complexity has already seen a number of high-profile failures and threats emerge. Notable collapses such as that of Terra (LUNA), and the subsequent failure of organisations such as Three Arrows Capital and Celsius, have shown vulnerabilities in DeFi.

There is an argument that these were never truly DeFi to start with. But resolving that debate is not the aim of this book.

The clear point is that DeFi *is here to stay*. It is fast emerging as a more palatable world of finance – and not just for the unbanked and those without access to TradFi products. It is appealing to everyone, of any wealth level and at any location, with any desire to participate in global finance.

That alone makes it one of the most powerful and important movements of the modern era.

Of course DeFi is only one of many innovations that have developed hand-in-hand with crypto. Next we'll look at one of the most fascinating: the 'metaverse'.

Metaverse

TAKE A PEACEFUL moment. Draw in a deep breath. Picture yourself on a tropical island. There's a bar just off the warm sandy beach, under some palm trees. It's fully stocked with your favourite drinks.

Close your eyes… put yourself there.

You sidle up to the bar and take a seat at one of the bar stools. You see another person at the bar with you. It's your buddy who lives several countries away – you've not caught up in almost two years! You chat for hours on end, just shooting the breeze and having a grand old time.

You like it here. You want to spend more time here. Meet others. Catch up with more friends. You could get used to this place!

Congratulations, you've just been in a metaverse. Sort of.

The Greek *meta* roughly means after, or beyond. When used in the word 'metaverse' we're really talking about the idea of a world beyond our own universe.

When used to describe a metaverse today, however, we are primarily talking about a *digital world* we can exist in, communicate in and transact in.

CHAPTER 9

I'll often refer to '*a* metaverse' not '*the* metaverse'. That's because there is not one single, all-encompassing metaverse. The idea that there is only one metaverse is a very common misunderstanding.

Metaverses are many. And many more will come. Some will be popular and well populated. Some small and private. Some will interact well with others, share resources and have interchangeable economies. Some you'll never know about (and probably won't want to).

A metaverse can theoretically be *any* kind of digital world. It could be a game, a simulation, or a virtual reality world.

Something else worth considering: metaverses aren't new.

With most impactful technologies, overnight success is usually a decade or so in the making. The same is true of metaverses.

Arguably the first metaverses were built during the early days of personal computing in the 1970s, 1980s and throughout the home video game console wars of the 1990s.

But metaverses of the past were always a dichotomy, often at odds with the ideals of the people who used them. They were controlled and closed off – commercial pursuits built for the many but controlled by the few.

They were not free, they were not open; they were designed to be isolated and restrictive.

Metaverses now present a fast-growing opportunity due to that shift of power so common in crypto: power moving away from centralised control towards a decentralised network of people.

The new metaverses are built by the people, for the people. They have flourishing economies where the economic benefit flows to the players, the users, the participants, the individuals of that metaverse.

Furthermore, they're globally accessible. They are borderless. They are also making a lot of early adopters rich – which for metaverses of years gone by was never a realistic outcome.

This metaverse wealth boom is only possible because modern

metaverses are built on crypto networks, with cryptocurrencies as economic incentives. These metaverse crypto act as units of exchange in these worlds, and in many cases we're seeing an explosion of fully fledged metaverse economies and financial systems.

Where does this metaverse wealth come from?

Modern, successful metaverses will be open, accessible, unrestricted, free and fun to use and, importantly, offer some kind of crypto-based economy to participate in.

To understand why that's important, you need to understand that at its core level a metaverse is an evolution of communication, and communication unlocks economic potential.

When you look through the history of communication, there are periods in time where social communication radically changes. These changes bring monumental economic opportunities.

The invention of the telephone in the late 19th century is one of the most significant of these developments. But of course, one telephone is quite useless. It wasn't until switchboards and exchanges came along a few decades later that millions of people began speaking over the phone.

As José Luis Cordeiro concludes in his 2008 research paper:

> The history of telecommunications suggests strongly that there is a very high correlation between the number of telephone lines and economic growth during the 20th century.[17]

Telephones enabled people to break down barriers and borders. The technology allowed for more efficient commerce to take place. In essence, it made the world a smaller place.

In more modern times we can look to the development of the internet and the ability for people to communicate and interact online.

The internet and its contribution to economic output is unparalleled. For example, research from the Internet Advertising Bureau (IAB) explains that in 2021 the internet contributed $2.45 trillion to the US total GDP of $21.18trn.[18]

These history-defining, *enabling* communications technologies unlocked huge economic potential to the world. So what comes next? What is the next evolution of these enabling communications technologies?

Well, the expectation is that the next evolution of communication will be real-time, in-person, but in a metaverse.

What makes metaverse communication so exciting is the same thing that made the telecommunications industry and the internet so appealing: unlocking huge economic potential and wealth.

A virtual, digital world that someone can connect to – and not just exist in but transact in and conduct commerce in – is a powerful idea.

A virtual world with no borders, no barriers, no filters. It allows people to gather, socialise, connect and transact in a world of their own creation. It allows people to be *present* with each other in a more human way, regardless of where they might physically exist in the world.

A metaverse, like the telephone and the internet, makes the world an even smaller place.

These crypto metaverses are digital, virtual worlds – built by the people, for the people. They represent another form of digital asset creation and ownership that allows individuals to access, control and also potentially benefit economically.

It's these ongoing, underlying themes in cryptocurrencies and digital assets – a shift of power and control back to the individual (with immense wealth potential) – that bring in people in ever-increasing numbers to use and invest.

Crypto metaverses are often built on major crypto networks, such as Ethereum, Binance Chain, Tezos, Polygon and Solana. Most have their own currency – a crypto token native to their particular metaverse.

These crypto of course have monetary value and utility that can be used for commerce within the associated metaverse, whether that be buying land or even buying clothing for your digital avatar. The wealth explosion opportunity from a metaverse comes as they become more popular, more populated, and the demand for the digital assets of that metaverse (along with the native crypto) rises.

There's a lot to explore when it comes to metaverses. Fundamentally, they amount to an explosion of new communication technology that challenges the idea and ideals of how we communicate, how we socialise and how we conduct commerce in an ever-more-digital world.

It's an exciting, fast-growing opportunity and critical for people to know about, understand and ultimately get involved with.

Naturally, some technological developments are more contentious than others. Let's look at one you've likely heard a lot about already: NFTs.

NFTs

"You'd better make sure you like the look of it – there's a good chance you'll be looking at it for a very long time!"

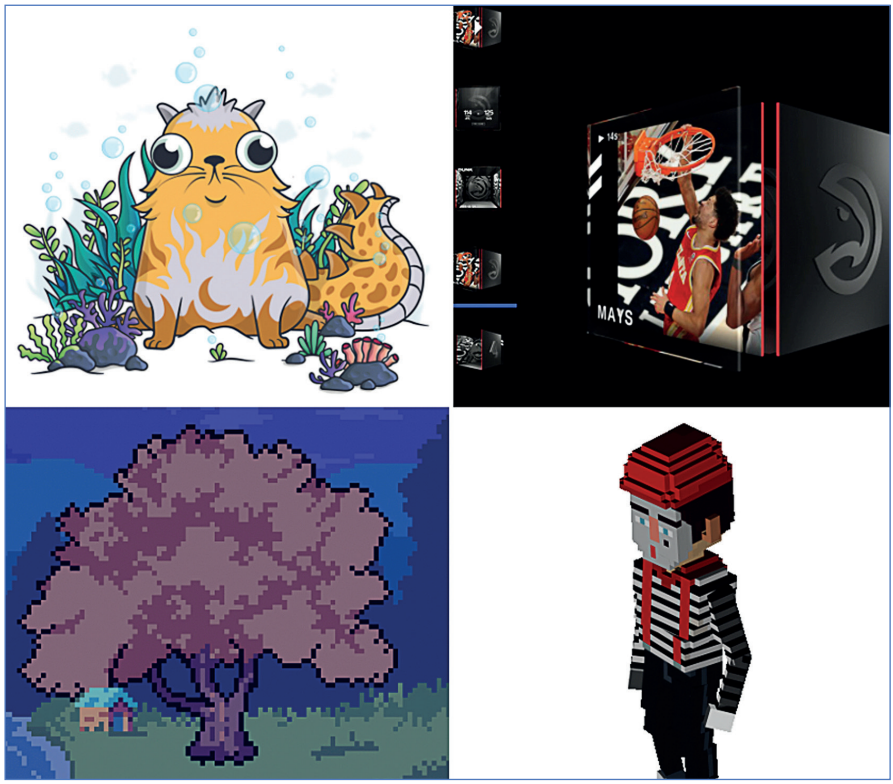
This was my response when someone recently asked me what I thought about a particular NFT they'd seen on Opensea.

I'll be the first to admit, I own a lot of NFTs. Too many, to be honest. Most of them are worthless. Most of them will always be worthless. Most of them I paid too much for. But many I bought just to experiment with – to learn more about what they were and how they worked.

That's why I've got CryptoKitties from November 2017, NBA Top Shots from February 2021, a mime from The Sandbox and even some CryptoTrunks from late 2021.

CHAPTER 10

Figure 7: Worthless NFTs: CryptoKitties, NBA Top Shot, CryptoTrunks, The Sandbox ASSETs



Source: Editor's own image

Yes, the 'works of art' in Figure 7 are as ridiculous as they sound. And they are only a fraction of the NFTs I have. But I tell you what: it was fun, funny and ultimately enriched my understanding of the market.

Sadly, a lot of people got caught up in the NFT mania of 2021 and thought of it as a speculative paradise rather than something to just experiment with and have some fun.

Now, far too many people are sitting on what sceptics describe as 'expensive JPEGs'. To a point, the sceptics are right. But was the NFT mania of 2021 and 2022 a once-in-a-lifetime event, or is there more to NFTs than meets the eye?

To understand that, we need to get back to first principles.

What is an NFT?

NFT stands for 'non-fungible token'. It is a crypto token that cannot be replicated or divided. It is unique and represents an asset – that asset might be data, it might be an image, it might be a song, or any piece of unique intellectual property, perhaps even a book.

The first key thing to get to grips with is the idea of an NFT being unique *data*.

Take, for example, a piece of art – which is the most common representation of an NFT.

If you were to take a photograph of your family, that very moment becomes unique. It is *never to be repeated*. You could try to replicate that moment, but it will never be *the same moment*.

In a sense NFTs represent that unique moment. They are data, but that data is constructed in a way that makes what the NFT represents unique.

As they are data, what NFTs also then allow for is enhanced features and functionality that exist as a part of that data.

Thinking again about that photo. The moment is unique, and the first photo of that moment is unique. Now you may copy the photo and send it to family, but that first one you took – that you hold – is the original, and that will never change.

Again, thinking about it in terms of data, you can copy the data, send the data, but the data itself proves without doubt which copy is the original.

This way, as unique data, an NFT can provide ultimate provenance, a chain of custody so to speak; proof that an asset is what it says it is. That is just one part of what makes NFTs, and the underlying nature of what they are, so appealing.

The reason we saw an explosion of NFTs in 2021 was partly due to another major crypto cycle, but also because of the realisation and application of NFTs in creative industries.

The appeal lies in the proof that NFT data brings to intellectual property.

A common argument from critics of NFTs is that – as most NFTs take the form of digital art – you can just 'right click' and copy them. Therefore they are not unique.

That is true, to a point. But a copy will only ever be a copy.

I could go to the giftshop at the Moco Museum in Amsterdam and buy a signed, framed *print* of a Banksy. It would cost a lot, but it would not be an original. I could also buy an unsigned poster of the same Banksy piece; it looks the same, but it is just a cheaper copy.

The value – particularly in art – is in the originality of a piece.

Nothing beats original art, and if you can show undeniable provenance, then you can assure originality. With an NFT you can categorically prove the origin and provenance of not just art, but *any asset* that the NFT represents.

If you're a musician and you create an original song, sure, it can be copied. A lot of music is. But an original song *with* data as an NFT to prove it is the first original piece would be like having John Lennon's original hand-written lyrics for *All You Need is Love*.

NFTs are incredibly useful for any kind of asset that you want to prove the origin, track provenance, or convey the rarity and uniqueness of. And as they are data, you can also add features like royalties into the NFT.

If you're an artist and you sell an NFT, you can bake a royalty into the data for every time that piece is sold. The NFT could change hands a dozen times over its life, and the original artist can earn a percentage of the sale price with every transaction.

This means that creative artists can get appropriately paid for the work they create. This is why NFTs are appealing not just to the art world but to musicians, game creators, authors, academics and even athletes and sports organisations.

The realisation is that NFTs aren't just overpriced JPEGs – that was a

catalyst moment that opened many minds to what NFTs can represent. And what an NFT represents is a particular asset with unique data that cannot be altered.

A $69 million market catalyst

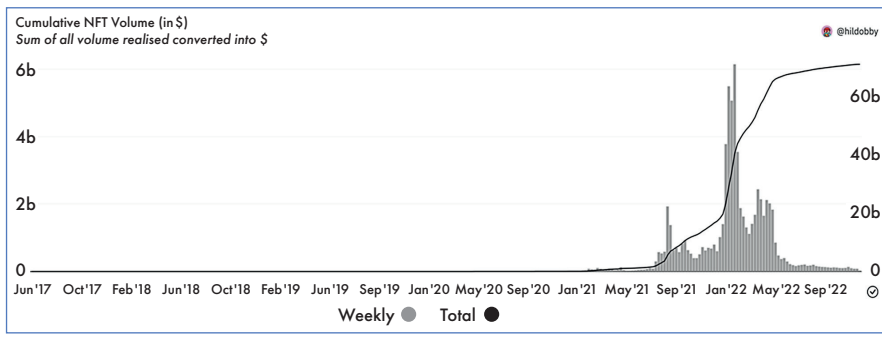
NFTs have been around for a while and will be around even longer.

One of the earlier indications of the potential of NFTs was the CryptoKitties mania that kicked off during 2017.

At one point the demand for CryptoKitties NFTs pushed Ethereum's network fees so high that it slowed down the entire Ethereum blockchain.

But that was nothing compared to 2021. To give you an idea of just how fast the NFT market accelerated in 2021, take a look at Figure 8.

Figure 8: Cumulative NFT volume in USD, mid-2017 to late 2022



Source: Dune Analytics, Dune Wizard – @hildobby

As I mentioned, NFTs were around in 2017, 2018 and 2019 – although looking at the chart you'd never know. But January 2021 saw things pick up, and then *explode* in 2021 and 2022.

In January 2021, NFTs were doing around $4.5m in weekly volume. At that point the cumulative NFT volume was about $70m.

By January 2022, there was around $5–6bn in weekly volume. And the cumulative value had soared past $40 billion.

What's fascinating about the market is that it was March 2021, early on in the NFT boom, when NFT artist Beeple sold his 'Everydays: The First 5000 Days' NFT for $69,346,250 in a Christie's auction.[19]

That wasn't the peak of the market; that was the catalyst that sent the market into overdrive.

The result was that NFTs started coming from everywhere, in a very similar fashion to the ICO boom of the 2017–18 crypto cycle.

Today there are thousands of NFT projects and millions of NFTs. The market exists on blockchains ranging from Ethereum to Harmony, Flow, Solana, Tezos, Cosmos, Secret Network and more.

Though wild fiat-currency boom-and-bust prices for NFTs capture the headlines, the information that lies underneath is what's important to take away.

While the NFTs themselves might be volatile and valuable and mint small fortunes (or lose small fortunes more likely), underpinning them all is data and infrastructure that brings value to the industry.

Whether it's something like NFT artwork, rare trading cards, image rights, a game, a book, or even a physical asset with a digital twin NFT, it's the underlying networks and technology that are often missed by the market.

That's where I see opportunity in NFTs. But maybe you want to get into NFTs as well? Maybe you're keen on understanding how to get an NFT or whether you even should?

In short, the NFT market isn't what it used to be. The data we saw in Figure 8 shows this.

That actually makes it a great time to learn more and to experiment with NFTs.

I see the NFT wave marking the beginning of a bigger trend that will encompass everything from art to collectibles, gaming, property, investments, goods, and maybe even your digital identity.

If you want to buy some NFT art, the best thing to do is to get a wallet,

such as MetaMask, Coinbase Wallet or Walletconnect, and connect to the biggest NFT marketplace: Opensea.

There are other ways to buy NFTs, including getting in on 'drops' (alerts to upcoming NFT releases), but you should be very aware the NFT world is *rife with scammers*.

Unless you're highly experienced in crypto, don't respond to any NFT drops on Twitter, never listen to anyone on Reddit, Discord or Telegram. Stick to the big, reputable markets on Opensea, Coinbase NFT, Rarible or SuperRare.

Also remember the market has massively fallen away in terms of values and volume. If you're buying an NFT, it's typically going to be illiquid. That means your chances of actually finding a buyer down the track are *slim*.

The trick is to stay rational and figure out your motivations for being in the market, then act accordingly. Treat it with caution – and also with a bit of fun.

If another NFT boom does come around, which I think it will, don't get caught up in the FOMO.

Realise it's very unlikely that you'll get an NFT or get access to an early drop for a 'millionaire maker' NFT project. Chances are, whatever you get might *at best* retain some long-term value; but most likely you'll have that NFT forever.

Most people with art NFTs are going to be left with illiquid, untradeable NFTs. I'd suggest that if you do start to acquire NFTs, you'd better make sure you like the look of them.

NFTs are here to stay. The principles of the underlying technology and networks hold huge promise for multiple use cases. It's an exciting world, with a lot of potential, but it is *much more* than overpriced JPEGs.

This is a big trend you should test, try, have a go at and have fun with.

Web3

THE FIRST ITERATION of the internet – which we now refer to as Web1 – gave us the *potential* of an open, distributed digital world. A new information superhighway.

This developed into Web2 – an engaging, 'free' digital world of genuine social interactions, but one restricted by terms and conditions, not to mention a thousand walled gardens. It became a hoarder, user and abuser of data.

Web1 promised the ideals of decentralisation and freedom, and delivered immense economic value.

Web2 promised the ultimate user experience and delivered a reality of centralisation and constraint, albeit with an exponentially greater economic value.

This leads us to ask: what will Web3 give us? What does it promise, and what can it deliver? Will its economic value be exponentially greater than Web2's?

CHAPTER 11

Are we really on the 'third' web?

There's a general view within the tech industry that Web1 – that early iteration of the world wide web – encompasses everything up to and immediately following the dot-com bubble.

It was the internet in its earliest form. The 'good old days', where simply getting (and staying) connected to the internet depended on no one else in the house picking up the landline.

Web1 provided us with the catalyst and foundations of a world-changing technology – perhaps the most world-changing technology in history. A platform of creative disruption that opened up growth on a scale never before seen.

Recognition of this potential, this growth opportunity, led us to Web2.

Web2 is defined as the era of mass-adoption internet. Global coverage, mobile connectivity and the realisation that data was the lifeblood of a connected, online world.

Web2 is the era of the monetisation, corporatisation and centralisation of the web. In an environment of cheap money, the giants of tech – the so-called 'FAANGS' (Facebook, Apple, Amazon, Netflix, Google, Spotify) – were able to absorb, hoard and centralise data, capital and power.

Web3 is the next evolution – or perhaps revolution – of the internet.

It promises to be:

- Open: the idea is that anyone can build in Web3. Open-source networks and IP-free technology are key drivers of the speed and growth happening in Web3.
- Accessible: anyone, anywhere, from any background, can access Web3. There's no need for a Google account, an Apple product, a Facebook profile or Microsoft subscription. Get yourself an open-source crypto wallet and connect to Web3. If you want to try it, then go for it, no third-party accounts needed.

- Trusted: underlying trust exists in the open networks. The crypto principles of decentralisation and self-sovereignty are the hallmarks of what Web3 can be. The peer-to-peer nature of Web3 allows trust to exist. Trust is in the code, the mathematics, the smart contracts of these Web3 networks. No third party needed.

The web tug of war

What many people don't realise is the idea of Web3 has been around for quite a while.

In 2018 I was at a conference interviewing early Ethereum architect, and founder of ConsenSys, Joe Lubin. I asked him then if he thought that decentralised crypto networks like Ethereum were in effect another, more decentralised version of the internet.

He explained that in his view, crypto networks were a natural progression of internet protocols. As he put it: "We call it Web3 as a sort of umbrella term. And it's a new trust foundation layer."

This idea of a 'trust foundation layer' is central to whether Web3 lives up to its promise or simply becomes Web2 on steroids.

What I mean by that is we run a risk that Web3 becomes Web2 with a better marketing strategy. A web where the same centralised data-and-capital hoarders maintain control of access and accessibility.

For example, say Amazon Web Services' (AWS) market share of global cloud services is around 33%. In a truly decentralised Web3, that market share might equate to something like 1% (or less).

Considering that AWS contributes well over 70% of Amazon's operating income, you have to ask: just how willing would Amazon be to embrace the idea of a decentralised Web3?[20]

Decentralisation is supposed to be at the core of the Web3 movement. That means a shift away from centralised organisations like Amazon, Google and Microsoft to a widely distributed network.

These new, distributed networks will be able to do all the things Big Tech can do, but the data, control, monetisation and rewards flow to the individual, not the organisation.

Hence there's a clash of forces between what Web3 could and perhaps *should* be, and what the practicalities and realities of our world are. We've yet to see how much of a fight incumbents will put up to protect their competitive advantages.

Web3's opportunity

This tug of war between the opposing forces of centralised and decentralised web creates opportunity.

Ultimately, I take the view that – over time – decentralisation will end up being too great a force to withstand. Web3 will become the bedrock of a more equitable, free and empowering internet.

This means a truly Web3 environment, with everything from storage to bandwidth, computing, hosting, domains, identity and all aspects of the web from cloud to cross-border remittance, being decentralised.

To fulfil that outcome, we need protocols, crypto networks and application layer projects built on crypto networks that can deliver the necessary infrastructure and user experience.

Therein lies the opportunities of Web3.

These protocols, platforms and products are being experimented with and developed today.

Decentralised storage? That's the vision of Filecoin. Decentralised domains? That's what Ethereum Names Service (ENS) is working on. Decentralised identity? Perhaps your crypto wallet becomes the conduit for connecting to Web3, and that becomes your digital identity.

This ties in closely with the potential and promise of metaverses. From a practical sense, you would connect to a metaverse using your crypto

wallet. In this new Web3 environment, the control of all data within – from financial data to identity – is controlled and managed by you.

You will often see Web3 discussed in parallel with the metaverse. The idea is the two complement each other, co-existing. They are not mutually exclusive.

This is very much a theme throughout the many exciting developments within the crypto industry: the intertwining of technologies and ideas into a better outcome for all.

The optimist in me believes that is exactly what we'll achieve with Web3, though the journey is unlikely to be smooth sailing.

If the future of Web3 is destined to play out as I expect, then when we talk about crypto as money, we're really looking at Web3 finance. When we pick apart the pros and cons of NFTs, we're talking about Web3 assets. When we dissect what the metaverse is, we're really trying to figure out Web3 social networks.

If you consider that decentralised crypto networks will form the foundations of Web3, and that has the potential to be exponentially bigger than Web2, then we must ask: what is the value of those foundations?

This is the opportunity I see in Web3 today.

Web1 delivered companies like Netscape, Microsoft, Yahoo! and AOL.

Web2 gave us opportunities like Google, Spotify, Meta, Amazon and Netflix.

What opportunities will Web3 give us?

It is not a question of *if* there will be opportunities in Web3. It is simply a question of which ones can you take advantage of?

Now that we've covered some of the core concepts within and surrounding crypto, it's time to take a deeper dive into the data.

RESEARCH, DATA & ANALYSIS

PART TWO

Crypto Cycles: Harder, Better, Faster, Stronger

CHAPTER 12

When we talk about the crypto markets, most investors (whether crypto or traditional) are familiar with two major boom-and-bust cycles: those of 2017–18 and 2021–22.

But when we wind the clock right back to the earliest days of crypto, we find cycles as early as 2011 and 2013–14.

Cycle One: 2011

When I first learned about Bitcoin in 2010, I was personally sceptical. After all, I'd come from a background of traditional stock investing, economics and finance, and financial advice.

The 'digital money tree' that Bitcoin appeared to be seemed too good to be true. And the first cycle confirmed that perhaps it *was* too good to be true.

In early 2011 one bitcoin was trading at around 30 cents.

The acceleration of Bitcoin's price in this cycle was amplified by Adrien Chen's article 'The Underground Website Where You Can Buy Any Drug Imaginable', posted to popular blogging site Gawker on 1 June 2011.[21] The article explained how bitcoin was facilitating a new wave of anonymous and remote purchasing of drugs and other contraband. The salacious and mysterious nature of the article meant it got a lot of mainstream attention, as did bitcoin.

Within the next month, one bitcoin was trading for $30. By November 2011 it was back down to $2. That was enough to terrify the most seasoned of investors, including yours truly – at least to start with.

That was cycle one. It was short, sharp, thrilling and terrifying.

Cycle Two: 2013–14

The first altcoin boom of 2013 was the key driver of the second cycle.

The constant launch of altcoins – usually through the Bitcointalk forum – quickly saw the overall crypto market swell in size. Along with the speculative returns that were being made in the market, this created a vortex of activity. Most notably, there was an appetite for copy-pasting code, launching a token, pumping and dumping it, then rinsing and repeating.

It was an opportunistic environment to say the least. But, deeper down, there was a movement of developers that had been inspired by Bitcoin's success. Development of new crypto networks had now begun in earnest. Some of the most long-standing, robust networks were built and launched in 2013 and 2014 – many of which still exist and flourish today.

These new launches to market got early movers and investors into quite the speculative frenzy.

