

# **TECTONIC SHIFTS**

How Blockchain Technology Changes Everything

**Bryant D Nielson**

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**TECTONIC SHIFTS:**

**How Blockchain Technology Changes Everything**

**by Bryant D Nielson**

# Dedication



**T**oo often, we embark on a journey, not knowing what or who will make it worthwhile. I dedicate this book to my lovely wife. Without her support, this would not have been possible.

A shoutout to my two sons, who have shown me the strength of character. Their will to overcome adversity and their unhindered dedication to pursue one's goals gave me the clarity to reach my goals.

# Acknowledgment



One individual never accomplishes the process of creating a book. It requires a team effort where people are fascinated with the topic and come together to make it a reality. Much of this effort would not have been possible without the following contributions of these individuals: Alisha Sanders for editing a number of the book's drafts, for Sana Naz for the research she contributed to the book.

To W. Scott Stornetta, who I had the pleasure of interviewing for over two hours. To find myself in the presence of one of the two men who imagined this transformative technology was inspiring. To Gerard Dache, watching him tirelessly push forward to promote blockchain technology through both booms and busts.

Surprisingly Todd Green, who approached me at a Blockchain conference in London with a unique idea. He was the one who suggested that a book on the blockchain might be interesting. It all took place because of his continuous initial dedication and incessant reaching out to me in the initial days. There were so many times I dismissed him because I was a nobody in the nascent technology scene. While I failed to write this book when he first proposed it, his queries were the impetus to write something more than just another book about blockchain.

## About the Author



**B**ryant Nielson is a trailblazer in the dynamic world of blockchain and cryptocurrency. He is a visionary leader and a highly respected authority in the sphere of digital transformation. His expertise spans an impressive range of roles and achievements, each contributing to his status as an innovative thought leader in the industry.

Bryant is the distinguished founder of The Blockchain Academy, a pioneering institution with operations in both Washington DC and Napa, California. The Blockchain Academy has become a beacon of knowledge and a hub for aspiring blockchain professionals, symbolizing Bryant's commitment to education and the democratization of this groundbreaking technology.

His leadership role extended further when he took up the mantle as Chairman of the Government Blockchain Association