Things got really crazy when the crypto market hit an inflection point around October 2013. The overall market cap of the whole crypto market leapt from around $1.5bn, reaching a peak of $15.8bn in December 2013.

That's right – the entire market cap of crypto shot up tenfold in the space of *a couple of months* – as you can see in Figure 9.

Figure 9: Total crypto market cap 2013–15

Source: CoinMarketCap

While the overall market cap of crypto shot higher, the main driver of the rise was once again bitcoin.

When you look at Figure 10, you'll see that bitcoin's fortunes during this period match those of the overall market very closely. While there were of course a wider array of cryptocurrencies available by this point, their values depended predominately on the price of bitcoin.

Figure 10: USD price of bitcoin 2013–15

Source: CoinMarketCap

At its peak in December 2013, Bitcoin's market cap topped out at $14bn.

By comparison, the rest of the crypto market – all altcoins combined – peaked in this cycle with a market cap of about $1.8bn.

This bull market was better and stronger than 2011's. It ran harder and faster than many expected. It brought *a lot* more attention, and the realisation there was real money to be made in this market. The big attraction was that *anyone* could do it.

This idea was frowned upon by traditional finance, but nobody could ignore the power and speed of the crypto community. It had become a market to be reckoned with.

Cycle Two also had its downsides. Irrational exuberance took hold on the way up, which meant a lot of people got burned on the way down. As all seasoned investors know, when any market runs that hard and fast, it is inevitable that it flips and crashes. Many investors learned that the hard way in 2014.

Just like 2011, this cycle fell as hard as it rose.

With prices peaking at the end of 2013 and start of 2014, things headed lower, and lower, and lower. In 2015 the market found a bottom at around $2bn in total market cap. Just as bitcoin's value had been a

driver of this second cycle, it now applied a handbrake. As bitcoin headed lower, so too did the rest of the market.

Figures 9 and 10 show that the rise and fall of bitcoin was virtually identical to that of the overall market, largely because at this point most cryptocurrencies traded primarily with bitcoin.

That meant the crypto market was priced in bitcoin. When bitcoin rose in fiat currency, the rest of the market followed.

As the market wound off between 2014 and 2016, it entered its first *real* crypto winter (though technically it was the second).

Of course the term 'crypto winter' is slightly misleading. While the prices and market cap might cool dramatically during these periods, the development, innovation and new ideas coming to market utilising crypto and decentralised networks actually get stronger.

The winter sets the scene for the next cycle.

During 2014, 2015 and 2016 we saw immense development and innovation. This set up the market for the next cycle.

Cycle Three: 2016–18

The third cycle started in late 2016 and early 2017.

Momentum continued to build through the first half of 2017, and significant returns were made as the market recovered from the crypto winter.

While one major driver was a steady rise in bitcoin's value, another was a new powerhouse crypto on the market: Ethereum.

The significance of Ethereum in the wider crypto ecosystem cannot be understated. While it may have detractors, the fact is the 2017–18 cycle was driven not just by bitcoin's price but also by Ethereum – and what it allowed the market to do.

What Ethereum offered was the ability to easily launch new crypto to market at the application level. A huge number of currencies raised

capital and launched by utilising smart contracts, an integral part of Ethereum's protocols. This was the ICO boom of 2017–18.

This saw an unbelievable rise in the number of crypto now hitting the market for the first time (good, bad and ugly) but also drove activity on Ethereum's blockchain, drawing in more financial and human capital and driving prices higher.

What's key about this third cycle is that by the very start of 2017 Bitcoin's total market cap was now at over $16bn, well past its peak from 2013. The total market cap of all crypto was around $17.7bn (Ethereum now made up $1bn of that).

The market momentum had already set the stage for the acceleration of this new cycle.

Soon the crypto market had ballooned from a few altcoins in 2011–12, to a few hundred in 2013–14, to well over 1,500 by the middle of 2017 – thanks to Ethereum.

The rate of crypto coming to market would only accelerate during the 2017–18 cycle and what is referred to now as the 'ICO bubble'.

Figure 11 demonstrates that by its peak on 8 January 2018, Bitcoin's market cap had swelled to almost $300bn, Ethereum's to $135bn and the total crypto market cap to over *$830bn* – just four years after hitting a bottom of $2bn in 2015's crypto winter.

This was a market now running higher, harder and faster than the previous cycle. The launchpad of the new cycle was the highs of the previous cycle. This no longer looked like a coincidence; it was a pattern.

If the market rose that hard and fast, and a pattern was emerging that looked like previous cycles, then surely the market would peak, crash and enter a new winter?

It did exactly that.

Figure 11: Total crypto market cap 2016–19

Source: CoinMarketCap

As the charts indicate, by early 2019 the market had fallen far from its all-time highs. Bitcoin's market cap had peeled right back to around $50bn, and its price to around $3,000. Ethereum had found a bottom around $8bn in market cap, with a price around $80. The total market was now worth $110bn.

Compared to the highs in 2017–18, this was a crisis. A collapse. To some, the death of crypto. For many it was the start of their first crypto winter. But in reality, the lows of 2019 were still significantly higher than the highs of Cycle Two.

Figure 12 puts that into perspective. This is a chart covering *both* the 2013–14 and 2017–18 boom-and-bust cycles.

This shows – even accounting for the 2018 bust – just how much the total market had grown over a mere five-year period.

Figure 12: Total crypto market cap 2013–19

Source: CoinMarketCap

Granted, there were many times more crypto in the market now, but while the perception was that winter had set in, the truth was the market was getting stronger. Those crypto that survived the crash were setting up again for the next cycle.

Cycle Four: 2020–22

Cycle Four is the most recent cycle in the market.

The setup for this boom-and-bust cycle began in 2020. This was a year of immense global uncertainty, with governments imposing controls and restrictions never thought possible in the face of the Covid-19 pandemic.

Political and societal uncertainty aside, the global pandemic sent a shockwave through all asset classes in early 2020. And crypto was not spared.

In March, as lockdowns kicked into full swing everywhere, the market tanked. It was a true black swan event. And with the market already in

the depths of a crypto winter, there was fair reason to be concerned as to whether a new cycle would ever come again.

This was the same kind of market uncertainty I felt in 2012, 2015 and 2019. Early 2020 was still technically in the third winter. Seeing the familiar setup patterns emerge, confidence of another cycle peak was there, but the timing was always the unknown factor.

It took about two years for the winter of Cycle One to yield to the next major bull run. After Cycle Two it took about three years. Here we were, about two years after Cycle Three, so it was hard to tell if the winter would drag on another year or if the market was primed to go again.

It went again.

During 2020 market momentum gradually crept higher. It didn't completely shoot the lights out, but showed a consistent upward trend.

While the market had been sideways throughout 2019 and into early 2020, momentum returned as the year rolled on. In fact, it crept up on everyone a little while we were distracted by the global pandemic.

Bitcoin's market cap peak in 2017–18 was around $300bn. By late November 2020, it had worked its way back to and then *past* that mark. It was at this point, when bitcoin hit its previous all-time high, that it and the wider market exploded higher again.

The peak in the wider market from 2017–18 was a total market cap around $830bn. By the start of December 2020, the entire market hit the previous peak again. This was the end of the setup; the market was now again free to run.

By May 2021, the market was hitting extreme all-time highs again.

The total market cap was around $2.5trn. The market had gone from around $110bn at its 2019 bottom, through $830bn in late 2020, and now on to $2.5trn in just two years.

This was a market again running harder, better, faster – and during the crypto winter it was getting stronger.

But then something happened we hadn't seen in previous cycles: the market took a dive in the middle of the 2021 cycle.

The entire market more than halved between May and July 2021. It would have been fair to assume that Cycle Four was over, and that once again, winter was coming.

Not the case.

From July to November 2021, the market took off again. Many crypto across the board returned to all-time highs. The catalysts for market peaks are numerous. It's often a mix of genuine progress and positive news events, coupled with a dash of traditional financial system instability and a healthy splattering of FOMO from investors.

It's fair to say that in 2021 another catalyst was increased central bank monetary policy intervention in the global financial system, following the imposition of social restrictions, This fuelled further speculation in crypto, which boosted the second peak of the 2021 cycle.

This further spurred on the fourth cycle and saw the market top out just shy of $3trn, with Bitcoin around $1.3trn and Ethereum well over $550bn (see Figure 13).

Figure 13: Total crypto market cap 2020–22

Source: CoinMarketCap

Inevitably, the market followed previous cycle patterns and tapered off significantly and sharply in 2022. Bitcoin's market cap fell to $330bn, Ethereum's to $158bn. In this new crypto winter, the total crypto market cap dropped to $820bn.

Now we're in yet another crypto winter (I'm almost losing count by this stage), it's worth taking perspective of where the market is compared to previous cycles and the broad scheme of the 2010s.

You can see the fourth cycle's rise and fall in Figure 14. Cycle Three is visible, but you can barely recognise the second cycle, and the first cycle doesn't even register.

Figure 14: Total crypto market cap 2013–22

Source: CoinMarketCap

If we are now in a fourth winter, then we need to ask: what is the potential setup for a fifth cycle?

While it might not feel like there will even *be* a fifth cycle, it's hard to ignore the previous cycles. While we can't rely on them, we can derive patterns from what we've seen since crypto's early days.

Historically, the setup comes from the bottom of the winter and momentum back up to the previous cycle's highs. From there, we see a hockey stick-style inflection to the new all-time highs.

If we assume that will again be the case, the tricky part is figuring out the bottom of this winter. The good news is you don't need to be precise – you just need to be in the ballpark and in the game.

We see that previous winter bottoms have come around one year after the cycle peaks. If Cycle Four peaked in November 2021, then an assumption could be made that the market finds its bottom around November–December 2022.

Previous cycles indicate that, over the year following the bottom, consistent momentum back towards the previous cycle highs will provide the launchpad for the fifth.

If in November 2023 we find the market caps for Bitcoin, Ethereum and the total market are again close to – or have hit, or started to surpass – the highs from 2021, then strap in, because things could be about to get wild… again.

It should also be said that we can never really know just how these cycles will work. We never know in advance when the exact bottom or top of a cycle will be.

Timing the crypto market – timing any market – is an impossible task. And there's no crystal ball that says we'll even have a fifth cycle.

I believe there will be many more cycles. Based on over a decade's experience in this market, and a fundamental understanding that a crypto winter is when the greatest and most valuable developments happen, I see Cycle Five coming.

Prices may suggest otherwise in the short term, but each cycle typically attracts more human, financial and intellectual capital than previous cycles. That attraction sets the industry up for another bigger, better, faster, harder and stronger cycle.

The other thing to keep in mind is that you don't need to perfectly time the market to be successful in each cycle. You can be patient. You can wait for momentum. But you need to be in the game to benefit.

Sitting on the side-lines is not the play to maximise opportunity from cycles in crypto markets.

Knowing about the previous cycles is an important aspect of success in the market. While every cycle booms and busts with great ferocity, achieving success is more about *time in* the market than *timing* the market.

Analysis of Crypto Asset Performance

CHAPTER 13

Analysing the performance of crypto assets over time is arguably one of the hardest tasks in global markets.

The crypto market doesn't function on the same kind of information and data that traditional markets do.

For a start, transparency of information is often lacking. You'll find that a Tweet or a Medium post can shift a crypto value faster than getting coverage on Bloomberg ever could.

Or – and this would be even harder to predict – a paid group on Telegram might be coordinating to push the price of a crypto on a certain date or time.

Yes, I'm well aware of the potential illegality of that – market manipulation, front running, insider trading. All of that is rife in crypto, which makes figuring out the reason why some crypto outperform others a near-impossible task.

Then you add macroeconomic factors into the mix. The crypto market is full of speculative, risk-on capital. That means investors accept the high-risk nature of the asset class in their pursuit of greater performance.

However, in 2022–23's decidedly risk-off macro-environment, investors typically look to flee risky asset classes such as stocks and (especially) crypto. Given the money now invested in the crypto asset class, this can see the market take a battering.

At first glance 2022 would seem to be a perfect example of the crypto market taking a beating due to investors fleeing risky assets – but was it?

While you can certainly attribute some of the crypto falls in 2022 to wider macroeconomic factors, there's also an argument that the crypto market was ready to naturally find its bust (and next crypto winter) based on the three previous cycles – this may have taken place even if the stock market and macro factors were still buoyant.

In my view, the more important analysis is how the cycles move and over what duration they play out. Perhaps most importantly, what lessons can we learn from how the setup of the market leads into explosive inflection points and new all-time highs?

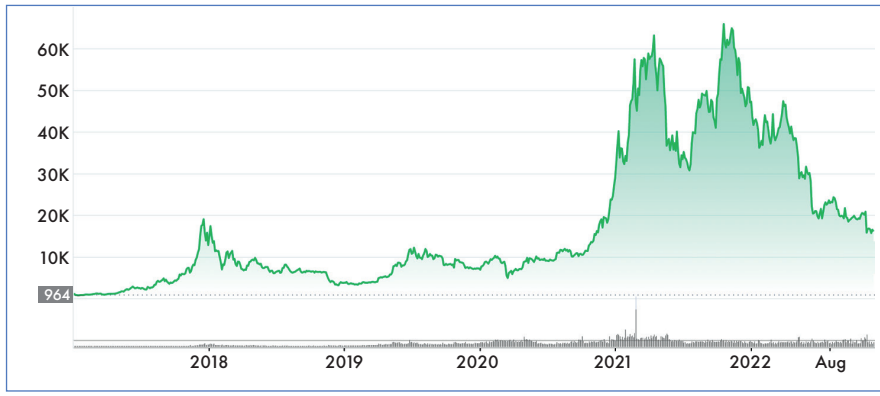
Cycles aside, there are a few things that need consideration if you're going to try to analyse how the market and your crypto portfolio are performing.

Know your denominator

Early on you'll need to figure out how you want to track your performance. That means typically you need to approach the market in two distinct ways: tracking crypto price movements against fiat currency and against other cryptocurrencies.

For example, Figure 15 shows the price of bitcoin since the start of 2017 in fiat currency (USD).

Figure 15: Price of bitcoin in USD since 2017



Source: CoinMarketCap

You can see a run up from around $964 to $20,000 in 2018, then a drop to $4,000 in 2020 before picking back up to over $65,000 in 2021.

Figure 16 covers the same timeframe for ETH, also priced in USD.

Figure 16: Price of ETH in USD since 2017

Source: CoinMarketCap

Here you see a run from just $8 at the start of 2017 to around $1,300 in 2018, then up to more than $4,500 at its peak in 2021. From trough to peak, 56,150% gain.

In Figure 17 we see the same timeframe, but ether is priced in *bitcoin*.

Figure 17: Price of ETH in BTC since 2017

Source: CoinMarketCap

Figure 17 demonstrates the importance of your denominator currency (the one you're comparing the price of your assets to). What you're pricing your assets against is crucial to analysing performance in the appropriate way.

If your denominator is bitcoin, as in this example, then ETH priced in bitcoin has never been as high as it was in June 2017. Even though the crypto market priced in fiat currency hit all-time highs in January 2018, around April 2021 and finally in November 2021, you'd have lost ETH value when priced in bitcoin.

Had you bought ETH in June 2017, with the view to selling it to get more bitcoin in a few years' time, you'd be highly disappointed. In June 2017, you needed 6.8 ETH to buy one bitcoin. By November 2021, you needed 13.3 ETH to get one bitcoin.

In relative terms, you've lost value when pricing your assets in bitcoin.

This happens a lot when it comes to the value of altcoins relative to bitcoin as the underlying denominator. In fact, if your aim is to build up bitcoin holdings by trading and investing in altcoins, you may want to rethink your strategy.

There are numerous examples of assets that have done relatively

well when priced in fiat currency but reveal a different story when priced in bitcoin.

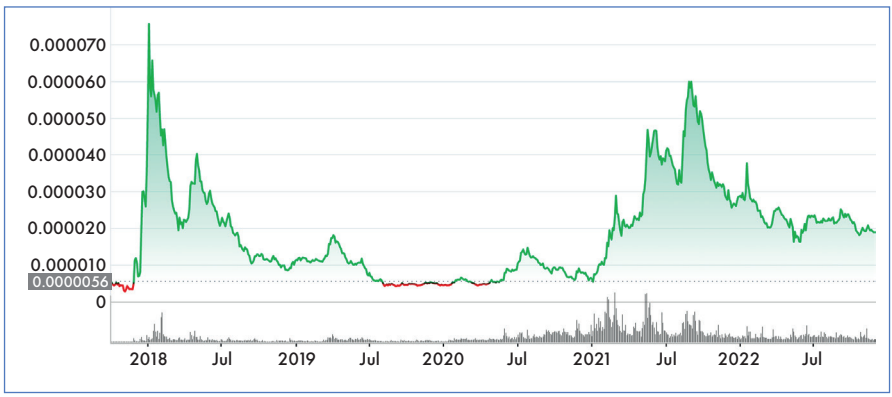
Figure 18 charts the value of cryptocurrency XRP (XRP) when priced in BTC.

Figure 18: Price of XRP in BTC since 2017

Source: CoinMarketCap

Figures 19, 20 and 21 track the same relationship from the perspectives of cardano (ADA), litecoin (LTC) sand stellar (XLM) respectively.

Figure 19: Price of cardano in BTC since 2017



Source: CoinMarketCap

Figure 20: Price of litecoin in BTC since 2017

Source: CoinMarketCap

Figure 21: Price of stellar in BTC since 2017

Source: CoinMarketCap

Every single one of these cryptocurrencies achieved all-time highs against bitcoin in the 2017–18 bull market cycle.

None of them has gone on to higher highs when priced in bitcoin during the 2021 bull market.

Flip back to their prices against fiat currency and you'll find a number of them went on to new higher highs during the 2021 peak.

Ether peaked at $1,400 in January 2018, and then went on to reach $4,891 in November 2021.

Cardano peaked at $1.17 in 2018 and then $2.95 in September 2021.

Litecoin, up at $315 in December 2017, then peaked again in May 2021 at $412.

Stellar and XRP are a little different. They both peaked in 2018, stellar at 93 cents in January 2018 and XRP at $3.84. They wouldn't hit new all-time highs in 2021, but they'd get reasonably close. Stellar would recover to 71 cents and XRP to $1.65. Not a complete return to glory, but a markedly better recovery priced in fiat currency than priced in bitcoin.

It is also worth pointing out that – regardless of any of these examples – had you invested in any of these currencies on 1 January 2017, you'd actually be doing pretty well in bitcoin *and* fiat currency.

In reality, not a lot of investors in 2017 were that early. Many of them came to the market late in the year, as the FOMO and hype kicked into overdrive. That meant they were buying and trading bitcoin for altcoins at levels which, over the long run, proved to be disastrous.

When we come forward to the 2021 cycle, we see similar patterns emerge.

A number of crypto which came to market in the crypto winter of 2019 and early 2020 exploded in value in the 2021 bull market, but are now showing the same signs of fatigue.

You can see in Figure 22 a massive rise in solana's (SOL) value, peaking early in its existence. But since coming off the top of this peak, it's been in a long downtrend.

Figure 22: All-time price of solana in BTC

Source: CoinMarketCap

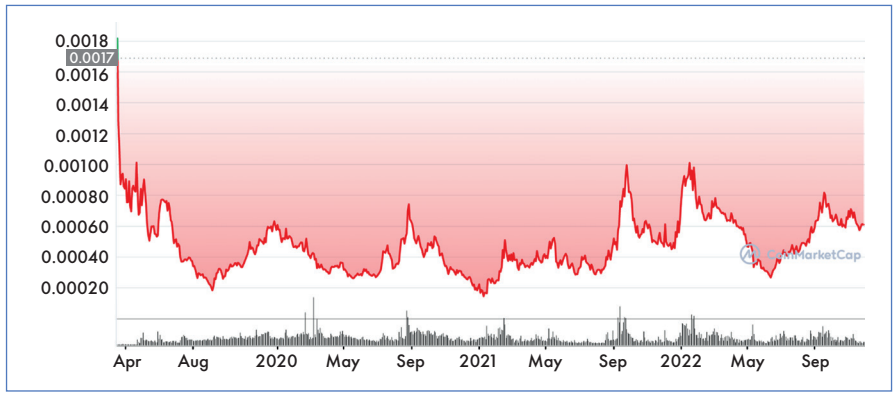
Again, with polkadot (DOT) in Figure 23, we see a similar pattern: a peak early in its existence, and then downwards since.

Figure 23: All-time price of polkadot in BTC

Source: CoinMarketCap

With cosmos hub (ATOM) (Figure 24) we see it immediately peak against bitcoin and then plunge straight down, never to repeat the peak.

Figure 24: All-time price of cosmos hub in BTC



Source: CoinMarketCap

There is, however, one outlier: binance coin (BNB) (see Figure 25).

Figure 25: All-time price of binance coin in BTC

Source: CoinMarketCap

Exceptions such as binance coin always appear obvious in hindsight, but at the time they are very difficult to nail down. This does tell us, though, that not all altcoins are the same. However, the broad trend is that when priced in bitcoin, over time altcoins tend to lose value.

At the same time, they might hold their value in fiat currency; it all

comes back to what value you're trying to build wealth in – crypto or fiat currency?

Another consideration, if the patterns from 2017–18 are anything to go by, is the party might not be over just yet for crypto that saw their first bull market in 2021 and have since cratered.

If we do indeed head into a fifth cycle, there's a fair assumption to be made that many will go on to higher highs. Whether the same can be said for crypto which have now endured two cycles is hard to say.

The key takeaway from the market performance is the importance of either investing early, at the bottom of the cycle, or as the cycle is again picking up momentum. Being even slightly late to the party can be detrimental if you're looking to build your bitcoin holdings.

When you look at the relative performance of cryptocurrencies against both fiat currencies and bitcoin, this goes some way to reinforcing the view of bitcoin maxis – those who believe that bitcoin is the supreme monetary system, store of value or reserve currency asset – that all other crypto are just worthless Ponzi schemes and shitcoins.

Imperfect timing is just fine

If you're attuned to the market cycles, which is no easy task, then it pays to be one of two things when it comes to altcoins: either early or late. You certainly want to avoid moving as the masses do once FOMO and hype kick in after the upwards inflection point.

From my own experiences in the market, when it seems everyone is making money hand over fist, you want to be doing *nothing*. You want to have already made your positions in the market during the crypto winters.

Being active when the masses are inactive is the smart play.

And being inactive when the mainstream is being active is the way to approach market peaks.

When you look again at the previous charts, each is worth more bitcoin today than it was on 1 January 2017. But of course you needed to be really early to maximise that potential.

Likewise, each has a low point against bitcoin in the year following each initial peak – which then led to greater highs.

Relative to bitcoin, ETH peaked in mid-2017 and then cratered to 0.016 BTC in September 2019. But from that bottom it rose more than four-fold in late 2021.

Even XRP, which over time has substantially underperformed when priced in bitcoin, has its moments. From 0.0000069 BTC in January 2021, just a couple of months later in May 2021 it had ballooned to 0.000037 BTC, a quickfire 436% rise priced in bitcoin.

Most of the big money in the longer-standing altcoins priced in either bitcoin or fiat currency is made when you're into a crypto *early*. It pays most to be early.

But if you can't be early, then short-term trading opportunities become the best option based on current available data. If you can't be early, be late, but always when the cycle has peaked and then ripped lower.

However, even that doesn't quite paint the full story in today's market.

It's very difficult to be early into token projects at this point. There is no one, universal site for all new token launches. And the rampant launches of tokens on a website à la ICO boom of 2017 are long gone.

Now, with more oversight and enforcement from regulators, the market for new coin launches isn't what it used to be. It may never be again.

But this doesn't eliminate the opportunities to ride huge waves of performance. The key is always to make the contrarian play. That of course is no hard and fast guarantee for success, but it has worked so far.

A long-term hodl strategy works when you're early before a cycle has peaked, or late after a cycle has peaked. When a cycle is peaking and astronomical crypto gains are *everywhere*, that's when you want to be assessing your portfolio and clipping out appropriate profits.

There's one other trick when you analyse these markets, though it's a trick that is hard to do: make sure that as the market cycle turns higher you incrementally take profits off the table.

You can make returns in fiat currency that stretch into the tens of thousands of percent. Sometimes even higher. The trick is to not overshoot in a peaking market.

Returns of 100%, 200%, 1,000% are *excellent* in any language. What crypto has done is distort our expectations of what's possible versus what's practically achievable.

Ask yourself, are you able to de-risk your capital in a position by taking out your initial investment amount and letting the rest run, capital-risk free? If you double your value in a position, should you take out half and then let the rest ride?

It's hard to do because the voice in your head says, "Let it all ride, and it *could* all shoot higher and higher." Sometimes it does, but at what cost and what risk? Smart profit-taking in crypto is a task not many are good at, but if you act sensibly and with realistic expectations, you'll find more often than not you end up on the winning side of investing in this market.

If you act sensibly *and* have a firm vision for what each element of your portfolio is intended to achieve, you'll do even better. So let's look at how to go about crafting an effective crypto portfolio.

How to Construct a Crypto Portfolio

CHAPTER 14

When it comes to building any asset portfolio, there is one critical question you must ask yourself before you start doing *anything*.

What are the outcomes you're seeking to achieve?

First and foremost, you *must* figure out your plans and state your goals. Are you looking to save up for a deposit for a house? Are you looking to build up assets apart from your house? Are you putting money away for your kids? Are you looking to accumulate wealth for retirement? Are you in retirement looking for income? Do you just want to buy a Ferrari?

These are some of the things that people might be trying to do, planning to do, working their way towards. Ultimately, the lifecycle of a portfolio involves accumulating wealth then at some point drawing that wealth down and/or passing it on to beneficiaries.

Another important thing to bear in mind during portfolio construction is that your goals are yours

to define, and they are unique to you. You shouldn't let anyone else decide what you are aiming to achieve with your investments.

Yes, there are some priorities that are more important than others, according to conventional wisdom, like owning your own home. But for some people, that may not be so important. As society's values and views change, so does what's important in life. Hence the diverse and changing nature of what a portfolio might be used for.

A portfolio of assets isn't a rigid tool that should be set in stone and never change. It is – and should be – fluid, adaptable, but also relevant to your stated plans and goals. Still, you should have some structure and methodology in how you put a portfolio together.

With that in mind, let's look at the first step of portfolio construction in more detail.

Figure out your goals and plans for your overall portfolio of assets

Let's say you've figured out *what* you want to achieve from your overall investment portfolio. Next you've got to figure out *how* to achieve it.

As the title of this chapter implies, I'm not here to talk to you about overall portfolio construction across all asset classes. What I want to focus on here is what I'd consider the right approach towards crypto assets in the context of your overall portfolio.

Therefore I'm going to assume you've already figured out the other assets that make up your wider portfolio. And you've now determined you want a segment that's focused solely on the crypto market.

This leads us to the second step in constructing a crypto portfolio. This is something I've applied as gospel when investing in and surviving the crypto market over the last decade or more.

Determine your 'sleep at night' factor

You absolutely must understand what I call the 'sleep at night' factor.

This means understanding your capital allocation risk tolerance. How much fiat currency capital can you really stomach in this volatile asset class? How much could you put into the market and, if you woke up tomorrow with the stark realisation that it was all gone, still be okay?

Perhaps through some unforeseen event (a hack, user error, or some assets that do go to zero) your entire capital allocation to this asset class is gone. Could you sleep at night knowing that tomorrow your capital will be worthless? Is that a risk you could face in the morning?

That might sound alarming, but it's a reality you must come to accept when holding crypto assets.

Essentially, *don't invest more than you can afford to lose.*

Some people I know have a sleep at night factor that could be 80–90% of their entire net wealth. For others it's as low as 5–10%. Only you really know what you're comfortable risking.

Once you know how much you are really prepared to risk in this asset class as part of your wider portfolio, then you're ready to get granular.

You've got plans and goals. You know what your sleep at night factor is and how much you're directing to crypto assets – now what?

That leads us on to step three.

Portfolio inception

CoinMarketCap tracks the prices of around 22,000 cryptocurrencies. We all know you cannot hold that many in your crypto portfolio.

So how on earth do you filter 22,000 into a sensible portfolio allocation?

The best way to approach your crypto portfolio is to segment it. For each segment, you need to think about the role it is to play in the overall crypto portfolio – and so as a part of your overall total asset portfolio.

In this sense, you end up with a portfolio within a portfolio.

Hence why I call it 'portfolio inception'.

The following examples of crypto are only indicative of the kinds of crypto that could suit each segment. They are a guide, not a recommendation. You should always understand any investment you're making and decide if it meets your intended goals, plans, risk tolerances and capital allocation thresholds.

One part might be a simple, buy and hodl strategy for the largest, most robust crypto that started all this off: bitcoin.

Then you might have a segment dedicated to other networks such as Ethereum, Stellar, Tezos, Solana, BNB or XRP.

You might allocate another segment to pure-play DeFi opportunities. These may have capital appreciation potential in their native tokens, but also have yield-generation potential from their platforms and protocols.

It is worth noting that a number of crypto in your portfolio may be capable of earning staking rewards. Always ensure you maximise your holdings' potential, but also keep in mind the importance of self-custody over any potential yield.

You might decide to have a segment dedicated to thematic opportunities. This might include areas covered in Part One of this book: things like exchanges, NFTs, metaverses, Web3, decentralised storage and computing, more DeFi, and sports and gaming.

You'll often find several crypto attached to each thematic idea – dive into them deeper, research and understand them, and then add them to this part of your crypto portfolio.

It's also not a bad idea to hold a portion of your capital in stablecoins. This gives you the flexibility to call on these funds when opportunity

strikes. Perhaps you've got a chance to participate in a token launch, or a crypto on your watchlist is now at a prime buying value, or maybe you've just been waiting to get your hands on an NFT that's now lower in price.

Or you may simply have cashed out of a winning position and are waiting to make your next move. Stablecoins, regardless of your views on them, are useful when managing a crypto portfolio.

Then we get to the highest-risk sections of what's already technically a high-risk crypto portfolio.

Plenty of people will suggest you don't go near any of this, but my view is that you can't be in crypto and not have the occasional dabble in some 'meme crypto'.

What do I mean by meme crypto? Well, it's crypto that has no apparent rhyme or reason for existing.

Maybe it's a project that launched because of an impending global event, or because an infamous billionaire CEO decided they liked a particular kind of dog. Maybe it's something you just like the name of, or perhaps it really is a crypto based on a meme.

The thing here is, it doesn't matter. This is where you can have creative freedom and a ton of fun. It's where you can play and enjoy the insanity that sometimes comes with crypto.

The thing about meme crypto investing is *you should expect to lose it all.* That might sound counterproductive in the context of a portfolio, but sometimes it's the meme crypto that get the biggest, most furious momentum behind them and can explode in value harder and faster than any other kind.

This is likely a *tiny part* of the portfolio, and it should never get out of hand. If you do lose funds dabbling in meme crypto, don't go constantly adding back to it on the hope the next one moons. This is really just a punt and play part of the portfolio and should be treated as such.

Also, meme crypto are almost always best utilised in a raging bull market. In a crypto winter, this is something you don't want to go near.

While portfolio construction can be strategic, it must be flexible – based on conditions in the market – and should have an element of fun about it too.

Finally, I suggest having an allocation of capital to what I call 'testing and experimentation'. This is a small allocation of capital that you use when trying out new aspects of the market.

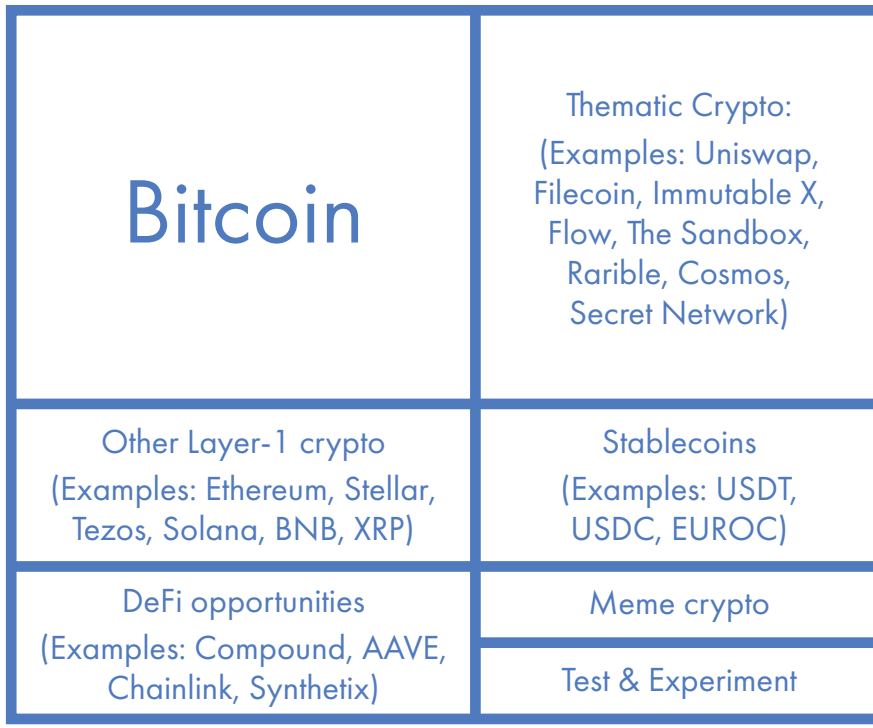
The crypto industry evolves and innovates at a frantic pace. New ideas hit the market at a moment's notice. The idea of DeFi didn't really exist before 2020. NFTs were unheard of before 2017. The only metaverse worth exploring pre-2017 was with an Italian plumber named Mario.

The testing and experimentation section isn't designed to generate huge returns, but it is supposed to level up your knowledge and understanding of new innovations to crypto.

Capital allocated here allows you to participate, test, try and (with a bit of luck) maybe invest in something that becomes much bigger than you'd first expected.

The indicative structure in Figure 26 is one way of building and segmenting a portfolio covering different aspects of the market. What's important to understand is that you should always consider each investment on its own merits and understand what role it's designed to play in your overall strategy.

Figure 26: Example portfolio structure



Source: Editor's own image

Above all else, when constructing a crypto portfolio, remember to understand the purpose of each investment you make.

- Is it a 30-year hodl in a non-yielding asset like bitcoin?
- Is it a 10-, 20- or 30-year hodl in a yielding, compounding-potential asset like ether?
- Is it an investment into the explosion of decentralised finance?
- Is it a thematic play on investment ideas like decentralised storage, metaverse, Web3 or gaming?
- Is it a short-term punt on a meme crypto for fun?

If you're very clear and defined about the role of each investment you make, then you find the construction of the portfolio kind of just takes care of itself.

Once you've created your portfolio, you'll need to manage it as the market moves around you. Next we'll look at some new and upcoming trends you would be wise to be aware of.

Emerging Sectors and Trends

CHAPTER 15

Since the genesis of Bitcoin, the crypto ecosystem has exploded into a diverse, innovative ecosystem rich in ideas.

At the heart of the crypto revolution are core beliefs in decentralisation, self-sovereignty and the redistribution of power and control away from centralised authorities in favour of individuals.

When it comes to emerging trends and ideas, I believe we should still include Bitcoin's creation and explosion. It is still in its earliest days, compared to the global financial system and money as we know it.

It's funny that the oldest and longest-standing cryptocurrencies are only just over a decade old, as of 2023. Others around nine years old are considered veterans, and the real acceleration of innovation and ideas in this industry is only about five years old – yet it feels like this has all been around for decades.

If we're talking about emerging sectors and trends – it's *all* still emerging and trending!

This kind of perspective is always necessary. I mean, Amazon Inc. has about a 15-year head start on Bitcoin and about 25 years on many of the younger cryptocurrencies.

The coverage and attention this market gets makes its youth easy to forget. We are still in a nascent stage. It *feels* older because its open and accessible nature means that innovation in crypto happens at an incredible rate.

As a result, the expectation is that returns and reward will also come quicker and faster than ever before.

With so much speculative money rushing around today's fast-paced crypto market, patience is not a virtue you would expect to hear of when talking about emerging sectors, trends and opportunities.

But patience and perspective are essential. What may have been an emerging sector yesterday may no longer appear to be a trend today, but that doesn't mean it won't emerge again as a bigger trend tomorrow.

That's why it's important to look at some of the emerging sectors and trends that came with each of the previous cycles. What we find is these sectors and opportunities emerge, rise, fall, and often rise again – inspiring new opportunities to come to market.

Like all markets, there's room for more than one player. In fact, a healthy market will have multiple opportunities within each sector – which is something we see reflected in crypto.

Cycles and opportunities

It's easy to see what the emerging idea of the first crypto cycle was: Bitcoin.

This cycle posed fundamental questions about money, what it is, how it's issued, who does (or doesn't) control it, and how global citizens can transact and interact financially without the intermediaries of the traditional financial system.

These questions represent what is still a huge trend – decentralisation of money – that I believe will bring about the biggest and most significant change we've seen in society since – well, maybe ever.

Patience and perspective are needed here. The size and impact of this trend may play out over a longer period than you or I will live to see, which is why knowledge about Bitcoin and its impact is important to pass on through the generations.

Cycle Two is where we started to see a greater variety of trends and increasing diversity of ideas.

One of the things about the second cycle is that it attempted to build on the core idea of the first – a new currency for the world. If Satoshi could launch Bitcoin for the world, then maybe someone else could launch a cryptocurrency to serve some other purpose or utility.

Soon enough there were digital currencies proposed for all manner of communities and even organisations. Weirdly, the ideas here were almost like early central bank digital currencies (CBDCs) which are now proposed by many countries. These new cryptocurrencies of cycle two were not really decentralised. They were controlled by a few developers (at best) and, on balance, not many served a great purpose or had much utility.

But it was a distinctive trend – an emerging idea from Cycle Two – that anyone could create a *network of value*.

Cycle Three brought us the ICO Boom. You can love or hate that period of the market, and cheer or bemoan the wins or losses that came from it. But when you look at the bigger picture, this was a novel way of raising capital and forming capital structures without the frictions of the traditional financial system.

Of course, this had both positive and negative outcomes. But it certainly proved that capital markets – and, importantly, access to capital markets – could and should be more open, accessible and available to all levels of investor. The appetite for investment is there,

but too often traditional finance opportunities are closed off to 'retail' inventors.

While the ICO boom had its issues, perhaps the main benefit to come out of it was the idea of the tokenisation of assets and decentralised services. It's those ideas that have stuck around long term.

Cycle Four was perhaps the biggest explosion of ideas and emerging trends we've seen through all previous cycles.

It started with the 'DeFi summer' of late 2020, then rolled out into NFTs, metaverses, play-to-earn gaming and, ultimately, into Web3.

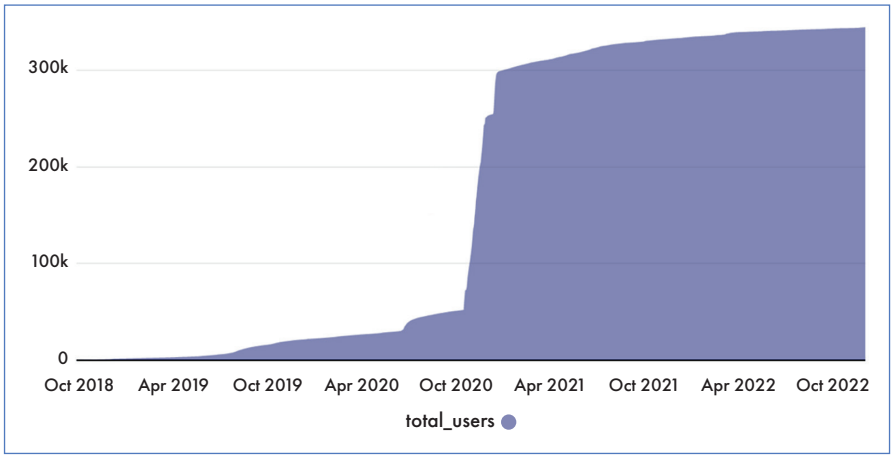
The emerging trends from 2021 are the ones that are worth taking a closer look at, because even though the market entered a crypto winter in 2022, it's these trends that will likely stick around, along with networks of value, tokenisation of assets and decentralisation of services (which we inherited from previous cycles). These are what may very well drive the next cycle.

DeFi

Starting with the 2020 DeFi summer – the precursor to the 2021 market peaks – we can see a huge rise in users of a number of the DeFi protocols that had been in development for a number of years.

Take a look at Compound, which is a lending-and-interest-rate platform in the DeFi world, in Figure 27.

Figure 27: Total Compound users over time

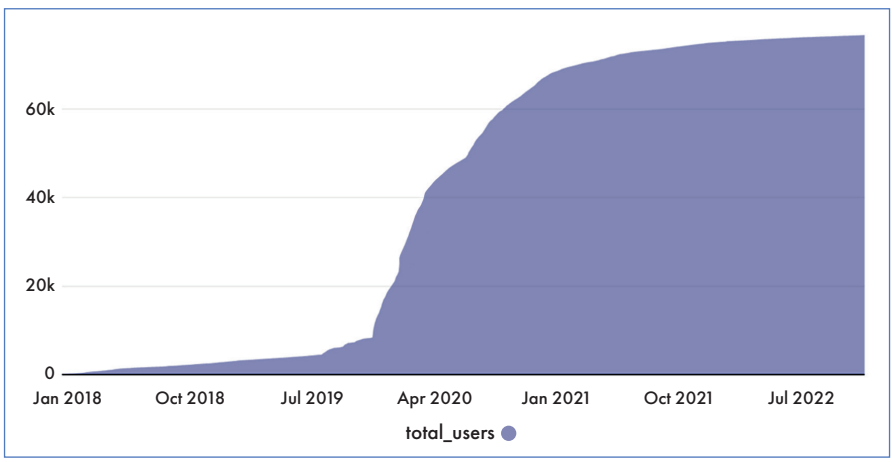


Source: Dune Analytics, Dune Wizard @rchen8

You can see an increase in users of Compound during 2019 and into mid-2020, then a rapid five-fold increase between October and December 2020.

In Figure 28 MakerDAO, a protocol that governs the DAI stablecoin ecosystem, shows a similar pattern of user growth during the DeFi summer – albeit its inflection point gets a jumpstart on Compound.

Figure 28: Total MakerDAO users over time

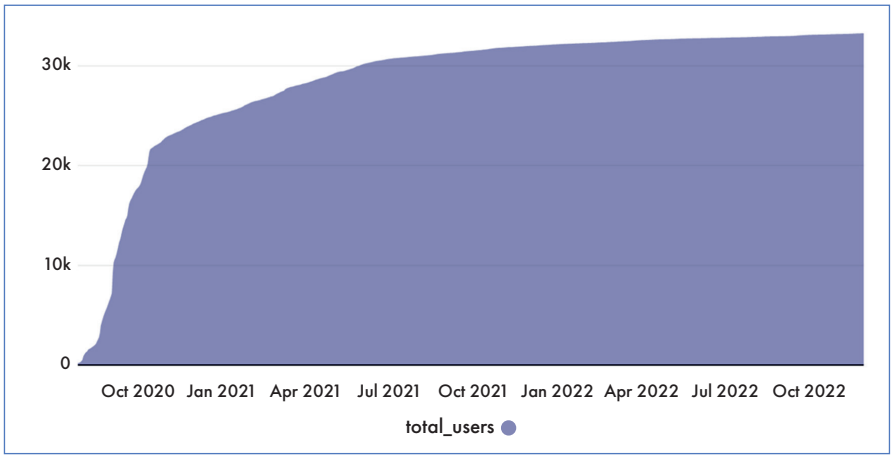


Source: Dune Analytics, Dune Wizard @rchen8

Again, you see user numbers slowly but surely building, then in 2020 an astronomical rise, tripling over the course of the year.

Yearn Finance, another DeFi lending protocol, is also similar, with an exponential rise in users in later 2020 (see Figure 29).

Figure 29: Total Yearn users over time



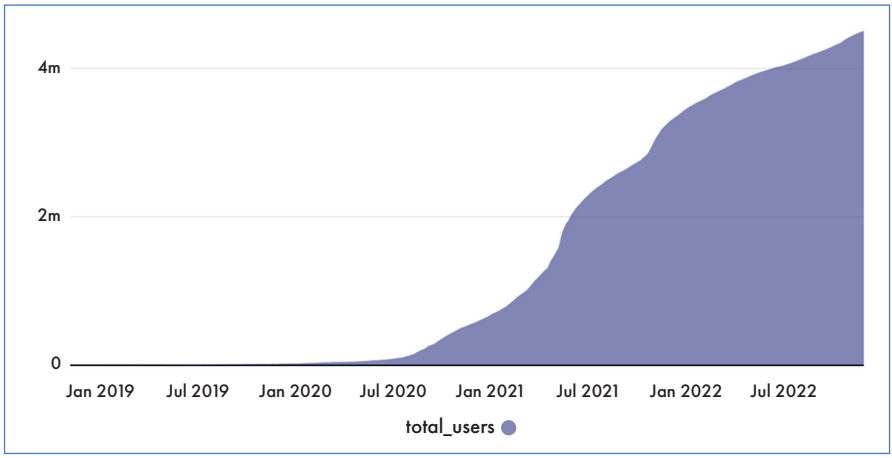
Source: Dune Analytics, Dune Wizard @rchen8

From 180 users in July 2020, by the end of that year Yearn had over 25,000 users interacting with its protocol.

You can work your way through most DeFi protocols to see this pattern emerging. But what makes this a trend is that – while it's clear the user growth has tapered off as market prices headed south – we're seeing consistent and stable growth of a number of the bigger DeFi protocols even in 2022's winter.

This is particularly apparent with the largest DEX platform: Uniswap, as Figure 30 shows.

Figure 30: Total Uniswap users over time



Source: Dune Analytics, Dune Wizard @rchen8

You can see there's constant growth, from virtually no users in 2019 to an inflection point in mid-2020, followed by incredible (and constant) growth surpassing 4.5m users by late 2022. This is not a pattern most people would expect, considering the 2022 market decline and crypto winter.

Maintaining growth in that way without a huge plateau reinforces that elements of DeFi are definitely here to stay, particularly those around DEXs and automated market makers (AMMs).

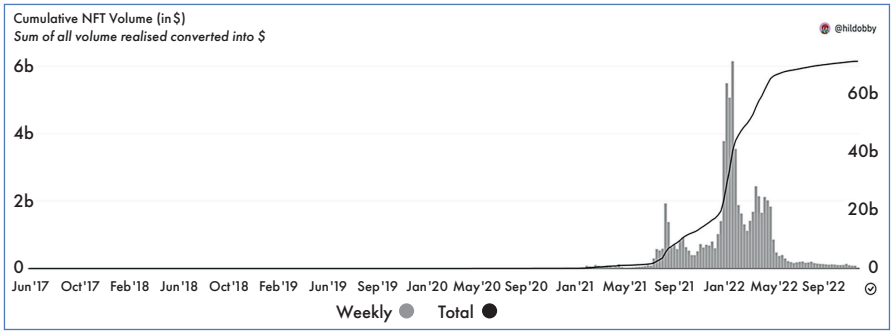
The emerging DeFi trend is certainly one of the most important to emerge from 2021. It remains one of the best opportunities as we head towards another crypto cycle for investors and traders.

NFT markets

We can't look at emerging trends without also looking at NFTs. The charts paint an obvious story of the market boom and bust.

And nothing quite displays that like the weekly volume and cumulative volume shown in Figure 31.

Figure 31: Cumulative NFT volume (in $)

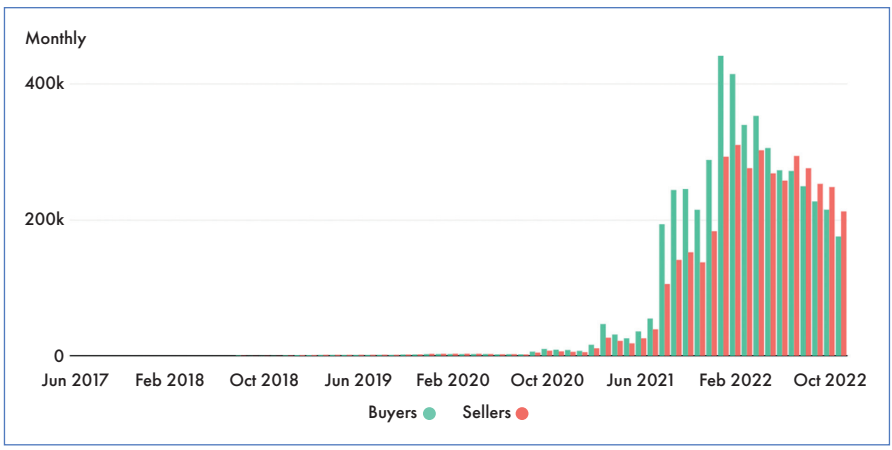


Source: Dune Analytics, Dune Wizard @hildobby

As covered in Chapter 10, this is a market that was pumped with irrational exuberance at its peak. It then left a lot of people holding worthless NFTs, trapped in a speculative bubble.

In Figure 32 you can see that, in the run up to the NFT peak, buyers heavily outnumbered sellers of NFTs. But in May, June and July 2022 that dynamic shifted, then flipped, as the NFT market started crashing.

Figure 32: NFTs – buyers and sellers



Source: Dune Analytics, Dune Wizard @hildobby

One of the metrics that will herald the NFT market roaring back into life is that relationship flipping again. Until that point, it's fair to assume the NFT market will remain in a winter of its own.

However, as we've seen, there's more to NFTs than overpriced JPEGs. There is a deeper technology story around unique data that can be applied to everything from creative arts to your digital identity.

Yes, in terms of volume of NFT art sold the market is a shadow of what it was. But there is still a lot of innovation happening in the NFT world. What appears to be the emerging story, which ties into the trend that came from 2017, is the use of NFTs as a representation of tokenised assets, including real-world assets that carry 'digital twin' NFTs that can be tracked and have a proven chain of custody, using blockchain technology.

That's definitely an emerging trend to keep a closer eye on.

The metaverse(s)

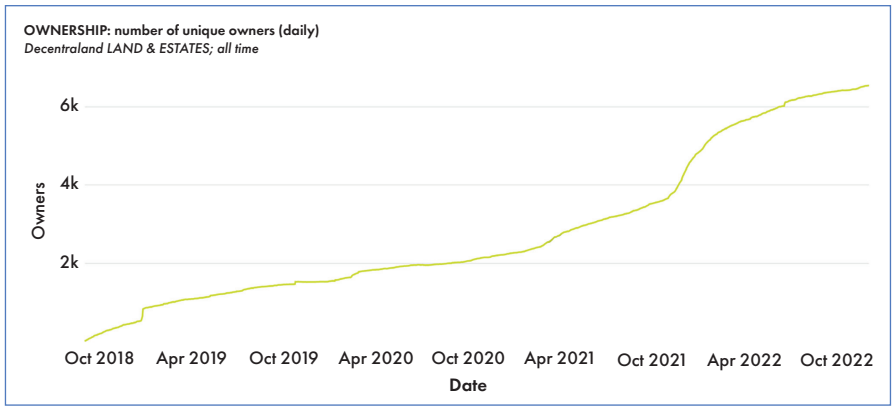
The rise of metaverses is another trend that gathered immense momentum and emerged as a significant market driver in 2021.

The user metrics from Decentraland, one of the first major metaverse projects to launch to market, are a great way to see the rise of metaverses. We see a constant rise in the number of LAND (virtual land within the Decentraland metaverse) owners, but a significant inflection as the market peaked in late 2021.

That's a typical pattern we see in markets – it happened in the NFT market as well. When the market peaks, hitting all-time highs, is when the greatest interest is generated and the largest number of buyers are in the market.

Be wary when you see these highs (as in Figure 33), because they usually point to a market top. In fact, it's during the low periods of interest, when there's not excessive demand, that the market becomes ripe for the taking.

Figure 33: Metaverse ownership



Source: Dune Analytics, Dune Wizard @metaland

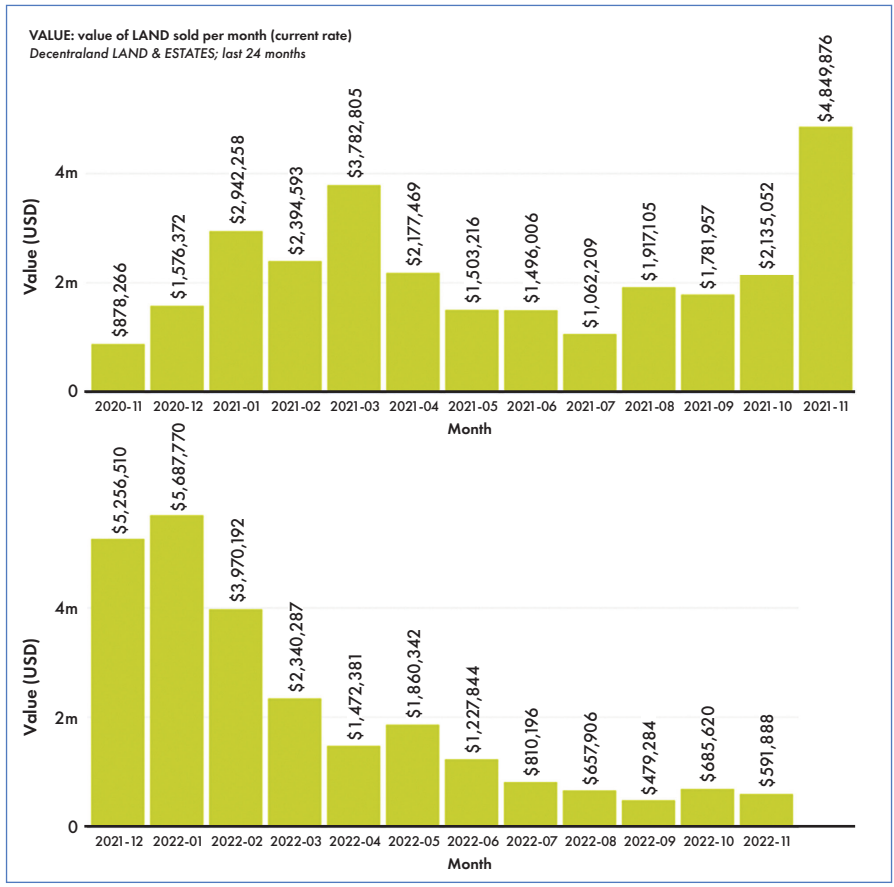
This view is supported when you look at the value of LAND sold per month in Decentraland (see Figure 34). The values peak as the market peaks, demand skyrockets, FOMO kicks in and prices paid for virtual assets distort.

It's another example of investors buying high and selling low (often at a loss).

The emerging trend of metaverses looks similar to the rise of early social networks. Ultimately, as discussed earlier, if you think of metaverses as the evolution of human communication and social networks, the parallels between the two start to emerge. We know the power of social networks and social connection; the growth of companies like Meta, Snapchat, TikTok is a prime example of it.

I believe that if we look at metaverses as we look at social networks, the long-term rising trend is something we can't deny.

Figure 34: Value of LAND



Source: Dune Analytics, Dune Wizard @metaland

DAOs

Again we need look no further back than 2021 to find the introduction of a new kind of organisational structure, the DAO – decentralised autonomous organisation.

DAOs are controversial. While nominally organisations, they often lack any hierarchal leadership or specific jurisdiction of incorporation. It's unlikely to be clear who's part of a DAO at all, just 'anons'.

This is a challenging concept to get your head around, and it's very

much in its infancy as an emerging trend, but we can look at an example of how a DAO can work to consider what potential they *might* have.

ConstitutionDAO was formed when an original copy of the US Constitution was to go to auction.

The purpose of the DAO was to raise the equivalent of $20m in ETH and to win the Constitution at auction. Thereby all contributors, and hence owners of the DAO, would have governance and control of this copy of the document. Should it be sold again at some point, the DAO owners would reap the rewards of that sale.

It was a fascinating experiment, and an early manifestation of the idea of tokenising a real-world asset.

The datasets in Figure 35 show that between its inception and the auction date (21 November 2021) ConstitutionDAO raised almost $15m to bid in the auction, from 17,555 unique addresses.

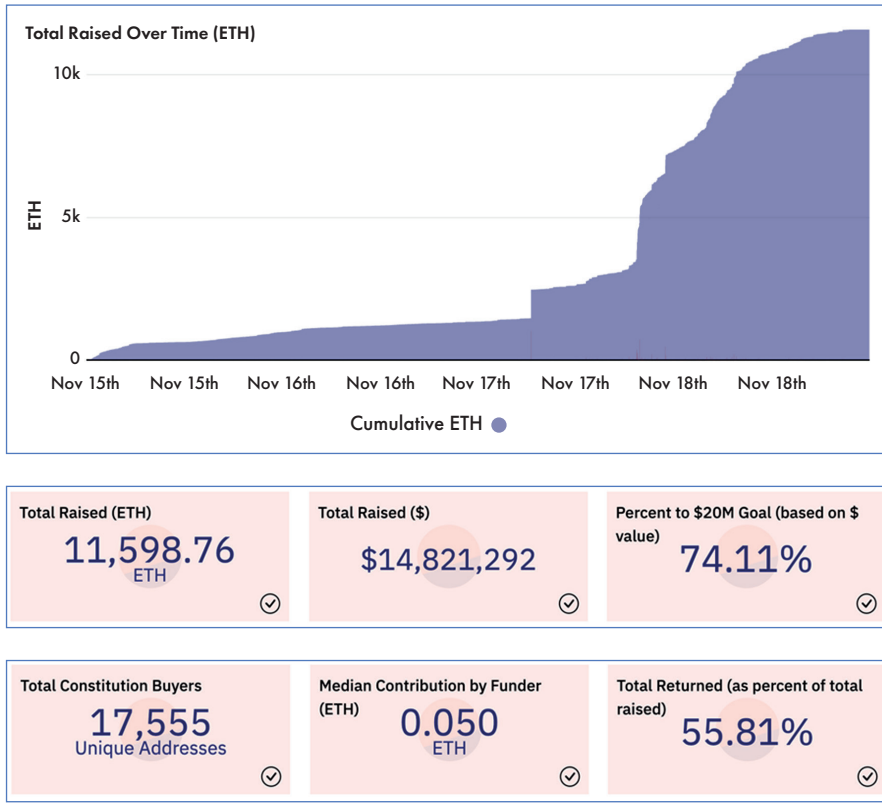
The DAO was unsuccessful in the auction, so had to return the funds to contributors. At the time, the median contribution amount of 0.05 ETH was the equivalent of around $220. Ethereum Gas fees (the network's term for its transaction fees) were also around $200 – a flat rate each investor had to pay to reclaim their funds. This meant that many investors ended up effectively burning money in the attempt to extract their initial investment.

Nonetheless, I expect ideas using a DAO structure to be a trend we see more of in the next cycle.

The concept makes us completely rethink the idea of corporate structures, hierarchies and capital structures. This comes with regulatory and legal challenges, which will be contentious and testing over time. But I think the idea of DAOs will continue to rise in popularity and use.

Ideally, the next generation of DAOs will be more transparent, abide by jurisdictional regulations and follow some form of organisation competence – all within a decentralised community.

Figure 35: ConstitutionDAO



Source: Dune Analytics, Dune Wizard @ilemi

Tokenisation of assets

All these trends point towards what could be the biggest trend of all for the next cycle: the tokenisation of assets.

This is a reoccurring theme you should keep an eye on.

Many signals point towards the tokenisation of assets in the global economy: the data we see from exchanges; the rise of Uniswap and other DEXs; the boom in NFTs and improved understanding of the underlying technology; metaverse worlds and a realisation of the social benefits and ownership of digital assets within those worlds; the growth of DeFi…

What shape this theme ultimately takes is hard to say. But what crypto has done is make people challenge their thinking about TradFi concepts and structures.

These emerging trends force us to think about the frictions and frustrations of our financial system and TradFi markets and ask, is there a better way?

Why can't property be sold using a smart contract with real-time settlement of funds?

Why do stock markets have to operate during 'business hours' and not on weekends or public holidays?

Why can't I have instant settlement and the ability to take self-custody of my equities just like I can with crypto?

Why can't a company have a DAO structure and issue tokens to its community instead of stock, and have the community be an active participant in the management, decision-making and voting within the organisation?

Why can't investors receive income directly from a DAO company instead of the traditional method of dividends paid half-yearly or quarterly by a company whose board decides what we should or shouldn't get?

These are all ideas pushed to the surface because of emerging trends like digital money and currencies, ICOs, DeFi, NFTs, metaverses, Web3 and DAOs.

Tokenisation is not something I alone believe is coming. We're now seeing a realisation of the potential of these technologies and trends from major players in TradFi.

Speaking at *The New York Times* Deal Book Summit in 2020, BlackRock CEO Larry Fink said:

> I actually believe most of the [crypto] companies are not going to be around [long term]… I believe [decentralised ledger] technology is going to be very important… I believe

> the next generation for markets, the next generation for securities will be tokenisation of securities. And if we can have that distributed ledger that we know every beneficial owner, every beneficial seller, we all have our code of who's buying, who's selling, instantaneous settlement, it changes the whole ecosystem, you don't need trust banks. [22]

This is one of the strongest indications yet of the global realisation of the power of crypto and the emergence of game-changing trends.

It's what I believe will not just *drive* Cycle Five, but will make it bigger and better than any cycle that's come previously.

Don't just take my word for it. In Part Three, we'll be asking some of the foremost minds in the crypto space for their views and opinions. But first, let's get an institutional investor's expert outlook.

CHAPTER 16

How Blockchain Will Revolutionise the Financial System

by Luc Froehlich, Fidelity International

SOMETIMES INNOVATION HAPPENS overnight.

The Monday after the Big Bang in 1986, when financial markets were deregulated by UK Prime Minister Margaret Thatcher – stepping into the electronic age – the noise and bustle of the trading floor of the London Stock Exchange was eerily quiet.

Sometimes innovation creeps forward slowly over time, unnoticed, until one day it is ubiquitous. Cryptocurrencies like bitcoin have existed for over a decade, but their extreme price volatility has obscured the real revolution: the blockchain technology which underpins them. Bitcoin proves that blockchain works.

A blockchain is a form of DLT that is now being developed for many applications around the world, most visibly in finance.

Just as the switch to electronic trading in 1986 fundamentally changed the financial system, DLT is set to revolutionise it once again, with profound implications for investors and organisations.

The digital revolution

DLT provides a secure way to trade assets and record those transactions in multiple places, using a distributed ledger. This ledger is virtually tamper-proof thanks to the cryptographic 'fingerprint' that users leave. DLT also uses what's known as 'consensus protocols', which are rules in the code of a network that determine the legitimacy of transactions. And for many networks, smart contracts – automated, machine-executable code – are used to execute pre-agreed contractual obligations.

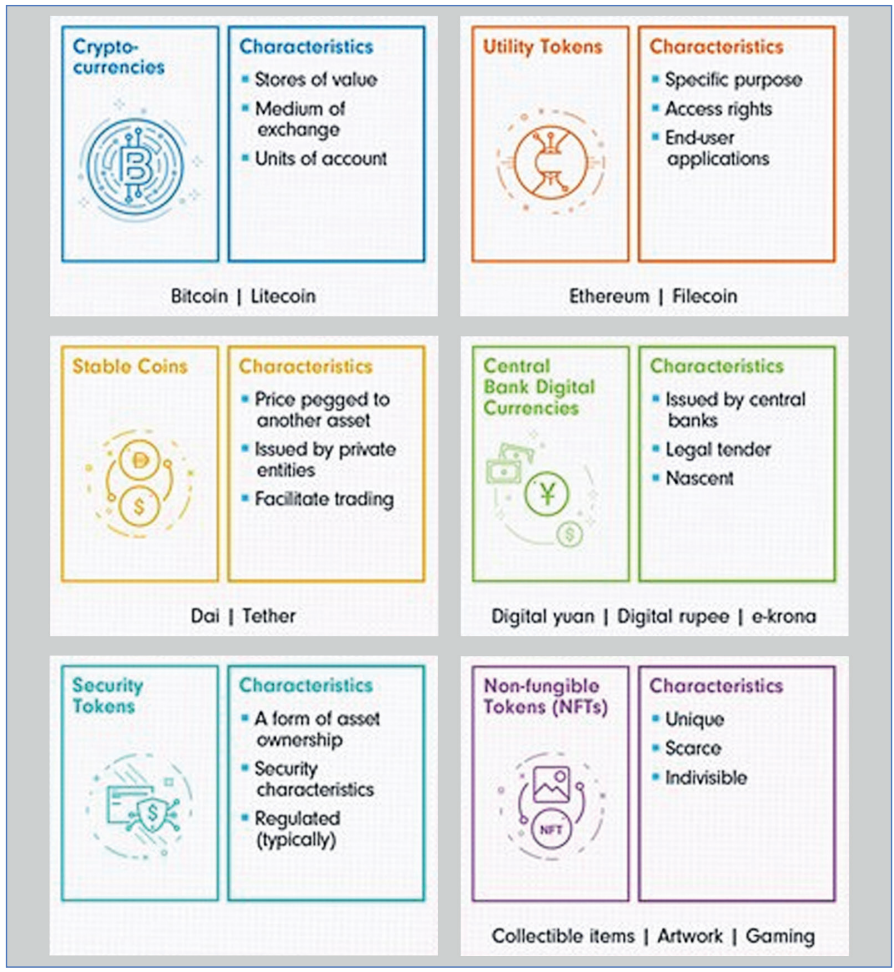
These features of DLT may eliminate the need for intermediaries in financial transactions, reduce counterparty risk and ultimately reduce transaction fees and operating costs, making a global financial system more efficient and cost effective.

I therefore expect DLT to disrupt many parts of the financial world. Banks are already altering their trading infrastructure and the type of assets they trade. Custody providers and exchanges are developing

new clearing and settlement processes to accommodate digital assets created on DLT, also tackling some of the potential risks to investors – meaning they can gain easier access to a broader range of potential investments and opportunities.

The development of digital assets will not, in fact, be as new as people might initially think. They will simply be alternative ways of doing what the financial world has always done: the transfer of capital to where it can achieve the greatest financial and non-financial returns with the least possible friction (see Figure 36).

Figure 36: Digital asset characteristics



Source: Fidelity International

Digital assets can take several forms. While a universal standard is yet to be agreed upon, some of the variations include medium-of-exchange tokens (e.g., crypto*currencies*), utility tokens (a 'voucher' for a future product or service) and security tokens (similar to ownership of stocks and bonds).

Each digital asset has properties that offer new opportunities and, inevitably, create some risks. But it's the opportunities that are most exciting for investors and organisations.

A common infrastructure

One of the most exciting aspects of digital assets is they will offer investors a greater degree of personalisation.

In comparison to a financial offering, where the person must fit the product, digital assets offer the potential for product customisation to fit the person.

This is thanks to the design of digital assets and the design of the infrastructure that sits underneath them – with the potential to one day create a decentralised global investment platform.

In a practical sense, it means investors will be able to pick and choose the components that suit them at a scale they can afford.

Having a shared infrastructure, such as a common distributed ledger between an asset manager and a bank, could also remove a lot of technological and administrative friction and cost.

For example, this shared infrastructure could speed up and simplify reporting to stakeholders and provide regulators with an easily accessible and transparent audit trail.

It could also enable easier portability of client data. Think about a client who is securely onboarded by one entity (a bank for instance) who can then automatically interact with another organisation (a fund manager) on the ledger, no matter where they were located.

Individual risk appetite could be assessed using real (and real-time) data, for instance by looking at the type of transactions a client performs, the complexity of their existing investments and how they spend money.

This is instead of relying on the current methods of typically standard and often inaccurate questionnaires used to assess how much risk an investor is ready and willing to take. While there are obvious questions around privacy and ownership of data, it does have the potential to open investing to new participants or offer new investment opportunities for existing participants.

Cheaper by the token

Tokenisation (the digitisation of ownership rights) and fractionalisation (the slicing of assets or securities into smaller, bite-size units) are other features enabled by DLT.

By design this could broaden access to investment markets by lowering the threshold to gain exposure to those markets.

Take corporate bonds as an example. Not only are many deals still brokered *over the phone* between institutions, but bonds are usually sold in tranches exceeding $300,000. Both the size of transaction and the costs involved in brokering put them out of reach of retail investors.

But if corporate bonds were tokenised as digital assets, the market could be opened to more investors and potentially deepen liquidity. Investors could maintain diversification while personalising their return objectives more closely to their individual investment goals (e.g., investing in a bond that matures at the right time to pay for a child's university education).

Going private – and green

Tokenisation could also be used to increase access to private and other investment markets currently only available to institutions or high-net-worth individuals. These include commercial real estate, timber, or collectibles such as paintings and sculptures. Green infrastructure is another area where tokenisation could allow retail investors greater participation as the world moves towards net zero emissions. This may provide access to infrastructure investments, typically reserved for institutional clients, or offering investors more quantifiable information on the environmental impact of their investments.

Tokenised assets do also present a different type of risk to publicly listed securities, namely liquidity risk. While tokenisation does not create liquidity per se, it can facilitate the exchange of illiquid assets in secondary markets.

Consider venture capital funds. Limited partners typically wait many years before their investment can be liquidated. The tokenisation of limited partners' rights would allow them to sell their position in a secondary market.

While some of the illiquidity premium may be sacrificed as a result, tokenisation can nonetheless provide a new group of potential investors with access to young companies on faster growth trajectories than more established listed firms and help them diversify across a wider range of assets.

Less correlation offers more diversification

From cryptocurrencies to tokenised private assets, digital assets can benefit investors' portfolios thanks to potentially lower correlation with publicly traded instruments.

Weaker correlation matters because, as we have seen over the past

years, the level of diversification offered by traditionally 'safe' public assets such as government bonds can drop at times where investors need it the most.

Following a historical stretch in valuations, many investors are also seeking to recycle profits into areas that can still perform well over the next decade or are less correlated with public markets even if not necessarily less volatile. Digital assets are often less correlated and could aid diversification in this regard, while their infrastructure can offer new sources of income to bolster lower returns from traditional investments.

New income streams

Current market infrastructure needs intermediaries to help originate, trade and administer investors' assets. While each intermediary adds levels of expertise and service, they also create layers of fees that eat into investors' returns. These intermediaries are unlikely to disappear overnight, but their role will evolve in a more digitised and decentralised world.

Blockchains using Proof-of-Stake (PoS) consensus mechanisms, an alternative to the Proof-of-Work (PoW) mechanism used by the Bitcoin blockchain, provide a glimpse into this disintermediation trend, opening new revenue streams for investors.

In contrast to PoW protocols where computing power, and hence energy, are required to earn the right to mine a block and get paid for it, the probability of earning a reward with PoS protocols is driven by the amount of native token committed.

Therefore, investors holding tokens of PoS blockchains are effectively contributing to their function and security. As a reward for this participation they earn more tokens via the process of staking.

Staking still leaves investors exposed to the price volatility of the underlying token, hence the staking return on offer is also volatile.

However, alternatives to staking have emerged with the rise of lending protocols in the decentralised finance (DeFi) space, and the growing availability of hedging instruments.

Investors are increasingly able to access more stable income, which at the time of writing is typically a multiple of the yield generated by traditional fixed income instruments, such as money market securities or bonds. Critically, savers can access those yields while reducing their exposure to the price volatility of cryptocurrencies.

Investors can also generate new forms of revenue by facilitating trading activity across cryptocurrencies. Matching buyers and sellers in traditional markets, in particular with fixed income, can be a difficult task, requiring experience and an established network, which in turn lowers investors' returns.

Some DeFi protocols have sought to address this challenge by establishing pools of funds, which allow trades to take place automatically. Savers can contribute to those liquidity pools by committing assets to them. For this service, they will receive a share of the trading fees and sometimes additional incentives.

Stablecoins may one day reach where banks cannot

Further into the future, there may be greater use of digital assets to increase financial inclusion. Bitcoin's wild swings in value, while expected for a young asset, can make it hard for risk-averse investors to hold, even if it provides a first step into the world of crypto.

Stablecoins could bring widespread benefits, offering access to financial services for billions of people across the world unable to open a bank account, let alone put their money to work. They may also operate in areas not covered by traditional institutions (whether for geographical, income or credit reasons), and – with fewer intermediaries – at considerably lower cost. This would give people a

chance to save money and invest their savings in productive assets that may increase their wealth over time.

Moreover, the transparency of DLT creates confidence to invest in new businesses, especially in areas with limited local banking services. Open ledgers may, for instance, be used to generate credit ratings automatically: a smart contract could assess a user's transactions (visible on the ledger) to work out:

a) if the business is real

b) if the risk of lending to it is acceptable.

This new way of making loans could increase access to funding – think micro-loans in emerging markets for instance – and create the ability to develop new revenue opportunities.

The growing popularity of stablecoins, as well as some of the attractive features enabled by DLT, provide valuable insights in the creation of what could emerge as the ultimate stablecoins: Central Bank Digital Currencies (CBDCs).

In contrast to stablecoins, which are issued by private entities, CBDCs are legal tender and benefit from the full backing of a country's central bank. This backing is critical as it circumvents some of the challenges raised by stablecoins, namely the way they are stabilised through reserves (e.g., ideally a dollar-for-dollar coverage), collateral (e.g., a basket of cryptocurrencies) and algorithmically stabilised coins, which could be perceived by regulators as a form of derivative.

CBDCs are already in operation in some countries (such as the Bahamas and Nigeria) and in pilot testing and development in multiple major economies. The potential is to address practical issues such as speeding up cross-border payments and supporting financial inclusion. Because of their underlying infrastructure, such as DLT, they could also open the door to new forms of monetary policy tools or facilitate unorthodox ones, such as targeted helicopter money.

However, more research is still required to assess the macroeconomic impacts of CBDCs, from monetary policy to financial stability, in

particular with respect to the role of commercial banks. Furthermore, there is little research into the social impact of highly programmable money in the general population.

Buck for your bang

DLT offers the potential for a radical overhaul of financial markets. This may take shape as the democratisation of access to financial services and private assets, or cheaper, more diversified investing through tokenisation.

It is a fast-moving and exciting landscape.

At the same time, we will only navigate it successfully by making informed decisions through engaging, learning and consulting experts. The overhaul of markets may not happen overnight like the Big Bang of 1986, but the effects of DLT on the financial world will no doubt be long lasting.

INTERVIEW SERIES – INSIGHT FROM CRYPTO LEADERS

PART THREE

CHAPTER 17

Do You Have a Wallet? If Not, Leave the Building

Part One of an interview with Luc Froehlich and Ben Brophy, Fidelity International

One of the original principles that drove crypto from obscurity to the mainstream was the idea it was an opportunity for sovereign individuals to get a jumpstart on the TradFi institutions of the world. Now anyone, anywhere could take steps using tools developed by other individuals to 'beat' the TradFi system.

This is still very much a driving force behind development and innovation in crypto. However, the world's big financial institutions aren't oblivious to this emerging market. While on the surface it might appear that some are, and that some lack a fundamental understanding of the crypto revolution, others – such as Fidelity International – are taking a far more proactive approach.

In fact, if you want to look at a legacy TradFi institution that's been forward thinking and progressive in the crypto space, then you inevitably find yourself looking at the work Fidelity is doing in this space.

Fidelity International has been heavily involved for years in understanding, researching, developing and innovating in crypto. I sat down with Luc Froehlich, global head of Digital Assets Solutions, and Ben Brophy, head of Fidelity International's Blockchain Centre of Excellence, to talk about their involvement in crypto, how Fidelity has been a market leader in this space and their experiences of how organisations, institutions and clients are moving to embrace crypto.

Sam Volkering: Fidelity's had a long history with digital assets, longer than most of your competitors'. How does a large global asset manager like Fidelity launch a digital assets division? I think a lot of organisations – a lot of people – can learn a lot from your experiences.

Luc Froehlich: This relates to the underlying culture of the company. It doesn't matter if it's in the US, the UK, or elsewhere. The basic culture facilitates an entrepreneurial environment. That's the first aspect that's important, the entrepreneurial part.

The second aspect is our desire and openness for disruption and self-disruption.

The third aspect is our concept of ongoing improvement.

I think those three values embedded in the culture of Fidelity explain how we managed to be among the first movers in the crypto space.

When it comes to the entrepreneurial environment, there is the ability for anybody in the company to try things. If you have an idea, you are typically given room to execute on those ideas. This has been very clear to me and to a lot of people that surround me – a highly attractive feature of this company.

There is an active willingness to let people experiment within a certain framework. While in some ways the company is a very traditional, highly regulated entity, we still have this freedom.

On the aspect of disruption, you only need to look at the history of the founders of Fidelity – particularly from a technological point of view. They always had a desire to be ahead of the curve, and that's why a lot of our technology was – and is – built in-house.

When it comes to the third aspect, ongoing improvement, there is a constant desire to disrupt how things are done, and to find a way to improve them. If you think of blockchain technology specifically – it presents a way to potentially do things in a more efficient way and, ultimately, to do things differently.

SV: From what you've just said, I'm curious as to whether Fidelity's approach towards crypto is more of that founders' mentality, technological curiosity and being ahead of the curve; or whether in this case it was predominately the demand from clients and customers forcing your hand to move into this space.

LF: I think it's a combination of both. The focus on the technology is a pull factor; the drive and interest from our clients is a push factor.

At the beginning, if you think back to 2014, there was very little interest

in digital asset technology. It was very much reserved for only the most committed nerds.

SV: I wholeheartedly agree with that, it's what attracted me to Bitcoin and crypto – and I'd very much put myself in that category.

LF: Thinking about that technology aspect, then, I would say our original motivation was: let's pull this technology and see what we can do with it. When it comes to the launch of the most recent digital assets or crypto-related products, that was very much the pull factor, because we have the experience, the understanding of the technology and what we can do with it.

But we are also seeing a growing demand from our clients, the push factor. This is something that we've first noticed and delivered on in Canada.

Ben Brophy: In some ways, I think what Fidelity offers is unusual, yet progressive. Of course pure blockchain people could argue it's still not enough. But I would also say the reason Fidelity is *so* progressive in this space comes down to our people.

Organisations can talk a good game, launch lots of papers, be there in the market, making noise; but, fundamentally, have they got the right people to do the work?

For me, one of the things you must appreciate when it comes to the opportunity of digital assets is that this is a people problem. You must have the right people in the right environment to deliver.

One of the reasons Fidelity is so successful in this space is our long-standing digital assets team.

Our team is quite heavyweight in terms of visibility to research, its ability to build things – user interfaces, backends – to *truly* experiment.

I don't mean putting together a PowerPoint deck. I don't mean a partner coming in and showing you a series of screens.

I mean they have what it takes to actually build and deploy technology.

The learning that comes from that is an order of magnitude more relevant and useful than a slick PowerPoint.

In a lot of organisations, the belief is that product design is having a great PowerPoint presentation.

But product design is building, deploying, engaging, *breaking*, building again, iterating – all those positive things. And for me there is the mandate to do that at Fidelity, which I have to say, again, is genuinely surprising and exciting.

SV: It's interesting that you talk about the digital assets opportunity as a people problem. From my research, the smart organisations moving into digital assets and crypto break it down to core societal values, e.g., what impact is this going to have on people, rather than just how can they make money from it.

I know there are a lot of organisations that look at crypto and think: this isn't something I want to deploy capital to. I don't want to put the time, effort and resources into it because I can't figure out how to make money from it. They can't figure out where the return on investment [ROI] is.

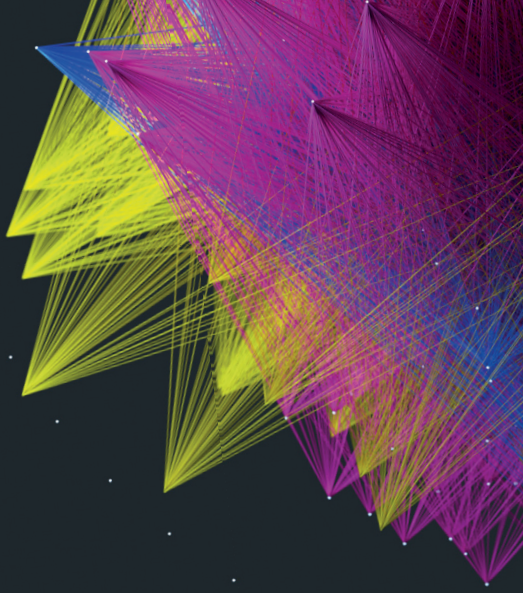
Do you feel that for organisations to embrace the opportunity here, they should shake off that idea of trying to find the ROI?

Or have you been able to see a return on your investment and resources put towards your work?

LF: We look at digital assets as an asset class where you can build products and generate revenues. But we also look at them from an infrastructure point of view. We look at how we can change our internal processes, onboard assets, etc.

When it comes to the ROI, I do not think the concept of ROI is a first consideration when it comes to digital assets, especially within the crypto space, simply because the time horizon that you need to see the return is too far ahead.

Discover the new frontier of digital assets



74% of institutional investors expect to buy or invest in digital assets in the future, and 80% believe that they have a role to play in investment portfolios.*

As the market matures and expands, we expect to see this appetite continuing to increase. But currently, investing in digital assets is not easy, and a lack of robust operating models puts off many traditional investors.

At Fidelity International we aim to bridge the gap between Traditional Finance and Decentralised Finance.

If you're an institutional investor and want to learn more about how digital assets work, or how you can get involved, please contact your local Fidelity International representative.

Fidelity INTERNATIONAL

*Source: Fidelity Digital Assets℠ 2022 Institutional Investor Digital Assets Study, October 2022.

It's more a question of stretching what we can do and trying to figure out what innovations could be of interest to clients.

If we just focused on the ROI, I don't think we would be launching anything. Or by the time we launched it, someone else could have launched something very similar, and by then we would have lost the race.

BB: When Luc and I have these kinds of conversations, we sometimes joke that working in this space is like that famous line from the movie *Field of Dreams*: "Build it, and they will come!"

You've got to recognise this isn't a debate about ROI. You have to come to that conclusion upfront.

It's unhelpful if you start this conversation by saying: what's my return on investment? You've lost already. You're in the wrong conversation.

You have to start off with something like a headline trend analysis. Look at monetary flows, wallet adoption, early-stage brand adoption – brands that might not even be in your industry but are large, credible brands like Nike and Adidas. You could look at some of the big game studios too.

Realise that the sheer amount of capital flow will drive huge amounts of investment in digital assets technology and products.

This will attract extremely intelligent people. Then you need to understand how to implement blockchain services, because this allows you to raise a multiple on your business.

If you can add a multiple to the valuation of your business that will attract more money, more smart minds and talent, because they can earn more and they see your organisation is progressive.

The other thing worth adding to the conversation is that blockchain is unique as a technology because of its accessibility.

One thing that I see time and time again when it comes to blockchain, and crypto more specifically, is people will arrive to a meeting and say: "Hey, I want to join in and talk about blockchain."

The first thing I ask them is: "Have you got a wallet? If the answer's no, turn around, leave the building."

There is a constructive way to have that conversation of course. But this technology is predominately open source, it is ridiculously accessible, an unheard-of level of accessibility; and it's *so* powerful.

For anyone who asks me, "What does blockchain mean for your business? How do I get into the crypto and digital assets space?" I say: "Pick up your phone, take five minutes to get your hands on the technology, and you're in."

SV: It's important for people to understand the accessibility you talk of. And coming back to something Luc said earlier about self-disruption, that disruption exists thanks to this unheard-of level of accessibility.

As you rightly point out, crypto also draws in a huge amount of human and financial capital. Very intelligent people see an opportunity to build, grow and create value from this.

However, in doing that, there's an element of fundamental risk that Fidelity and TradFi institutions could be cut out of the game, so to speak. Fidelity's clearly not going to go out of business tomorrow because of upstart blockchain and crypto projects, but long term the idea is valid.

How do you approach this potential threat?

How do you balance development and innovation with an undercurrent of self-disruption in the back of your mind? Do you ask yourselves: how do we move forward but make sure that we don't take ourselves out of the equation?

LF: I don't think that you have a choice anymore on whether to do something or not when it comes to digital assets. You would only have a choice if you were in a market structure where you have a global monopoly – and that doesn't exist in financial services.

Within a highly competitive market, you had better self-reinvent your business before someone else does it for you. This keeps you ahead

of the curve and the competition. I don't think that there is any real pushback in that sense. I think the pushback comes more from the aspect of understanding how and to what extent we're self-disrupting. In addition, you need to strike a balance between moving fast and leaving your people behind, versus moving at pace while bringing your people on that journey with you.

There's an upfront cost for long-term investment in delivering digital assets products, but we deal with that by testing. There's a lot of proof of concept [PoC] testing in the work that Ben and I do. But there's also real money involved at the point people need to commit to a certain project, and there are expectations attached to that.

Like Ben said before, this isn't about delivering a fancy PowerPoint; it's not even getting to a PoC. It's more like delivering a working pilot or minimum viable product.

If you sit on your hands and do nothing, that's when the competition catches up.

Four years ago I thought FinTech upstarts might be able to disrupt the way we do business. As it turned out, that didn't happen.

Now, are small tech companies focused on blockchain going to be able to disrupt the way we do business? That sounds more likely to me.

I do believe it's different this time, because what blockchain technology does is remove the guy in the middle. The FinTech 'uprising' was trying to smooth some segments of the value chain, and many ended up absorbed by larger entities. But what if you manage to cut the whole entity out of the system? That's a different proposition.

So going back to your earlier point, I believe Fidelity will remain relevant for the decades to come, but it will mostly likely look dramatically different.

BB: There are some fundamental tenets in digital assets and crypto technology that are often opaque in our industry.

I think for me, you could start with fraud or compliance as some of those tenets.

Think about it like this: you'd have to be a fool to try and commit anti-money-laundering breaches on an open ledger. I'd say well done for leaving a perfectly visible trail for law enforcement to track. Everything you've done, all your co-conspirators: law enforcement must love open ledger technology. The development of forensic analysis of blockchain is moving at great speed because of this.

An open ledger is fantastic for security and stability of the system; it really is. From that point of view, the risk to an organisation is an order of magnitude less and the ability to forensically analyse behaviour is of an order of magnitude greater.

Another tenet is the concept of self-custody: this can be quite terrifying for an inexperienced retail investor, but for sophisticated investors and sophisticated entities, this is something that is done as standard. But self-custody for everyone? That's quite a big leap forward.

Lastly, I would say trust is an important tenet. In this system, if you already have trust you're ok. But there is risk in coming from new entities with very low trust, often because they're opaque and aren't all that forthcoming with who they are, where they are and what they do.

That's the risk that some bad actors in the crypto industry have introduced. They're not willing to behave in an appropriate way. Fidelity is the reverse of that. We're coming in from the other way with trust, certainty, longevity and stability.

LF: I look at risk more in terms of the risk of being disrupted or becoming redundant from external competition.

For instance, if you look at self-custody, you have to ask what the role of a custodian is. Can, or should, this be disrupted? Does the wider market want self-custody? Should existing custodians be developing digital asset offerings to ensure they're still relevant? Should self-custody continue to be one of those important tenets you mention?

That's my view on risk: not necessarily business risk or operational risk, just the risk of being made redundant.

There's a theme that often gets talked about in the industry: the 'financialisation' of everything.

There are quite a few ideas on this topic that emerge off the back of the implementation of blockchain technology and digital assets. Intellectually, it all sounds really inspiring and exciting, but I'm not sure to what extent everything will be financialised. Do you want to live in a world where everything has a price, a secondary market, and fluctuates around you? Sounds appealing if you work in finance, but this would most likely be overwhelming or uninteresting for most.

SV: That's a valid point, Luc. To supplement that, you only need to look at the pushback from traditional game developers, studios and players who've been very much against what was called the 'play-to-earn' phenomenon in crypto in 2021. The thought was you can create these economies in-game, and financialise playing a game. But it completely busted when people realised that no, that's completely against the ethos of why you play a game. So yes, the idea of the financialisation of everything is a pretty dystopian view, and one I don't think will eventuate.

LF: Precisely. Now, what I would also mention here is the idea that we're going to decentralise everything. Again, this sounds great in theory. But firstly, I'm not sure that's going to work out. And secondly, I'm not sure that people will want it.

The future of finance might not be as exciting, fun and fancy as we currently think. But it also doesn't really matter, in the sense that it's not just about the destination; the journey that gets us there arguably matters more. It matters because along the way we're picking up a lot of ideas of how to do business better, how to provide better services to our clients and how to operate in a more efficient manner. That's what we then build on when developing future offerings in the digital assets space.

Having said that, I think most of us largely underestimate the impact DLT will have on financial markets and investing. Why? Because most people think of evolution in a linear fashion. That's not how I see the impact of DLT. It's more like a revolution, and we haven't scratched the surface in terms of new business models enabled by this foundational technology.

SV: Trust is something you've both mentioned, which is a very common thread when we look at the impact of crypto on the world.

Trust is something that TradFi institutions trade on very well. Trust is inherent when people keep their money with an institution: there is absolute trust, which is a powerful tool in finance.

You don't ever want to lose that.

But in our world trust is breaking down between individuals and traditional institutions, governments, central banks and the overall financial system. This erosion of trust in centralised institutions and organisations is a powerful force driving the decentralisation movement and much of the disruption we've mentioned.

DeFi in particular is shaping up to be an incredibly powerful long-term development. It's an area I want to pick apart with you both more – how is Fidelity approaching DeFi specifically, and how do you anticipate the DeFi ecosystem evolving?

CHAPTER 18

DeFi – the Tide's Gone Out; Who's Swimming Naked?

The concluding part of an interview with Luc Froehlich and Ben Brophy, Fidelity International

Decentralisation is a powerful driving force behind the growth and adoption of digital assets, as well as the mass movement of investors into crypto markets. It offers huge potential, particularly when it comes to finance. Elimination of the friction and intermediaries of the financial system is a disruption that's never before been seen on this scale.

This of course brings its fair share of scepticism, scrutiny and criticism from established legacy institutions. After all, a new, alternative, decentralised financial system is something to rile up the incumbents.

However, for all the detractors, there is a huge cohort within TradFi that look at DeFi and see incredible opportunity, innovation and potential.

Those who are progressive and innovative don't cast aside the potential of DeFi, but embrace it, looking at how it can be developed and improved upon to fit the needs and demands of an increasingly sophisticated and informed client base.

As one of the world's largest global asset managers, Fidelity could be expected to stick to what they've always been good at.

But as my discussion with Luc and Ben continues, and we take a more granular look at DeFi markets, we get a clear view of how Fidelity is embracing the opportunity, moving towards this exciting space for the benefit of their organisation and their customers.

Sam Volkering: We've been speaking a lot about trust. How TradFi has been very good at trading on trust for a long time.

But today, trust in TradFi, governments, central banks, centralised authority – that trust is eroding.

Trust, control and power are driving forces behind the construction of a decentralised financial system, which exists in parallel to TradFi right now.

I believe the momentum behind DeFi is only going to snowball, regardless of the short-term hurdles it must endure.

It appears that investors are waking up to this, seeing DeFi as a new wealth opportunity that offers huge yields and potential returns, new investment mechanisms to test and try. They see the potential of DeFi and want to know how to get in on the opportunity.

Is DeFi something that Fidelity is looking to progressively open up to? To test, try, understand and then deliver to your clients?

Luc Froehlich: The short answer is yes. And it goes back to what I was previously saying about the differentiation between digital assets as an asset class and digital assets in infrastructure.

As an asset class, there is definitely appetite for us to explore ways to provide our clients with access to certain types of DeFi yield.

It's not straightforward by the way. As a highly regulated entity, we can't just push money or earn money into a certain protocol without knowing who is on the other side.

The current ideology of DeFi – open to everybody, you don't need trust – doesn't hold well in a regulated world. At least not in a world with increasing scrutiny by authorities and certainly not for us as a highly regulated entity.

What we are considering though, is the possibility of providing our clients access to some corner of the DeFi space, as a kind of alternative source of income, but with multiple guardrails. However, as you can imagine, the more layers of security, KYL and AML you put in place, the further away you move from the original idea of DeFi. Nothing wrong with that, by the way, it's an evolution: first you experiment and look at the art of the possible, then you move towards what is feasible and suitable for your clients.

SV: That's powerful. And incredibly exciting coming from such a global institution like Fidelity.

With that in mind, and your own views on DeFi, do you think we're

looking at the earliest parts of a significant change to how people conduct finance?

Is it an arena where you think we will see further explosive growth?

LF: For me DeFi is the most exciting growth area in digital assets, but I'm also biased by my background in investing. Yet I don't believe it's going to be as fast as people might expect. Traditional organisations like Fidelity need to first understand what the opportunities in the DeFi space are – across the entire business. We need to work with regulators to shape a market that is safe and beneficial for all types of investor. Last but not least, users need to build expertise and confidence in this new way of operating.

Another thing that doesn't sound right to me is the idea of moving from TradFi to DeFi. It's more catchy than realistic, and I would instead expect a convergence of the two.

Ben Brophy: You've got sophisticated products that are being offered to unsophisticated investors. That's being done where there's a lack of regulation or you don't know who the other party is. And we know that's progressing towards a clash between regulators and the DeFi communities.

I think much of this discussion comes back to a route-to-market question. As a large, regulated institution, we can sit here a little more comfortably, because DeFi is going to have to come and talk to us.

If you think about the size of investments as a pie chart, what DeFi has under management – what's called total value locked – versus what we have in terms of assets under management, it's a difficult conversation for them to get around. When you just compare the figures, DeFi versus TradFi right now, DeFi is nascent, it's minimal.

SV: Do you think this idea of DeFi coming to talk to you, and to TradFi in general, poses a threat to the core nature of what DeFi is supposed to deliver?

That it almost *has* to come back inside a permissioned TradFi environment to reach scale? That it has to align to TradFi rules to

operate in a way that means that they're not breaking every law and regulation wherever they decide to offer a product?

This then raises another question: does DeFi have longevity in its current form, or do you think that it will have to come back into a more centralised finance environment and be a bit *less* DeFi?

LF: I don't think that imposing a permissioned environment on DeFi necessarily jeopardises the whole concept of DeFi. In fact, permissioning could segment market participants and allow you, as user, to define the type of counterparties you're comfortable facing. At worst, what we might be looking at is an evolution of the interaction between centralised parties. But the door is still open for more flexible and composable transactions between individuals, in a safer environment.

BB: I think if you're a developer and you're thinking, "You don't know who I am, and no one knows who owns this company, I'll make you so much money," then you have to also consider someone's losing out at some point.

If you've been in this space long enough – which we certainly have – you've experienced a rug-pull at some point, and you either laugh about it and take the view, "That's cheeky!" or it hits you hard and you think, "That really hurt."

That can only happen for so long.

If we can still maintain self-custody for the client, that's one of the libertarian tenets to this.

There's also an important conversation to be had about who we are targeting.

Think about a high-net-worth individual who has done well out of crypto. Now, they are looking for a safe harbour.

They actually *want* to come back to the CeFi [centralised finance] with a TradFi institution. But I think if we can maintain some of those core

tenants of DeFi, which I think we naturally would because it reduces the risk for us as well, why wouldn't we?

One of the challenges for DeFi platforms who want to work with TradFi is proving their legitimacy in a way that TradFi will accept – and having worked for DeFi protocols before, there's no way around this requirement.

When dealing with some of these projects you end up asking questions like: who is this '@MaxiMillion52'? What part of the project do they own? He owns 51% of the whole platform? From a TradFi perspective, you can't justify doing business under those circimstances.

Just to be clear, a TradFi organisation will never sign a contract with any company like that – with anons or an utter lack of transparency. You ask them, where are you based? St. Lucia? The Caymans? Good luck signing anything with TradFi – or avoiding the eye of the regulator for long.

The reality is that I'm sure they're actively thinking about how to be a better business. And many already are taking steps to do this. Things like the need to 'dox' yourself [reveal who you are], and move your entity into a well-known jurisdiction – these things are necessary, otherwise we can never work with you – TradFi can never work with you. That's the reality.

SV: Are DeFi entities proactively coming to you and saying, "Hey, look, we need some help." Or is this something you're going out there to find and looking to bring in?

It seems there's going to be a lot of consolidation in the space for the reasons that we've outlined. Do you think there are opportunities for plug-and-play style additions?

Or do you decide as an organisation, "You know what, we can actually build these protocols ourselves."

If, like you say, you can provide that level of self-custody to people and elements of DeFi, but deliver the trust that Fidelity inherently has with its clients, is that the direction that you end up seeing this go?

LF: There's a been change since the 2022 events. Before the collapses, digital natives were more focused on other digital native companies, because they are typically more experienced with the crypto space – i.e., you spend less time on education – and make quicker decisions. Following the market clean-up, there was clearly a stronger appetite to engage with TradFi and build solutions tailored to them, like Compound Treasury.

I don't think it's just a diversification of their offering but more likely a stark realisation there are limitations in the beautiful thinking they originally had.

I see the version of DeFi for institutions as what I would say is 'dumbed down', and that's not necessarily because institutional players would not be able to deal with at least part of the complexity of the original product. It's just a lot of it is not necessary, such as more than 100x leverage.

And you see a lot of limitations in the way DeFi currently works. If you think of a lending protocol for instance, you have one pool of funds to draw from and you typically have one yield, but this is not what I need to be able to service the needs of my clients. I need a range of different maturities, which doesn't necessarily work with only one pool, so there alone you're already starting to see some limitations. Plus, I'd like to play to my strengths and leverage my proprietary research to define which counterparties I'm happy to work with and at what price.

That means we have a role to play, using a more traditional approach to unlock those limitations.

Maybe it's just because it's still the early stages of DeFi. It's nascent and on-chain solutions to credit assessment will be available once more economic activities are operated on a ledger. But it looks like for now at least a more traditional approach remains relevant.

BB: Strange as it sounds, it's good at the moment that we're in a bear market, because you can have a more sensible conversation with the

industry. There are some limitations to that, because then there's obviously less pull from a client demand point of view.

But it is good there's a bear market. It feels very much like the tide's gone out, and you can see who's wearing swimming costumes and who's swimming naked. You can really see who's got what.

Crypto cycles I think dynamically change how DeFi-based companies talk to TradFi and CeFi.

We had people come to us last year who were saying, "You need to move in the next couple of weeks," and we would explain that we don't move in weeks, we move in months.

Now the conversation is more friendly and open. They now have time for us – *crave* time with us – and want to hang out more. That's a cyclical piece because in 2021 they were making amazing returns and they had enough money coming in from retail crypto investors. Not anymore.

My hard learning of being on the other side of the equation at times and approaching large institutions is *patience*. If you don't have the patience, don't bother getting in the conversation. Big organisations will just vampire you for all of your life force and extract all of the information out of you. There's no way they're going to engage with you unless you have that patience and are willing to make a multi-year commitment.

The reason why comes back to trust and risk aversion. When we build tech, we deploy it correctly. These things take time to deploy. It doesn't mean we can't move quickly when we need to, but you need to start with that patient mindset.

SV: I've recently been to two massive financial conferences, one from the TradFi world and one from the DeFi world. Poles apart in principle.

Noticeably, traditional banking and finance organisations are looking at the future and innovation and saying, "How do we rebuild the pipework, how do we build the pipes for the future?" By this they're referring to the infrastructure that underpins the global financial system.

And then DeFi communities are having the same conversation: "We are looking at how to build the pipes, we are rebuilding the pipes for the future." They're also talking about global financial infrastructure too, but from a very different perspective.

It seems like there's a lot of pipes that want to get built on both sides of the TradFi and DeFi debate, and no one is interested in building pipes together.

Do we just end up with immense fragmentation in the future because no one wants to play together? Or does it end up as the same system we have now, just packaged up into a better product?

LF: That's an interesting one. And that might be a matter of evolution. The reason why I say that is, if you look at what's happening with central bank digital currencies [CBDCs], for instance, it's a bit ridiculous in the sense that every country is trying to come up with their own CBDC. I don't see the improvement from the past model if you end up going from more than 100 fiat currencies to more than 100 CBDCs. I'm seeing similar situations in other areas where basically we're just swapping one tech stack for another. This is missing the point of doing something with a new technology which wasn't possible before.

Hopefully, this is just the first stage, a tech swap, on the way to the next evolution, with new business models and some aggregation. But this is probably where the human element conflicts with the technology.

You have to ask: what is achievable versus what people can agree to do? This is probably roadblock number one when it comes to the adoption of blockchain technology – trying to find a way to create a consortium, to get people sat at the table, agreeing to go beyond their egos to achieve a common goal. I think we are going to struggle to get beyond that roadblock and, ironically enough, it might be centralised entities, like governments, that will us enable to move to the next step.

BB: I think when it comes to products, the future systems won't care what you build it on. It's like asking, "What cloud provider are you using?" thinking that's so important. No one really cares.

We position a product, and if someone starts asking, "What proof are you using on that product? What are you building it on?" you have to think: does it really matter?

For products, it's somewhat irrelevant. In blockchain everyone becomes a technologist, but it doesn't matter, it's not relevant to the debate.

From a product point of view, I believe that, fundamentally, what you build on is not relevant to the product, because we will find a way to make it work.

SV: I guess it's like the different internet protocols TCP/IP or HTTP. No one really gets it, because it doesn't matter. No one cares. They just wanted to be able to jump on the web and search for cat videos on YouTube. The importance of the product for most people supersedes the importance of what lies underneath.

That's where institutions like Fidelity have a very important role to play. Not everyone has the resources and the capability to amalgamate technologies and networks and provide a trusted product to the end user.

BB: When you look at products as well, there are some things that we will just start to bake in. Staking, for instance, may just become a native feature.

We might find ourselves in two years' time saying you natively stake automatically – it's just something you do without a second thought.

Again, think of a product where you'll click on what you want, it asks, "Do you want to buy this?" You'll confirm, and it will ask, "Do you want enhanced yield?" and you click "YES".

That's how easy it will be. Will anyone then want to know how that's done? Well, if it's that easy, do you really care?

As opposed to today – where it feels important to talk about the technical stuff – hopefully, in two years you'll just natively stake, for example. Done. End of conversation.

SV: That sort of simplicity would be a dramatic and radical shift from

where we are now. To think that down the track it will be as easy as ticking a box in your app – I want extra yield; tick, done.

LF: This is again where there is a bit of a reality check for players in the digital asset space.

You need quite an infrastructure to be able to deliver products that are both safe and convenient. The tech is only one side of the equation. There are regulatory aspects as well. You need to have an army of people who dissect and interpret all the rules that are being pushed out. In the case of crypto, often you even have to be able to forecast what rules could be put in place.

Like anybody who wants to innovate and move fast, I've complained about all the rules in place and the endless checks and balances large companies have. But at the same time, I've dealt with those hurdles for decades, I know on average they lead to solutions that are better grounded. From an investor's point of view, you'll take a certain level of comfort that there have been checks and balances. See, somehow you still benefit from some sort of intermediary in the system.

It's been quite telling over the past year that all these big dominos have fallen, with many large corporate failures in crypto, due to a lack of checks and balances – because there was no proper risk management. To be fair, sometimes because growth was too fast, but frequently because it wasn't part of the way they did business.

I think, in terms of that kind of capability, this is not something that you can build overnight, but it's something we already have at Fidelity.

SV: It seems that even with some stiff headwinds in the industry recently, you're both quite optimistic about the future of digital assets and this industry moving forward. What aspects excite you about the future of it all?

BB: Bluntly, my view is this is open source, so if you're sat there thinking about how to get into blockchain, I cannot tell you what an enormous opportunity you have – everyone publishes what they do, so all the information is ready to go, accessible, there for the taking.

Our society is very much moving towards an idea of, "We want to experience our money in our world, not your world."

That is going to lead to interesting places. It will change the way that we understand our clients, how we engage with our clients, and how we let them help us co-create products. That's quite radical I think, and I do believe it's coming.

LF: Linked to this paradigm shift, this radically different way of approaching clients and solutions, is the capability you need to build to deliver that outcome. From a team building viewpoint, I'm for instance excited by the opportunity to reconsider how people are organised. Do you need a hierarchy? Do traditional compensation structures deliver the best incentive? Do we even all need to work for the same company? If you start implementing what you're preaching – decentralisation – you can start experimenting with dramatically different ways of working and coordination systems, all the way up to DAO. As they say, change won't lead to a better outcome, but you need change to improve an outcome. For me this is the once-in-a-lifetime opportunity to redefine what good looks like in parts of finance and refocus on the end-user.

SV: Luc, you spoke previously about having that entrepreneurial mindset. I think having that openness goes a long way towards building those teams. And that leads to development, innovation and creation. I think that when investors and organisations approach the market in that way, it's a key element of building those capabilities and, as you say, Luc, making your journey equally as important as the destination.

CHAPTER 19

Spinning Up the Crypto Vortex

An interview with James Putra, TradeStation

"Is there a magic formula? I don't know, but I think I've touched lightning."

James Putra

When I sat down with James Putra, vice president and group head of product strategy at TradeStation, I knew that our conversation would be filled with valuable insight as to how organisations go from zero exposure to crypto, to an almost all-in mindset and approach.

James Putra is a FinTech executive who has spent over 18 years building businesses and trading products. He was responsible for launching the TradeStation Innovation Lab, which paved the way for him to lead the firm's entry into cryptocurrency. James is passionate about helping others improve their financial literacy and building new products that improve how consumers interact with money.

TradeStation famously commissioned the Miami (Bitcoin) Bull in 2022 to show that, as an organisation, they were going to be market leaders in the development of modern finance.

We covered a number of topics in our discussion. But what I found incredibly insightful was how James and TradeStation had worked with other organisations to onboard crypto into their offerings.

While there might not be a magic formula per se, the 'lightning' James refers to is actually something that any organisation can easily and quickly put in place. And once they do, the speed at which they move is nothing short of breath-taking.

Sam Volkering: James, tell me about your background in crypto and how TradeStation moved into this space. I think that's key for other organisations seeking to understand the pathway into crypto.

James Putra: In 2013 and 2014, I was working on some interesting things for TradeStation, but not in crypto.

Suddenly, crypto is starting to bubble up around me. Like every good TradFi person, I'm thinking, "That's a scam. I don't want anything to do with it. This is nonsense."

We went to the MIT Media Lab, where we saw some very cool tech, including Bitcoin.

I remember leaving thinking, "I'm probably never going to see any of this stuff in commercial reality." Bitcoin just festered with me and our CEO at the time – because we're both avid traders.

But part of me is a knowledge junkie, and eventually that part took over. Then I started learning about cryptocurrency, blockchain – the potential.

My newfound interest was cemented when I walked into the office to talk about strategy for the company with our CEO and chief growth officer. We had been doing this workshop for a few weeks, and during some general chit-chat I said to them, "I just closed all my equities positions. I've closed my accounts at TradeStation and I've opened up a Coinbase account. I'm all in to crypto."

And they're like, "What are you talking about?"

That was a pivotal moment for all of us in that leadership group. They looked at me as if to say, "You are a maniac in trading. If you are going to shift all of your assets into this other asset class, we better pay attention to what's going on."

Over the next couple of weeks, they each opened up their own accounts. They started trading, and soon they were saying, "Hey, there is something here."

SV: Organisations see these crazy price swings; they see cycles that boom and bust. They see a lot of the negativity in the media about crypto assets. There's still an issue around perception of crypto. How do you combat that?

JP: We went from thinking, "This is a ridiculous asset class," to, "Hey, this is probably the most important thing we could do as a business." And that leap took *years* for us.

What we thought we knew was not even close to what we actually knew, what we put into practice and what we executed on. A lot of what we got distracted by early on was what was in the headlines, what crypto folks were talking about, and what TradFi was doing and saying.

Once we shifted our mindset to, "I know how to do these things, I can just apply them to this asset class," things started to become smoother for us.

One of the challenges that we faced as a TradFi company, compared with a crypto company, is reputational risk. This is the same thing that any institution that's running today is going to face.

When we started, the reputational risk could have led to us being ostracised by our peers, because everyone thought crypto was a ridiculous asset class.

Financial services is built on trust. If you get into a business and you lose an asset, you make a mistake, you get a fine or incur regulatory action, that could potentially impact your core business.

We grasped that and said, "We can't damage our core business." So how would we approach this crypto business in a way that we can, with a straight face, talk about why we did it? How we did it? And have a defensible position; by which I mean, the rules are not built yet, so what are our rules?

SV: What would you say is the key move for organisations that want to get into crypto? Is it a knowledge exercise more than anything?

JP: Well, is there a magic formula? I don't know, but I think I've touched lightning – in that you need to create a vortex. You need to get that vortex spinning quickly and start captivating and sucking people into that vortex.

Once that vortex hits a critical mass – once it has enough people thinking about it, talking about it, trying to solve the problem – you'll naturally bring in people from across the organisation.

SV: How did you approach that with what you were able to achieve at TradeStation?

JP: I've got a lot of tech resources, a lot of access, a data centre. So I thought, "Let's just build the mining thing, and we're going to learn how the mining works."

That helped us answer the question, "If you can't even retain custody of the assets, how are you going to help somebody else to do so?" You need to learn these things for yourself before you go outside.

It took us about a year, a year and a half, of just mining cryptocurrency, making mistakes, doing a bunch of different things.

We then introduced procedures. We didn't necessarily want the tech guys holding the wallets, so we had to figure out how we were going to build the wallets and how we were going to deal with custody.

And of course, crypto is an asset, so I needed to get finance involved so they could account for this little project on the books.

Our legal team had to be consulted, because we're opening up accounts at different places – I might open an account at Gemini, for example.

Security wanted to know how we're keeping the processes in place. Technology teams were learning about how all this stuff moves around.

By the time we were done, we had amassed a small fortune in crypto assets after the market took off. People started to ask a lot of questions, which was the plan.

By this point everyone was in alignment. They understood. They weren't scared of it anymore. I had enough swirling mass in the vortex to say, "Let's take that knowledge and let's go and figure out how to build the business on top of it."

SV: Tell me about some of the organisations you've helped to get their own vortex going.

JP: I worked with an insurance company, out in Miami. They wanted to do a whole bunch of things in crypto, huge ideas. Their owner was amazing, very forward thinking, but he couldn't get it off the ground.

He couldn't get the finance folks to figure it out. The CFO and the finance people didn't want to listen to him. They said, "Surely, this craze is going to pass." The legal team said, "There's no way we're touching this."

He had a hard time to get his staff aligned.

We told them what we had done.

I suggested that he create a project for his employees that they could learn on, and then use that to build from. His first thought was to run an education seminar for his employees.

Then he said that for employees who chose to invest in crypto, he would match a proportion of their investment. If they put in a thousand, he was going to give them up to a certain amount, a few hundred bucks.

We said, "If you're going to match them, TradeStation will match them too."

The owner put together the seminar. He told them about crypto. A bunch of employees opened up crypto accounts. He gave them crypto; we gave them a matching contribution. Then he brought in some experts that would continually talk to his team about crypto. In no time at all, they're all looking at this, they're excited about it, they're learning about it.

All of a sudden, his CFO is trading a bunch of different asset classes, a bunch of different crypto. And the guy he couldn't get to talk about crypto is now a maniac on it – he loves it.

Through that simple project, the owner created a retention programme that was unimaginable. With this approach, you're teaching your people about something that you feel strongly about.

That's important. It also drew in other people, so he was hiring people because of this programme and he was able to quickly launch a way of doing payments after that, so he could take insurance policy payments in crypto.

Once they started, it probably took about six months for them to get people really thrilled.

Within six months, they were taking bitcoin for insurance policies. That's amazing: to go from the CFO refusing to talk about crypto, to completely accepting it.

SV: It's interesting to hear that an organisation can be that quick. Going from, "Okay, we want to start this, let's educate, get that vortex spinning," and then to, "Bang! We're away and we are developing."

What other examples do you have of taking your experiences and learnings, and applying it in a different way?

JP: United Way, of Broward County, Florida is a large charity. They liked the idea of cryptocurrency. But they weren't exactly sure what to do. They didn't have a use case.

They thought nobody would ever donate crypto. It just didn't resonate, and when you're not clear on what you want, it's really easy to say, "Forget it. No, we don't need it."

I think we started chatting around late 2019. In early 2022 they came to us and said they were ready; they wanted to get into crypto.

They said, "We're facing a couple of challenges that we don't know how to solve. Can you help us with that?"

We explained that today, when you take a donation of cash, the cash goes right to your bank account. Easy peasy.

You can also allow people to give you appreciated securities. People can donate any stocks that they own. What happens is they automatically liquidate and then you get cash in your bank account.

So we told them we would do the same thing for crypto. When someone donates crypto, United Way would tell us they want to liquidate the cash and that would go right to their bank account.

At that point, convincing the board became simple: "This is just following the exact same procedure we do for securities donations."

When we explained this process to them, the lightbulb went on.

They understand that process. It's a matter of adjusting workflow and they can execute on that process.

SV: I think a lot of organisations get themselves to the point of doing something, but they don't realise it's not about having to hold bitcoin

on your balance sheet. It's not about having self-custody; it's just about adding value to your end customer and your end customer demands to have crypto as an option.

JP: The CFO from United Way is an amazing guy. He started out saying, "What are you actually doing to my balance sheet?" But once we gave him the solution, he loved it.

I think we weren't even fully live, when we got a phone call from him, saying, "Don't liquidate, we want to hold the crypto. I've done my research. I know what I need to do. I'll tell you when we want to sell it." This was only a few weeks after we first met.

They very quickly built up that expertise and comfort level.

SV: It's quite clear, once that vortex gets going, the speed at which knowledge builds and depth of understanding permeates through the organisation is breath-taking. Tell us about the Miami-Dade County experience.

JP: We were asked by the chief information officer of Miami-Dade County to come in and give a presentation about cryptocurrency.

As we were going through the conversation, I explained about blockchain, what a cryptocurrency is, how it works, where the industry is going, and then we started having some free conversation.

I told them, "You probably shouldn't use blockchain. You have these great databases that work. There's no need for you to use blockchain. But you're probably hearing that you should move all of your services to blockchain."

And what the county didn't have was a use case that they could get behind to try this stuff out.

So, we wanted to get them some experience in the space.

It turned out that there were many fragmented approaches to how they interacted with the community.

I asked, "Wouldn't it be interesting if you could do something around

an NFT? Not for any revenue, but purely around you learning and potentially bringing you closer to your end constituent."

They had a hard time getting over the fact that people thought NFTs were investments rather than collectibles.

As we continued talking, I said, "There's an easy solution. You already have logos of every park. Let's just put them into NFTs, and give them to people for free when they show up to the park.

"One, you're going to get people to go to the parks. Two, you're going to see who went to the parks and, three, you can do some special communication to the people in the parks. And the best part about it all? It's super low risk, because if it doesn't work, you can shut it down."

That's when they got it.

That was an interesting way for them to start thinking about how to move forward.

Their problem with the use case was the same problem most of these institutions have: they have somebody on the other end of the table telling them why they need to rip out and replace a system. It goes back to the questions of: what is the use case? How committed are you to solving that use case, and how do you build up your own institutional knowledge?

SV: What do you think is most important for an organisation to understand as they take those first steps into crypto?

JP: My suggestion is: develop the knowledge on a parallel use case that's low risk. Whether that's the NFTs we're talking about for the parks, or the employee programme for the insurance company. For us, it was crypto mining.

How do you do that? Develop it in a low-risk manner, so that it's not just a handful of people, it's a larger chunk of your organisation thinking about finding that solution. Because you're going to need that help.

You need to solve problems, and you need smart people in your organisation who you can rely on to find solutions to those problems

– to come up with suggestions and recommendations. If you're just trying to drive it from the top, it's going to be very hard.

SV: The idea of ownership of the vortex within the organisation is key. You need experts and the knowledge building constantly within. Alternatively, you recognise you don't have a solution to all the problems, so you bring in an external entity – which might be TradeStation or someone else – to plug that gap.

JP: Whether you're someone who is learning the trade, or someone who is learning to bring their business in, it's the same process. If you're thinking about getting involved in any capacity, an element of learning will be required.

The issue is that sometimes people and organisations just don't really know what they *should* know. They think they know what they know, but they don't *actually* know it.

It's not until you have that experience of trading something, be it an NFT at a park or whatever it might be. It might be just accepting crypto as a charity and then realising that you can liquidate it straight away to add to your balance sheet; but then, all of a sudden, you're like, "Actually, now I want to hold it."

It makes it real. And that step of making it real in a manner that contains risk is important.

The Miami Bull, Miami-Dade College, Wolfson Campus, Miami, Florida

CHAPTER 20

What Do Investors Really Want to Know?

A Q&A with Sam Volkering, Southbank Investment Research

One of the advantages of having helped launch crypto investment publications into both the Australian and British markets is I've had a direct line into what the retail investor wants to know and what concerns them about crypto.

I first started writing about bitcoin for Southbank Research in 2013. We explained to our readers that bitcoin was an anonymous digital currency existing solely online, independent and without bank interference or government oversight and regulation.

It was a different world back then. What I find interesting is that over a decade of writing to individuals about bitcoin, crypto and the emerging crypto assets space, time and time again the same questions, worries, criticisms and confusion come back to the surface.

We've barely scratched the surface of what people think they know versus the reality of what they should know about this industry.

This is why I believe it's important to look at the most common questions we get from individuals who are either getting into crypto for the first time or have been doing it a while yet are still perplexed by how it all works.

The following are some of the questions I've received over time. Some of my answers have been touched upon in earlier chapters, but this Q&A format is a good way to get answers to questions you might still have lingering in the back of your mind.

Q: Are there a finite number of bitcoin, or is it a case that 5,000 bitcoin exist until Joe Bloggs wants to buy one, at which point there are 5,001? If there are a finite number, what is that number? When I buy a bitcoin, am I just buying one from this total number? This all seems to be a giant scam to me.

A: There is a finite amount of bitcoin. The number is 20,999,999. In short, there will never be *more than* 21 million. The way Bitcoin's underlying blockchain technology works is that, to verify transactions

that occur in the network, bitcoin miners participate in the verification process, which adds blocks to the blockchain containing all the data about those transactions.

As a reward for their efforts (as there's a time and energy cost to being a miner) they are rewarded with bitcoin if they successfully mine a block, beating all other miners trying to do the same thing. This economic incentive is a core part of Bitcoin's design.

Hence these block rewards are the *only way* new bitcoins enter circulation. Due to the design of Bitcoin's code, the difficulty in solving the algorithm to mine a block and the speed in which blocks are mined (and rewards paid), it's not expected that all bitcoin will enter circulation until around the year 2140.

Hence if someone wants to buy a bitcoin, a new one isn't just created for them. They have to buy one that already exists in the network from someone that is happy to sell one.

That might be a miner who has received bitcoin rewards for mining; it might be another person; it might be a business; it could be anyone. But it's a pure market of buyers and sellers and velocity of bitcoin that exists in the network.

Q: As the number of bitcoin in circulation approaches 21 million, what will the miners do? The integrity of the whole Bitcoin system depends upon the economic incentives of miners. If there are no more bitcoin and the reward is no longer there, who keeps the blockchain and Bitcoin network honest and intact in perpetuity?

A: Yes, miners need an economic incentive to continue to mine bitcoin and add blocks to the blockchain, otherwise why should they bother (other than due to altruistic motives)?

Bitcoin was always intended to be deflationary. There was always a fixed supply and over time the release of bitcoin would slow and then stop. It plays into the economic principles of supply and demand. The big-sky idea is bitcoin would become globally recognised and accepted as

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a way to conduct transactions online as a medium of exchange and a payments system from peer to peer.

In doing so it would scale and grow in size to become a truly global system. That also means an exponentially increasing number of transactions as Bitcoin scales.

There was always an intended tipping point where the block reward for mining would not be as valuable as the transaction fees from so many transactions circulating through the network. Hence the transaction fees to miners would replace the block reward as the economic incentive.

For a miner, when they mine a block, instead of just block rewards they also get all the transaction fees in the block. While the bitcoin reward might fall away, the expectation is – and it's looking like it will be the case – that transaction fees more than replace that and continue to provide long-term economic incentive.

Q: Bitcoin is something created using a computer algorithm, so is it something on which no copyright exists? What is there to prevent a clever computer programmer replicating the system with all the facilities of Bitcoin, such as mining and a limited number of coins that can be created, calling it 'Ditcoin' and cashing in.

A: This is 100% correct: anyone can take Bitcoin's code, copy it and launch another version of it. In fact, you'll find that several cryptocurrencies are based off Bitcoin already. Litecoin, for example, is originally a copy (fork) of Bitcoin.

We see with forks off Bitcoin's blockchain that developers have an opposing view as to what the network should be or could be, so they have a go and build out a new version.

This is a feature of open-source code. Anyone can do what they want with it. The thing that's hard to replicate or develop is the adoption and acceptance of these copies or alternatives.

If the wider crypto industry were to consider bitcoin as an inferior

money and switch to bitcoin cash, for example, we may very well see that become a more dominant asset.

This is no different to confidence in and support of fiat currency. Ultimately, all money and stores of value have an inherent belief system backing them – without the belief and confidence in those currencies or assets (crypto or non-crypto), the monetary system it's a part of falls down.

Q: One of the concerns is that quantum computing will allow cracking of even highly encrypted transactions in minutes rather than millennia. Would this invalidate cryptocurrencies once it is widely available?

A: There are already a number of developments in the works or available now that are believed to be quantum-resistant.

These include Lamport signatures, ideal lattice cryptography, zk-SNARK cryptography, and even a migration to SHA-384 encryption. These all have the potential to be quantum-proof. They are just four current examples of known work in this field, but in all likelihood there will be more in the coming years.

We also know that an immense amount of research is being directed towards quantum cryptography.

A lot of it is coming from the very companies building these new quantum computers.

For example, IBM has quantum-safe cryptography research in the works already. And the US National Institute of Standards and Technology (NIST) is actively working on a standardised method for quantum-proof encryption.

Hence it isn't a binary outcome (relevant when talking about quantum) of quantum computers existing and crypto getting cracked. I think as quantum computers move into commercialisation more and more, so too will the quantum cryptography applied to crypto networks.

Q: I have one big concern: wallets! I have stored all my crypto via the exchanges where I purchased. Should I move my crypto investments from the above exchanges into another wallet?

A: Use of wallets can be a roadblock for a lot of people getting into crypto. It doesn't have to be. Exchanges often prefer you to hold your crypto in their wallets, and they go to some lengths to explain the safety of them.

But there's a saying in crypto: "Not your keys, not your crypto." That means if you don't have full access to the wallet at all times – by that I mean the cryptographic private encryption key – then you'll always be at the mercy of a third party.

I don't like this counterparty risk because it means you're putting your trust in someone else. One core principle of crypto is to take back power and control of your own money. Yes, that means a little more responsibility, but you should always store your assets in your wallets.

Q: Are all the crypto that I have on an exchange linked to my identity, as I need to prove who I am to use the exchanges? Therefore, when I move these to a hardware wallet or other wallet, will they still be linked to my ID, or is that link severed once I remove them from an exchange?

A: Typically, if you've had to register details with exchanges, which most now require to satisfy regulatory requirements to 'know your customer', then your crypto will be linked to your ID.

Moving them off an exchange will leave a trail on the relevant blockchain from the exchange wallet they come from to your hardware device wallet.

The blockchain itself doesn't carry any of your ID data, so you're all good there.

But if the exchange were in some way *compelled* to reveal your ID and wallets to a third party, then you could be linked to the hardware wallet and all transactions in and out of it.

Crypto and blockchain tech provides privacy but not complete anonymity. Modern forensic blockchain analysis is more than capable of linking individuals to wallets. That has both good and bad points, but it is also a reminder to protect your data as much as possible.

Q: How and where does the Bitcoin data/code and verification of the system exist and operate? Are there IT staff looking after 'servers' for example? Who updates or improves the system? There must surely be actual people involved – and some sort of office/HQ?

A: No, there's no centralised server. The data exists across all the nodes – all the miners that exist on the network. This is the power of a decentralised network. There is no single point of failure and no requirement for a single team of IT staff to maintain its operation.

Should one of the nodes fail, or try to push through false transactions, the rest of the network will detect it, and proceed with the dominant chain. This also is a fundamental design of how Bitcoin blocks are verified and added to its blockchain. This adds incredible security and transparency.

The key is widespread decentralisation and distribution. Without that, the network is next to worthless, but the bigger that network effect gets, the more its real value starts to ramp up.

This is why, when you look at how to value some of these networks, their network effect (how they're distributed and decentralised and at what scale) is so important.

Q: With some 2,000 cryptocurrencies in circulation, how do you know which ones to invest in?

A: There's actually somewhere in excess of 25,000 cryptocurrencies – it's really an untold number, as data aggregation sites don't list all crypto that are in existence.

How to know which to invest in is really hard. My methodology is based on over a decade of experience, trying to dig into the underlying values

of these crypto networks in the same way I'd approach analysing any new technology or innovation.

A lot of the crypto out there are really like start-ups. A very good parallel is the explosion of application start-ups we saw in the 2010s, as smartphones started to really explode in market penetration.

These crypto start-ups are best approached by looking at what they're trying to do, how they're going to do it, who's doing it, where they will generate value, revenues (crypto or fiat revenues) and the potential of the market they're trying to tap into.

There are also a lot of what are called 'layer-1' or 'foundation' crypto networks. The best way to think of a layer-1 network is like the wires that transmit electricity. They're more like the underlying infrastructure of something like the internet, or energy networks. They're also a lot harder to value. Most of them are widely distributed and decentralised – some even with unknown developers.

These you need to take a far more qualitative approach to, and again figure out: what is the use case; who will use it and how; how will organisations or other crypto 'bridge' into these networks; and what are the economic incentives and principles behind it?

What's the network effect in play? How widely are they distributed, how much adoption do they have and how will it scale to the masses?

In short, crypto is as diverse and widespread as the rest of the world, and it just takes time – a lot of time – an understanding of these markets and how they work to filter the good from the bad and the ugly.

Q: Do any of the technologies behind the cryptocurrencies (blockchain etc.) have any application to the task of 'decentralising the internet'?

A: Yes, and to a large extent this is the promise of what we now call Web3.

The real question here is about the decentralisation of data and information. The underlying protocols of the internet aren't really the *problem* with the internet. They work fantastically well. The problem of the internet is how data is created, transacted and who has access and

ownership over that data. Notably in Web2, that data and information is hoarded by the giants of 'Big Tech'.

In that sense, there are a number of crypto developments trying to shift that balance of power. They believe (and rightly so) in individual ownership of data and information and identity. You own your data, so that you have power and control over it in the rightful way.

Subsequently, if you choose to monetise that data, it's you that benefits from it, not some giant data-hoarding marketing and advertising social media business.

I believe this issue around data, information, privacy, identity and its ownership is one of the most important issues of our lifetime. I expect we'll see significant developments, and the answers to some of these issues, come from the crypto community. It's one of the things that actually makes me really excited about the future of crypto.

CHAPTER 21

Does Blockchain Fix Renewable Energy?

An interview with Dr Jemma Green, Powerledger

In this industry, you often here the phrase, "Blockchain fixes this."

There's no doubt that as an industry, there's a lot of work to be done around the real-world impact that blockchain based networks or DLT can have on the world.

While many support the idea that blockchain can fix everything, the practical realities aren't always so simple.

When I spoke with Dr Jemma Green, co-founder and chairman of Powerledger, she made the point that, "The notion of blockchain as the saviour – I just don't agree with it at all."

And she's right.

Blockchain doesn't fix *everything*.

However, it does have enormous potential across a number of critical industries helping to improve efficiencies, remove friction and lower costs.

One industry that blockchain does have tremendous potential to impact is electricity – in distinguishing different sources, including renewable energy.

That's the focus of the work Jemma is doing through Powerledger. The company is developing technology to remove the frictions and barriers of 24/7-accessible green, renewable energy.

In today's world, how sovereign nations secure their energy, how we access it and how much we pay for it have never been more important – or more firmly at the forefront of people's minds.

How can blockchain impact renewable energy markets? How does crypto contribute to the green energy transition? Does blockchain actually fix this?

Surprisingly, our conversation starts with Jemma talking about supermarkets…

Jemma Green: The notion of blockchain as the saviour – I just don't agree with it at all.

People will often ask me, "Why do you need a blockchain?" The simple answer is that you don't *need* a blockchain, you can do most things without a blockchain. In the same way, you don't *need* barcodes to have a supermarket, you can have a supermarket without barcodes and it works fine. It's called a corner store.

Sam Volkering: But the barcodes are useful. And now I think the next time I'm at the supermarket, I'm going to look at barcodes in a new light.

JG: There's an obvious efficiency that happens by virtue of having barcodes in the supermarket.

I think it's somewhat analogous to the notion of blockchain in the context of electricity.

Using blockchain provides a way of counting and tracking. In the case of energy, there are different sources of energy and claims made about it and different prices attached to that.

Once you mix energy into the grid, you've got to find a way to be able to track it and account for the type of energy and the time and the place it was generated. I think what blockchain technology provides is a great counting system that can be trusted to a greater extent.

What's happening in electricity markets is that we're moving away from a centralised system that was largely driven by big power stations sending electricity to people's houses and businesses. In the 21st century now, we've got this hybrid system, which is partly centralised and partly distributed. Everyone is beginning to supply everyone. We are now getting new market mechanisms, commercial models and business models that are underpinning that.

It's this idea of everyone supplies everyone, rather than unidirectional energy. As a result, you need a way to track all of that. You want to be able to trust that the information, and by extension the claims being made off of it, are correct.

If you think you're buying renewable energy from your neighbour, you want to trust that's actually what's happening.

For example, we're working with an electricity retailer in France that allows customers to choose their energy mix. They actually get to specify that up to 70% of their energy comes from this solar farm or that wind farm, and what we are doing is measuring the output of those power-generation assets at that time, and acquitting that against the consumption, so it's not being oversold.

People can validly claim, "I'm buying my energy from *there*." Even though we know the physics of energy mean it is plain old energy, but we are not overselling the output of that within a particular time period; we are precisely allocating the output of a particular generation asset.

SV: You mention about being able to choose your mix of energy. That comes back to a common thread when we talk about what blockchain networks and crypto can do: they give people choice.

They give people the power to exit a legacy system that doesn't really work for them anymore. It gives them more power and control over the choices they make about how they live.

What you were describing there, about being able to click and choose from this solar farm or that wind farm, is that something that's quite novel in the market?

JG: This 'choose your mix' idea is like 24/7, carbon-free energy, to put it another way. But this idea of hourly matching and local energy, connecting time and place-based energy, is really the premise of what Powerledger is working on.

There are other companies that are doing various things in this space as well, but I would say that there's not widespread mainstream adoption yet. I think that will come, in time.

SV: Is there a lot of pushback against these ideas, innovations and technologies from legacy energy companies? The efficiencies cut out intermediaries. Local, renewable energy cuts out a lot of the legacy providers in that sense. How are those companies reacting to all this?

JG: Grid operators are very interested in this because they are being asked to accommodate renewables, and they need to do it in an efficient way. If they can get more local energy, then they don't have to upgrade so much grid infrastructure.

For the retailers, the energy suppliers, it depends on what their energy portfolio looks like and also how innovative they are.

A lot of the retailers have very big balance sheets and a retailer model that works for them, and there is reluctance to change for several reasons.

For larger suppliers, their billing systems are often legacy systems – which makes changing them extremely time consuming and costly – so there is reluctance to experimentally innovate on products because of what's involved to integrate new developments into billing.

They may also have generation assets of their own, so the more customers supply themselves or others, the less their assets are needed or the lower the price they command.

You've had a digital energy retailer movement over the past eight-to-ten years. This has seen a lot of new retailers emerge, with a low-touch approach to customers – because digital platforms handle a lot.

Many of these retailers don't have their own energy generation assets and have more ability through their digital platforms to innovate on products. However, the very volatile wholesale market prices have led to these retailers' hedge costs going up, and a lot of them have gone bust.

For example, several retailers in the UK went bust, and the taxpayer had to bail them out. It cost the UK taxpayer a lot of money. What's happened in the UK is also happening in Australia.

You've got the retailers that are hanging on, and the question is whether they will be innovative or whether they'll just stick to their knitting.

I think they'll be in two camps, because if you look at disruptive innovation theory, which is what I did my PhD on, there will be some

that will just maintain the status quo, and then there'll be those that innovate.

Those that innovate may have to cannibalise parts of their own business, because if they don't, someone else will. I think there'll be a fair amount of that going on. It's the ones that are in the innovative camp that Powerledger wants to partner with.

SV: When you look at the actual cost of energy to the end user, energy prices skyrocketed in 2022. Do you think, with what we've seen happen in energy markets in 2022, this is going to be one of those catalyst moments that changes energy markets for the better?

For example, Covid-19 has pushed everyone a lot faster towards the idea of completely cashless commerce.

Do you think skyrocketing prices for consumers push the industry to adopt a lot of what Powerledger is doing, and bring blockchain networks right into the conversation, solely because these high energy costs need to be brought down?

JG: Sometimes circumstances catalyse things that were ripe for change in a good way. But in this case, I think that what's proposed by a lot of governments is actually a very poor outcome that will lead to higher costs and stifle innovation.

For example, in Australia, as a result of high prices and supply turmoil in June 2022, the government is proposing to introduce a capacity market to guarantee supply. This will work, but it will also be expensive, so it will push up electricity prices. Instead we could use existing distributed energy resources better, through local energy markets.

Local energy markets are a supply-and-demand side mechanism. They also reduce the need for demand response. The concept is that people and businesses that are located in a similar place, say beneath a substation, can trade solar- and battery-sourced energy with each other.

In doing so, they reduce grid congestion during noontime, as instead of solar electricity being exported to the superior grid, it's stored in a neighbour's battery and then consumed later that evening.

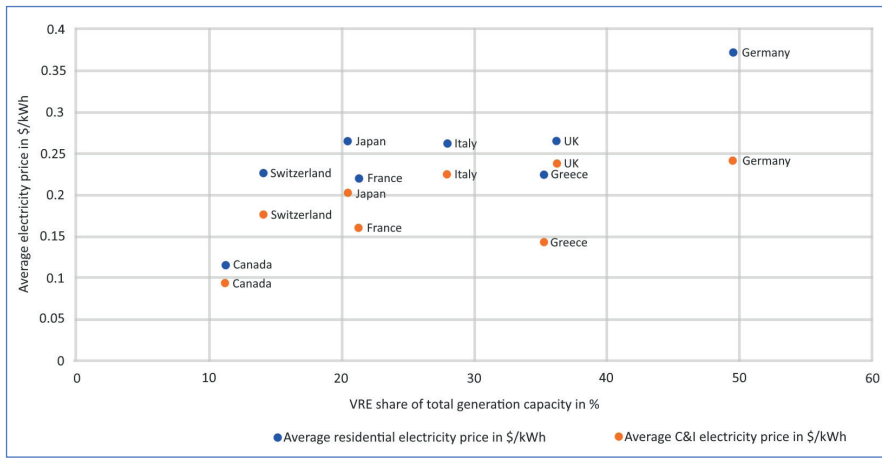
All this means you need less capacity markets and less demand response.

The premise of Powerledger is that we think that true markets will actually help solve the problem.

The more centralised market mechanisms you put into energy markets, the more cost you're ultimately going to add. Ultimately, I think that model will fail.

Take a look at the more extreme versions of this. Germany, for instance. [Figure 37] shows the average price of electricity in different places, and then the percentage of the variable renewable energy in those places.

Figure 37: Average electricity retail price versus VRE generation capacity share



Source: Powerledger

Germany has more than 50% renewable energy, and because of this has the highest cost of electricity in the world.

Denmark also has very high penetration of variable renewable energy. You can see this strong positive correlation between penetration and high electricity costs.

If we want to get to net zero targets, and we do things like add a capacity market, without local energy markets, that is actually going to make the problem worse.

SV: Isn't the idea of renewable energies to help lower the cost of energy though? The graph suggests otherwise.

JG: There are a lot of articles saying things like, "Solar now cheaper than gas. Wind now cheaper than coal and gas."

But what they don't say is that if you put centralised price signals in, you build that energy far away from where it is consumed, but then you have to spend *a lot* of money on network upgrades to get it to the market. Then you need grid stabilisation services on top of that, and when you add it all up, it becomes expensive.

This is what we call the 'place problem'.

Then you've got the 'time problem'.

For example, when solar energy generates at noon there's too much of it. That causes issues on the grid. Then you've got the consumption at night-time. You need a market mechanism to encourage that to be consumed or stored when it's generated, then dispatched when it's needed.

In terms of what our software does, it creates markets that price these attributes so that they can be more locally consumed, locally stored and locally dispatched later.

If you observe the energy crisis or talk to any energy expert, the sense of market failure is pretty apparent. When you dive in further, it becomes clear that we're going to need energy markets that take account of time and place if we're going to grow renewables without pushing up prices.

By matching energy consumption to energy generation, we can address issues like the duck curve [the imbalance between peak demand and renewable energy production], curtailment [the reduction in output below what can be produced to balance supply], and ultimately fuel poverty and people having to choose between heating and eating.

We envision a future where ordinary citizens and corporations can harness their rooftop storage and buying power in an optimal way. To

do this, we have to bring continuity in transmission, and distribution in the grid that's less susceptible to conventional grid failures, which we're seeing with increasing frequency.

Our thesis is that genuine markets will find the best way forward. The converse is also true: centralised energy markets will always fail in the long term. Our vision is for clean energy that works for everyone on the planet.

Our big goal is for us to impact the lives of a billion people through the work we are doing. That's significant and makes us want to get out of bed every day. It's also a bit scary.

SV: If we're talking about things like hourly matching of the consumption and pricing, you need a system that is reliable and quick to operate as a network. Not all blockchains can achieve that.

When I look at a blockchain like Ethereum, on the face of it, it's ideal. It's public, open source, but then has issues with the speed that would be needed. Do you say, "If we have issues with that network, we need to be network agnostic and have our platform operate cross-chain and across multiple blockchains"?

How do you see that evolving?

JG: We were using an Ethereum-based blockchain for recording electricity transactions. However, there are limitations with throughput on Ethereum: 10–12 transactions per second. Even with layer two and sharding, which are upgrades to Ethereum, it might get to a hundred; but it's pretty much untested.

That was unfit for purpose for energy markets. We thought about seeking an alternative, and we landed on a solana-based chain for the Powerledger Chain. We created a clone of the solana blockchain, and we've adapted it further for the energy-use case, are running it on renewables, and it is super energy efficient. It can process 50,000 to 65,000 transactions per second.

It's like night and day.

It's currently a permission blockchain, but our goal is to transition it to a public chain, and all of our smart contracts and blockchain source code are – and will continue to be – open source.

We created a POWR token, which is an Ethereum ERC-20 token and will remain so, and customers can access our software using the POWR token or with fiat currency.

POWR token holders can maintain a node on the Powerledger Chain by staking their POWR tokens to get a reward.

Blockchains get a lot of attention around being too energy hungry. Particularly Bitcoin. There's a lot of talk around how energy-hungry blockchains are. Proof-of-work blockchains use more energy than proof-of-stake blockchains. But even for proof-of-work chains, it's possible to run them on renewable energy and even to track the providence of the type of energy used to mine digital currency like bitcoin. The Powerledger platform can actually do this tracking and verify every kilowatt/hour used to mine a coin.

SV: When people sign up for an energy provider in five years' time, or log into their energy account, will they click to choose their mix of energy from a solar farm two miles away and a wind farm five miles away? And within the next five or 10 years, do you think it will be blockchain networks that will underpin that ability?

JG: I think that's very likely to be how it will look. You'll be able to switch suppliers readily, and maybe you won't even have an energy supplier. A blockchain means that you may not need one, that you can trade directly. There might be nodes on the market that support or underwrite risk between counterparties and things like that.

There could be new notions of retailers.

But I think wherever you are in that space, there's a transactive service to be delivered, and that's the commercial landscape that I think is emerging.

Maybe that sounds a bit like *Back to the Future*, but I think it's coming to a store near us all very soon.

We All Have that Road to Damascus Moment

An interview with Hector McNeil, CEO HANetf

CHAPTER 22

Hector McNeil is a pioneer in the world of exchange-traded funds (ETFs) – a popular TradFi investment vehicle which allows investors to gain exposure to a particular investment theme and basket of stocks via a single, cost-effective, easy to access and trade security.

Hector co-founded BoostETF, which was purchased by WisdomTree in 2014, and ETF Securities. Following a term as co-CEO of WisdomTree Europe, he went on to launch the white-labelled ETF platform, HANetf.

HANetf has played a part in bringing some of the most innovative ETFs and ETCs (exchange-traded commodities, which instead of providing exposure to stocks, provide exposure to commodities like gold) to market. In 2020 they launched the exchange-traded cryptocurrency ETC Group Physical Bitcoin (BTCE) into the German market.

Since then, HANetf has gone on to distribute multiple products to the European market in partnership with ETC Group, including an Ethereum ETC, Litecoin, XRP, Cardano, Solana and Stellar ETCs and more.

They've also brought more traditional ETFs with a focus on the crypto industry to market, including the ETC Group Digital Assets and Blockchain Equity UCITS ETF – which includes companies like Coinbase Global, Block Inc. and Marathon Digital Holdings – and the Grayscale Future of Finance ETF – offering exposure to similar publicly listed crypto-centric companies.

My aim was to understand from Hector how a long-standing pioneer in the ETF space makes that move from a focus on traditional asset classes and opportunities into crypto, and the trials and tribulations involved in bringing crypto products to market.

The journey from TradFi to DeFi (so to speak) is something that is important for people to understand. Even knowing the journey is possible can unlock new opportunities. Speaking to someone like Hector offers insight into the convergence of two seemingly opposite worlds that actually share quite a lot in common.

Sam Volkering: Hector, considering your background in what we would call traditional finance, with ETFs and traditional asset classes, I'm interested in how you went from doing what you do so well with ETF products to rolling the dice on an emerging, high-risk asset class and bringing that into the ETF space. Furthermore, what lit the spark that told you this is something you need to be doing?

Hector McNeil: Interestingly, throughout my career in the ETF world, we've always focused on doing the funky new scenarios, because going up against the BlackRocks and Vanguards of the world, it's hard to carve a space unless you've got massive scale and a huge footprint.

Obviously, the whole idea is that we're the small guy who goes unnoticed until we become a problem, at which point it's probably too late for them to do anything.

So, that has always meant a lot of innovation in what we do.

This idea of innovation started with gold. We invented the first gold ETF in the world, back in 2001. Then we brought that to Europe and we built our ETF Securities Physical Gold ETC off the back of that.

It was very straightforward process. Funnily enough, it was very similar to tokenisation. It bought a physical asset – which was a gold bar sitting in a vault – and then securitised it with a security that anybody could buy and exchange. Not only could you buy this gold bar, you could buy a share of it.

We made the official launch announcement for HANetf as a white-label ETF provider in 2017. I'd say about 40% of the calls we received about it were crypto related, from asset managers who wanted us to build ETFs for them.

At that time it was obvious crypto was a pretty hard gig. We made an active decision not to do anything until somebody plausible came along with a solution that we felt would work.

I personally had a bit of a 'Road to Damascus' experience with crypto, where I suddenly realised it's not particularly about any specific coin or token.

It's really about the technological enablement it brings, and the liberation of not needing central banks or clearing banks. If I do something with you, we can have a means of exchange, peer-to-peer. This ethos is very consistent with my belief in the democracy of ETFs as an investment vehicle.

When you look at all the criticism of Bitcoin – money laundering and criminality, Silk Road and the dark web – my simple answer to that is: the dollar is much worse.

I was at Morgan Stanley during the dot-com boom. The current crypto world feels very much like that, but not in the way you might think.

It's very nascent, with lots of interest and focus, loads of investment bankers quitting their jobs and going over to crypto firms. And some of the valuations are just crazy.

But then obviously, we had a massive washout of the dot-com boom. Companies adding dot-com to the end of their name saw their valuations go up tenfold.

SV: We've seen the same thing since 2017: companies' valuations skyrocketing because they were doing blockchain. Publicly listed companies were just adding blockchain to increase multiples. The infamous case of the Long Island Ice Tea company that overnight became Long Island Blockchain Company.

HM: Exactly.

But the big point for me with the dot-com boom was that the Amazons and Facebooks and those titans came out the other side. Real business with real revenues.

I realised my job as a product manufacturer is to create the products clients want, not what *I* want or what I believe in. My job is to create the most robust, solid, liquid and transparent products for clients. And I took that attitude with crypto.

SV: Would it be fair to say that you were initially sceptical of crypto, but demand kicking down the door persuaded you to take it more seriously? Will new titans emerge from all this?

HM: That, and the realisation that there's actually something there. It's not going away, and it's technology-enabled.

When I had my first job, the first computer I came across was a mainframe computer. But then we got the PC and then we got cloud technology.

Fundamentally these big developments: PC, cloud, crypto, aren't all that different. It's the underlying technology that enables the massive leap forward.

And I think this is what I realised with crypto: there's something special here.

It's why I don't buy into the idea that countries creating their own CBDCs are going to kill the crypto market.

That's like Facebook's rebranding as Meta. It's a data controller, so it can't be part of the metaverse. The whole idea of the metaverse is that you don't have anybody controlling your data.

That's the same as central banks trying to create their own CBDCs. Sure, it might replace paper money, but it's not going to replace the fact that you and I can now say we don't need any of that, because I trust genuine DeFi and cryptocurrencies more than I trust central banks.

SV: That's a common thread that I've been writing about for the better part of the last decade. There's a fundamental breakdown of trust in these centrally controlled systems – whether they be the central bank, the government, Facebook or Google. Crypto at its core disrupts that idea of centralised control, and is an open-source, distributed, decentralised way of doing things differently.

HM: Crypto gives you the motivation to say, "Actually, we can control this without having to go through the established structures and

political systems." The whole traditional financial system, it's all built on trust at the end of the day. It's all built on the fact you believe that everything's secure and the whole thing works. But it doesn't take a lot for it not to work, does it?

SV: You're right, and we're seeing the ramifications of that play out in society now. That gives crypto quite a tailwind to ride forward. And when it comes to tailwinds, the boom we saw from early 2020 through into 2021 was one of the biggest yet. What was it like then, being part of the launch to market for the BTCE product during that period?

HM: Firstly, we don't have any of our own products. We white-label for third parties, and Tim Bevan [founder and co-CEO of ETC Group] came along with a solution for Bitcoin. As I said earlier, we didn't want to work with anybody unless what they offered was real and coherent. We talked to Tim about ETC Group's approach to Bitcoin. Not only was it interesting, it was timed superbly – coinciding with the German government waking up to cryptocurrencies and making them official financial instruments.

The German market embraced this technology and this world. So they opened the door. As a regulator, they said, "Right, crypto can go on the exchange."

ETC Group had their own way into the markets at that exact time, so they got there first. With Germany being such a big ETF market anyway – probably the biggest in Europe – it was perfect timing.

What I liked about ETC Group's method was that their crypto assets are stored securely in offline wallets. The end client can send a notice to us requesting physical redemption, and they can get the physical units. There are lots of checks and balances in that process, and world-class service providers supporting it. For me, when you've got an asset class which has a reputation of being risky or highly volatile, it's important the engineering is right. That's one thing we've always held tight to, and we felt that ETC group had that exactly right. The launch was a massive success. In 2020 it was the most traded ETF in Europe.

SV: The inception date is listed as June 2020. The timing couldn't have been better, because one bitcoin cost less than $10,000 at that time. Was that just a little bit of luck, or was it intentional timing?

HM: You have to be in the fight to win it. Obviously, that bit wasn't luck; but I always say to my guys in the company, "There are only two things you control: working smart and working hard." Luck and timing take care of themselves. You've got to be in it to take advantage of that. But I don't think anybody had any expectations that the market would go the way it did.

It mainstreamed before my eyes. One moment you had these very fringe people interested in crypto, then you suddenly got the family offices, wealth managers, private banks, institutional interest... and I wouldn't say it got total acceptance across that spectrum, but it certainly got a lot more acceptance, and there were enough people there to make it interesting.

SV: When BTCE launched, we'd just gone into lockdowns and government-imposed restrictions. Against the backdrop of immense uncertainty, what was the demand like from investors? Did it explode as soon as BTCE hit the market?

HM: It was rapid. BTCE had the right set of service providers and really good market makers, so the whole thing was very efficient. I think it was the right product at the right time. We got the right marketing, got the right sales. The price put the wind behind it as well; at its peak, that product was worth $1.6bn.

BTCE took off, then we brought in ZETH, which was the Ethereum version. Then we drilled down to 14 crypto products. I would say the interest is very much at a peak at this stage.

SV: What prompted the decision to offer 14 different crypto ETCs? What's the rationale behind that? Is that a sign of where you think the market and investors are heading in the long term?

HM: When you get into beta products, with no active management or IP behind them, the scale of the platform is important. When a client

says, “I want to shift some of my money out of Bitcoin into Ethereum,” you need to have an Ethereum product, because you want to keep that client within the fold.

Having a robust platform with depth of options is really important, especially when you go and talk to the gatekeepers who might be looking to offer our products to their organisation. Some banks or wealth managers will say, “None of our advisors or wealth managers can use your product until it’s onboarded properly,” and they’ll do their due diligence.

They’re more likely to make a positive decision if you’ve got an extensive platform. What they don’t want to do is have to go to five different issuers to get that offering.

Between ourselves and ETC Group, we wanted to be the most comprehensive offering that’s out there. We felt we could use this as a building block within that structure. Typically, any index products that are out there include at least 10 cryptocurrencies. That was also part of the rationale.

I’d be surprised if we don’t end up with 20, 30, 40 products. And you know, the demand for crypto comes in waves, doesn’t it?

We’ve had that wave, and it’s subsided for now, but you know it’ll come back at some point soon. Having some track record, and having the products out there for a while, is quite important. An amazing fact I often mention is that 80% of ETF assets under management are in funds over 15 years old. That says a lot!

CHAPTER 23

Understanding the Role of Bitcoin and Crypto in a Portfolio

An interview with Lawrence Wintermeyer, chair of GBBC Digital Finance

Lawrence Wintermeyer is a leader in the digital assets world, having worked with organisations at all levels, from start-ups to global institutions. His expertise and insight are unrivalled when it comes to markets, investments and the digital assets space.

As Lawrence is a proponent of ethical, sustainable, transparent finance utilising our digital world for fairer and equitable markets, our conversation started by looking at what digital assets and crypto mean to people.

Naturally, that meant we gravitated towards a discussion around portfolios, portfolio construction, how crypto plays a role in people's investments and how misconceptions of the market aren't doing anyone any favours.

Our discussion took place a matter of weeks before the collapse of mega-exchange FTX. Had we spoken after the event, we would have factored it into our discussion on the regulation of exchanges and risk in this market.

The timing of our conversation also highlights the importance of Lawrence's key message when it comes to exchanges, as you'll soon discover.

Later we discussed the huge potential that DeFi offers TradFi institutions willing to adopt it. Considering my discussions with Luc and Ben from Fidelity International, Lawrence's views not only made perfect sense, they further highlighted the direction the crypto industry is heading when it comes to institutional adoption.

My discussion with Lawrence is straight shooting, to the point and contains wonderful insights from a true thought-leader in the crypto and digital assets space.

Sam Volkering: Lawrence, let's say I'm a person who's heard about cryptocurrency but can't quite bring myself to take that first step. I hear so many different things, I don't know what to believe and I'm scared.

If I were in that position, how should I be thinking about cryptocurrencies?

Lawrence Wintermeyer: I would first ask whether you already do any trading or investment, and whether you have a `bucket of high-risk capital' for trading and investment, that you accept you might lose. If you don't already do these things, then don't invest in cryptocurrency – because you've got a lot of research work to do first.

Crypto is in the *high-risk* bucket of potential investment products. Your low-risk bucket contains your cash, savings and guaranteed deposits, and term deposits. Once you've managed that bucket, the next most important thing is likely your house mortgage. Then comes your pension and unit trusts or mutual fund investments, which will extend from securities: stocks, shares and bonds, possibly into property, commodities and other higher risk assets.

SV: Do you think crypto will remain in the high-risk bucket for quite some time? Or do you think over time it gets easier for people to understand and invest appropriately?

LW: Yes. Put crypto in the same high-risk bucket as stocks or better, commodities, and ask yourself whether high-risk investing or trading is for you. Are you an investor for the long term, or a trader for the short term? Do you trade or speculate currencies, CFDs, commodities or options - instruments with high volatility that use leverage? And if you can answer yes to any of these, then crypto may be a category that's worth looking at. But its volatility often looks more like commodities and derivatives than stocks and shares.

I know this may not be helpful for your average investor, but we could be in the 1980s or 1990s talking about stock market investing. I would encourage it, but I would encourage it for people who are interested in it and for people who have money or can afford losses as they learn to accumulate.

Many people don't like that answer. Most young people don't want to hear this. But that's my view.

SV: Putting crypto in that high-risk bucket changes the dynamic of a portfolio. There are elements of a portfolio, like cash and term deposits, that are *supposed* to be the safer bit. But in late 2022, a period of high inflation where the value of cash is eroding at double digit pace, the whole portfolio suddenly has a different risk profile than it did 20 years ago.

Does that change the way that people should think about crypto in their portfolio and their allocation to high-risk assets? If they've invested in stocks and high-risk assets before, does the current environment change the mix of investments?

LW: I think the point you've just raised is the most important one. But again, you need to be an investor, interested in long-term performance. You may be a retail investor, but you need to be interested in asset diversification if you want to accumulate, in a risk-adjusted manner over the long term, to ensure you are delivering acceptable returns and that you have protection from market shocks and 'black swan' events, especially as you near retirement.

To do that, you should have a diversified portfolio, because any one category of assets has some degree of volatility that you want to smooth out over the longer term.

If you are an active investor and have a portfolio, what you need to consider is how government debt and cash are performing. In a high-inflation environment, your savings rates are going to be higher than they are in a low inflation environment, but your cash is going to be worth less.

You need to do discounted cash flows if you want to work out the net effect of the value of your future money. In the high-risk category of a diversified portfolio, bitcoin certainly promises to be one of the tools you can consider hedging against both inflation and the erosion of the government debt part of your portfolio.

I think every long-term investor should be interested in bitcoin, and I will leave out ether and other cryptocurrencies here and specifically

focus on bitcoin. It can be terribly boring and technical, but investors should be interested in understanding it enough to either do self-investment, find a bitcoin fund, or find a qualified adviser to support them.

Making risk-adjusted money is all about making sure that you've accumulated a decent pension when you retire, especially as we are all living longer than previous generations, and a diversified portfolio is a tool for risk-adjusting that accumulation to help deliver a stable annual return.

SV: On the inflation aspect of things, for a little while now bitcoin has built up a narrative as a great inflation hedge. However, it's always been tied to consumer price inflation [CPI]. Looking at bitcoin relative to CPI, it doesn't appear to have held up as an inflation hedge.

Do you think the narrative around bitcoin as a CPI inflation hedge has been debunked? Or do you think the narrative was wrong to start with? That it's not a CPI inflation hedge, but it's a hedge against *debt inflation* in the economy?

LW: In my view, it's too early to tell. I would not be the arbiter of what is or what isn't technical or correct in that argument. Let the market work it out. But for an asset allocator or manager, bitcoin is a hedge against central bank behaviour, full stop.

I think we need to wait and see. Also forget about the fiat conversion argument. One bitcoin equals one bitcoin, full stop. You can convert to whatever you want, whether that's dollars, pounds, euros; you're always going to try to monetise it in fiat.

SV: The elegance and beauty of bitcoin is the certainty around the mathematics, around the code, around the supply. And in a world of extreme uncertainty, it provides a lot of certainty.

I echo everything you've just said, and particularly from a retail investor's perspective about asset allocation; but in a smart, appropriate, diversified way.

As for bitcoin as a hedge: I see it more as a hedge against *uncertainty*.

Thinking about it in that sense, if you're a treasury manager or a CFO, and you are trying to figure out how to manage your company's portfolio, does the decision-making approach to bitcoin change, or do you apply the same principles you would if you were a retail investor?

LW: I think different people have different jobs to do. A treasurer has a different job to a retail investor. The ultimate job of a retail investor is to accumulate in a long-term risk-adjusted manner. It's an accumulation strategy for growing your wealth.

What are you accumulating for? Your car, your holidays, your wedding, your house, your children and their education, your stash – perhaps all those things. It doesn't have to be an endowment or a pension, but it's for your future life events.

The point about accumulation is, if you look at most statistics on any normal distribution of retail investors in the Western world, people have cash flows that are limited to one or two or three months. The utility of what you and I are talking about here, I would argue, needs to be put into that perspective.

I think you're back to Clay Christensen's Jobs-to-be-Done theory, and what job does it do? Clay is saying you don't buy a drill because you need a drill, you buy a drill because you need a hole.

So a treasury manager has a different job to do than the retail investor, as does a pension fund manager. A pension manager certainly is interested in hedging and capital growth, but they're interested in yield because they have liabilities to meet.

Things like DeFi theoretically are of more interest to a pension manager with liabilities, simply because there is a yield associated with it.

I think it's horses for courses, to the extent that you need to look at the job that needs to be done.

But I would agree with your point that, in any diversified portfolio, bitcoin is a hedge against (central bank) uncertainty. In this case, bitcoin was created from the uncertainty brought on by the financial

crisis of 2008 and has become a popular asset class during the subsequent money-printing frenzy.

Ether, and other utility tokens, have different jobs to do than bitcoin and are used as an 'ecosystem currency' for developers and ecosystem actors. Stablecoins like USDC and USDT have a job to do primarily as on/off ramps to the crypto ecosystem from fiat, though there is a big focus on stablecoins in the emerging 'global digital payments' space.

But yes, all professional money managers, investors and traders should look at the role bitcoin can play.

SV: I agree it is very much horses for courses, and whatever function you have – whether you're investing for yourself or for a pension fund or hedge fund – it's about finding the right asset to fulfil the job.

You mentioned DeFi as well. There's obviously a lot of criticism around DeFi. It's very early stage, there's a lot of experimentation, there's a lot of risk.

Do you think that over time DeFi will mature to a point where it becomes more open, and easier for organisations and individuals to dip their toe in?

LW: Yes. DeFi right now looks like a predominantly non-retail instrument to me as it involves collateralising digital assets and borrowing through smart contracts.

Financial institutions like JP Morgan and Goldman Sachs are looking to DeFi as one of the biggest promise areas for the future – wholesale banking with smart contracts and automated market making. Wholesale bankers see the benefits of DeFi in both public and private consensus models.

In traditional finance, we already have KYC and AML standards, we have margin-lending standards, we've standards around algorithmic finance and high-frequency trading from the International Organization of Securities Commissions. We've got AI principles coming out of the OECD.

The not-for-profit members association I chair, GBBC Digital Finance, delivered recommendations for the DeFi community to start adopting those standards. DeFi will be scrutinised by regulators and lawmakers – to many observers DeFi looks like an unlimited liability mutual structure. Getting greater legal certainty around this, along with getting regulators on-chain as participants in the DeFi ecosystems, is a big part of efforts.

From my perspective, DeFi looks unsuitable for retail investors at this point. Could it become suitable? Possibly in a very specialised portfolio. But for anyone looking for yield, an environment that had certainty around the DAO would make it more institutionally acceptable, which is where the banking industry is going.

Using DeFi for yield is a great strategy for wealth and asset managers. It has the making of a great play but has the better part of three-to-five years to mature before it becomes mainstream in wholesale markets.

SV: It seems that, over the last decade, the more widespread and known crypto gets, the more and more opposition it receives.

That may be because of central powers of authority like central banks and governments pushing back harder, although I get the feeling they say one thing and perhaps do another.

But can public and centralised authorities' perceptions change for the better? Can we get to a point soon where everyone can look at crypto like they look at TradFi?

LW: I understand what regulators are saying, it is a very volatile (and seemingly speculative) asset class, and the market infrastructure is still maturing. If you're a central exchange, you need to be regulated so that you can provide assurances and cover the liability if your investors' assets are stolen.

If you're going operate in the retail space, those assurance and protections are there for consumers – even though they might look onerous to tech people. The minute retail investor assets disappear,

you're ripping off mom and pop, and that does not go down well with anyone: government, regulators, or industry.

I think the industry does have a way to go to provide assurances, and then we couch it into Web3, which is unfortunately introducing another technical term, but it's the next generation of digital financial market infrastructure that needs to better solve for these problems.

Until we better address digital identity and digital security in Web3, the technology doesn't look scalable to me.

SV: Finally, coming back to what we were talking about around building a portfolio, do you think crypto will ultimately become a more important part of people's portfolios? And do you think it will become a more important part of institutions' product and services offerings and how they manage their own organisations internally?

LW: Well, yes, absolutely.

A big focus in my community is on digital assets and the tokenisation of real world assets: stocks, bonds, property, commodities, etc. I think digital assets beyond native cryptocurrencies, like bitcoin, will become important to people because it will be easier for them to access a range of assets they can't access right now, either directly or through their financial advisers, fund managers, portfolio managers or pension managers.

To do that, regardless of how risky asset classes or specific assets are, 'the system' must provide the requisite assurance for investors, so they're not going to lose their money through hacking, scams or poor digital asset custody.

Whether that's through KYC, provenance, identity or granting the right licenses to firms who are holding your crypto or digital assets in custody – they need to take responsibility for them.

We have those safeguards built into the financial system, and it still blows up regularly. Look at the 2008 financial crisis, it was a highly regulated global market with sophisticated players and the very

questionable practices on behalf of the banks and rating agencies brough the global financial system to the brink of mass failure.

A minimum number of best practice and regulatory assurances should be in place before firms are given access to operate in the financial system, especially those offering products to retail investors. And then, there must be a degree of global coordination of regulators – digital is borderless, having regulations in one country but nor adopting them in the country next door will leader to regulatory arbitrage, and consumers will still be vulnerable to bad market actors.

If people want to access and trade high-risk assets, I would encourage them to learn how to trade and invest those assets. But if you don't have savings or a mortgage, or money that you must accept you might lose, I'd focus on those two things first before I go speculate in any market.

Many young people don't listen to that view or like the answer. Often young people don't care what I have to say or what a financial adviser might offer. I understand that. When I was young, I didn't like to listen to anybody talking about long-term investing and chose to trade volatile assets – you need to be prepared to learn from losing before you learn how to win.

I love speculation, but you need to have money to speculate with. A lot of young folks and retail investors don't have money to speculate with. But, if you want to do it and you want to try it, it's also better learning about it when you're younger and have fewer commitments. Just make sure you can afford to lose the money and that you spend time learning about the asset classes that you want to speculate in.

As for the general utility of crypto and digital assets, I think that there's a great utility in digital assets. Though for many crypto assets, it's still too early to tell.

I would say that bitcoin offers a great promise on your hedge against uncertainty concept. Because of the way that it's designed, it makes sense to me. It is an elegant design that makes a good hedge against uncertainty.

How bitcoin will play a role in the global payment system is a bit difficult to work out.

In my own community, a few years ago everyone was saying, "Bitcoin wasn't intended for the payment system, it was intended as a sovereign hedge." And I thought, have you read Satoshi's whitepaper? I don't ever recall reading anything about a sovereign hedge. I recall reading about a digital payment system and reducing the probability of a digital double spend.

Ultimately, the market will be the arbiter of what bitcoin is or isn't.

If you are a retail investor, this is an asset class that's interesting. However, you need to read up and do your research and learning. Make sure you're prepared to risk money and lose it, just as you would if you were going to go on to any of your favourite trading platforms for currencies, stocks, CFD's, currencies, options, and derivatives.

CONCLUSION

Fourteen years.

Everything contained within this book has come about in just 14 years.

It's the blink of an eye when you compare it to other technologies, industries and market opportunities.

It's said a lot in this industry, but it's true: we are still early. You are still early. If you zoom out at the entire crypto story so far, we are only in the first couple of chapters. Much more is to play out over not just in our lifetimes, but many generations to come.

Having taken the time to read through these chapters and absorb and analyse the data within, you will hopefully have developed a deeper understanding of what crypto is all about.

You might draw some of the same conclusions as I have from the direction this industry is heading. I hope that you also draw some conclusions that differ from mine – ones that lead you to make the decisions that are right for you.

Giving access to credible information about the state of the market and the industry is what this book has been about ever since its inception.

Armed with credible, quality information, we want to spur independent critical thinking about this industry. We want to highlight the opportunities it provides, and empower anyone from any experience level – within or external to crypto – to take further steps into it all.

One of the great aspects of this industry is that information is

everywhere. Sometimes the sheer volume of that information can be overwhelming. Some of it is not necessarily reliable or credible.

But a lot of it is, and I hope that regardless of your experience level, you take the information from this book and use it as a launchpad into further, deeper research and experimentation in crypto.

The tools you need to build up experience and confidence are right there at your fingertips. The open-source nature of the industry means you can test, try and experiment at your own pace, as much or as little as you like.

Maybe that will only be sending transactions and storing your crypto on a hardware wallet. Or maybe you'll try more advanced techniques, connecting with DeFi and figuring out yield-generation strategies.

The crypto world is your oyster.

With the information we've provided here, you can practise some of the more basic principles of common-sense operation within crypto, apply some risk mitigation strategies, build your portfolio and map out your ongoing crypto journey.

I'd also encourage you to get out into the industry in person. There are loads of great conferences, events and meetups which are all very open and welcoming to new initiates. Even though views can get a little tribal from time to time, there is a very warm and welcoming community within the industry.

The crypto journey is wild, experimental, challenging, exciting, interesting, a little risky, full of great people, incredible eye-opening innovation and a ton of fun. It's worth every effort and every minute, hour and day you put in.

The crypto revolution is here to stay, and whether your journey is just beginning or going to new heights, enjoy it for everything it's worth.

Thanks for reading.

Sam

ABOUT OUR PARTNERS

About Fidelity International

Fidelity International provides world-class investment solutions and retirement expertise to institutions, individuals and their advisers – to help our clients build better futures for themselves and generations to come. As a private company we think generationally and invest for the long term. Helping clients to save for retirement and other long-term investing objectives has been at the core of our business for over 50 years. We are responsible for total client assets of $663bn from over 2.8 million clients across the UK, Continental Europe and Asia Pacific.

Our Digital Assets Business

A core focus at Fidelity International is responding to the evolving needs of our clients. As we continue to see growing interest in digital assets, Fidelity has been actively looking to bring digital asset solutions to institutional clients. Fidelity is well positioned to act as both a guide and gateway for institutional clients to access digital asset investing.

By designing and delivering investment solutions, innovative next-generation products, a robust operating model backed by in-depth research and curated technology providers, we can help our

institutional clients securely gain exposure to digital assets and unlock new perspectives on the future of investments by leveraging decades of experience.

Our aim is to put ourselves in the front seat of evolution, engage with the next generation of investors and shape an industry exploring decentralisation to offer more value to end-users and bridge the gap between TradFi and DeFi.

Southbank Investment Research is a network of free thinkers that comprises some of the finest financial minds in the UK today. They are not money managers. They don't take advertising and are beholden to none.

Southbank is one of the UK's leading independent financial publishers. The company produces a range of investment advisories, including *The Fleet Street Letter* – Britain's longest-running financial newsletter. There is no 'house view', nor any party lines to be toed.

The editors have only one axe to grind. That is that the individual should be empowered to control their own financial destiny. As such, Southbank is a 'marketplace of ideas'. Nothing is off the table – except for 'groupthink'.

Groupthink risks letting other people tell you what you can and can't think. It leads to emotional, group-led investing, instead of rational, individual action. Groupthink is the reason most people are incapable of buying at the bottom and selling at the top. In fact, it's why they do the opposite. They ignore assets when they're cheap, hated and ignored, and buy them when they're at the top, when everyone else is buying.

Southbank aims to make plain to readers the opportunities about investing and wealth protection that the mainstream is NOT showing. Since 2015, Southbank's editors have been investigating everything from gold and precious metals… to commodities and cryptocurrencies… to energy (be it fossil fuel, renewable or nuclear)… to stock opportunities in cybersecurity, computer gaming, AI, quantum computing and all things tech, including biotech.

You will also find them writing about trading strategies, value investing

and income harvesting. Investing is about making your money work harder for you. By investing shrewdly, you give yourself the best chance of living life on your own terms.

There are lots of ways to do that. Whether you are a value investor – buying low and selling high, a momentum investor or a trader – buying high and selling higher, whether you specialise in a particular sector or industry and look for the shares with the best potential to rise this year, or if you are completely new to investing, you'll find experts and publications that can help at Southbank Investment Research.

So, whether you're investing for the long term, want to trade for a sizeable return in the short to medium term or require an immediate income, Southbank has you covered.

You can check out Southbank Investment Research for yourself at its website: www.southbankresearch.com.

TradeStation CRYPTO

TradeStation Crypto, Inc. is a self-clearing cryptocurrency broker offering crypto trading and investment accounts within a deep ecosystem that allows traders to quickly move between asset classes. Unlike typical crypto exchanges, the TradeStation platform aggregates multiple pools of liquidity in a consolidated data feed and combines that with an intelligent order routing system which aims to give clients improved visibility and trade execution.

TradeStation Crypto is a subsidiary of TradeStation Group, Inc. which provides online brokerage and investment education services to self-directed traders, as well as a variety of business and API solutions, primarily for finance and technology firms. TradeStation has offered clients access to markets since 1996, when TradeStation Securities, Inc. became an SEC-registered broker-dealer. TradeStation Securities offers equites, options and futures to self-directed traders. Prior to that, the company focused mostly on building trading and market analysis software. TradeStation is a global company with more than 600 employees working in the United States, United Kingdom, and Costa Rica.

As part of a firm with 40 years of experience, TradeStation Crypto is built on the same foundation of trust that supports all of the asset classes offered by TradeStation. TradeStation Crypto started operations in 2019 and applied the same client protection standards used in the broader business, including robust governance, regulatory compliance, dedicated risk management, and independent audits.

TradeStation Crypto is designed to help traders access cryptocurrency and is built to handle the ups and downs of the growing industry. TradeStation Crypto holds client assets on a 1:1 basis and does not lend or use those assets as collateral for loans. Multi-signature wallet technology with risk-based layered processes and controls are used

to safeguard client assets. TradeStation companies do not engage in proprietary trading.

Past performance, whether actual or indicated by historical tests of strategies, is no guarantee of future performance or success. There is a possibility that you may sustain a loss equal to or greater than your entire investment regardless of which asset class you trade (equities, options, futures or cryptocurrencies); therefore, you should not invest or risk money that you cannot afford to lose. Online trading is not suitable for all investors. View www.theocc.com/Company-Information/Documents-and-Archives/Options-Disclosure-Document. Before trading any asset class, customers must read the relevant risk disclosure statements on www.tradestation.com/important-information. System access and trade placement and execution may be delayed or fail due to market volatility and volume, quote delays, system and software errors, Internet traffic, outages and other factors.

See uploads.tradestation.com/uploads/investment-and-trading-disclosures-booklet-cryptocurrencies.pdf for more information on investing and trading in cryptocurrencies.

GLOSSARY

Bitcoin: a decentralised digital currency that uses cryptography to secure transactions and operates without a central authority. It is often referred to as a cryptocurrency.

Bitcoin maxis: a person who believes that bitcoin is the only true and legitimate cryptocurrency and that all other cryptocurrencies are inferior and will ultimately fail in comparison.

Bitcointalk: a forum website dedicated to the discussion of bitcoin and other cryptocurrencies. It was created in 2009 by Satoshi Nakamoto, the pseudonym used by the unknown person or group that created Bitcoin.

Block: a collection of transactions that have been verified and recorded. Each block contains a unique code called a 'hash' that links it to the previous block, creating a chain of blocks. This chain of blocks is a permanent and unchangeable record of all the transactions in the blockchain.

Blockchain: a digital ledger of transactions that uses cryptography to secure and record transactions in a decentralised and distributed way. It is the technology that underlies bitcoin and other cryptocurrencies.

Blockchain fork: a split in a blockchain network, caused by protocol changes or disagreements among users. There are two types: soft forks and hard forks, with the latter being non-backwards compatible.

Buidl: a term that originated in the cryptocurrency community as a play on the word 'hodl' and used to encourage people to focus on building

and developing projects and products, rather than just buying and holding onto cryptocurrency.

CBDC: a Central Bank Digital Currency. A digital version of a country's fiat currency that is issued and controlled by the country's central bank. CBDCs are similar to traditional bank deposits, but they are in digital form and can be used for digital transactions.

CeFi: centralised finance. This refers to traditional financial systems and institutions, such as banks and other financial intermediaries, that are centralised and regulated by government authorities.

Centralised Exchange (CEX): a type of cryptocurrency exchange where users deposit their funds into the exchange's own accounts and trade with other users on the platform. The exchange acts as an intermediary, holding the user's funds and facilitating trades.

Cryptocurrency: a digital or virtual currency that uses cryptography for security and operates independently of a central bank. Cryptocurrency transactions are recorded on a public digital ledger called a blockchain.

Cryptocurrency mining: the process of adding new blocks to a blockchain by solving complex mathematical problems. Miners use specialised software and hardware to perform these calculations and are rewarded with new coins and transaction fees for their efforts. This process is used to secure and maintain the network.

Decentralised exchange (DEX): a type of cryptocurrency exchange that allows users to trade crypto directly with one another, without the need for an intermediary. DEXs are built on blockchain technology and use smart contracts to facilitate trades. Unlike CEXs, DEXs do not hold the user's funds. Instead, users retain control of their own private keys.

DeFi: decentralised finance. A new financial ecosystem built on blockchain technology that allows for trustless and decentralised financial services, such as lending, borrowing, trading and insurance. DeFi aims to provide an open, transparent and accessible financial system that is not controlled by any centralised authority.

ERC-20: a technical standard for smart contracts on the Ethereum blockchain for implementing tokens. It defines a common set of rules for Ethereum tokens to follow, allowing for interoperability between different tokens.

FOMO: fear of missing out. A term used to describe the feeling of anxiety or fear that a person may experience when they believe they are missing out on an opportunity, particularly in the context of investments.

Hodl: a term that originated in the cryptocurrency community and used to describe the strategy of holding onto an asset, such as a coin or token, even during times of market volatility or uncertainty. The term was popularised in 2013 on Bitcointalk, when a user drunkenly posted how he would never sell his bitcoin, even if the market was crashing, and accidentally typed "I AM HODLING" instead of "I AM HOLDING".

Initial Coin Offering (ICO): a method of fundraising in which a new cryptocurrency project sells a portion of its tokens to early backers in exchange for funding. It is used by start-ups to raise funds by issuing a new cryptocurrency or token to the public. However, it is associated with a high level of risk and lack of regulation.

Market cap (crypto): the total value of all the coins or tokens of a particular cryptocurrency in circulation. It is calculated by multiplying the total number of coins or tokens in circulation by the current market price of a single coin or token.

Metaverse: a term used to describe a virtual world or universe that exists entirely in the digital realm. It is a collective virtual shared space, which can include elements of both virtual and mixed (or augmented) reality.

NFT: non-fungible token. A type of digital asset that represents ownership of a unique item or piece of content, such as a digital artwork, collectible or in-game item. NFTs are built on blockchain

technology, which allows for the creation of unique, one-of-a-kind digital assets that cannot be replicated or replaced.

Peer-to-peer (P2P): a form of communication and transacting between two parties without intermediaries. For example if you are a 'peer' on the network and we conduct a transaction without intermediaries, we have created a peer-to-peer transaction.

Proof-of-Stake (PoS): a consensus mechanism used by some blockchain networks to achieve distributed consensus and validate transactions. PoS uses the stake (ownership) of the validators (also called 'stakers') to achieve consensus.

Proof-of-Work (PoW): a consensus mechanism used by some blockchain networks to achieve distributed consensus and validate transactions. In PoW, the network's users, known as 'miners', use their computational power to solve complex mathematical puzzles.

Pump-and-dump (P&D): intentional inflation of the price of a crypto token by an organised group, to lure unaware investors to buy the token. This creates FOMO and helps drive the price up further. As the price rises, the organised group 'dumps' the token into the market, exiting for large gains as the market crashes for the unsuspecting buyers.

Satoshi (sat): the smallest denomination of a bitcoin, named after Satoshi Nakamoto (the pseudonym used by the unknown creator of Bitcoin). The value of a satoshi can be calculated by multiplying the value of a bitcoin by 0.00000001. For example, if the current value of bitcoin is $40,000, one satoshi would be worth 0.00000001 × 40,000 = $0.0004.

Satoshi Nakamoto: the pseudonym used by the unknown person or group of people who created Bitcoin and authored the original Bitcoin whitepaper in 2008.

Self-custody: the practice of individuals or organisations holding and managing their own digital assets, rather than trusting a third party such as an exchange or custodian to do so on their behalf. This means

that the user has full control over their private keys, which are used to access and manage their digital assets.

Smart contract: a self-executing contract with the terms of the agreement written into code. It is a program that runs on a blockchain network and is stored on the network's nodes.

Stablecoin: a type of cryptocurrency that is designed to maintain a stable value, typically by being pegged to a fiat currency or other stable asset such as gold. The main objective of a stablecoin is to reduce the volatility that is often associated with other cryptocurrencies.

TradFi: traditional finance. The traditional financial system and the institutions that operate within it, such as banks, securities firms and insurance companies. It includes all financial services and products that are provided by these institutions

Whitepaper: a detailed document that provides information about a new technology, product or service. In the context of cryptocurrency and blockchain, it typically provides a technical overview of a new project, including its goals, features and use cases, as well as information about the team, token sale and governance structure.

Yield: in the context of cryptocurrency, yield refers to the returns earned from holding or staking a particular coin or token. This can include interest earned from lending or borrowing using decentralised lending platforms, or rewards earned from holding or staking a coin.

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With a background in traditional investment markets and advice, in 2010 he discovered Bitcoin, changing the trajectory of his career.

He launched pioneering crypto research and advisory services into the Australian and British markets in 2013, helping investors understand, invest and participate in the crypto markets.

His debut book, *Crypto Revolution: Bitcoin, Cryptocurrencies and The Future of Money* (2017) has reached over 40,000 investors worldwide.

He's appeared on TV, radio and presented at conferences across the world as a leading authority on all aspects of the fast-moving crypto industry.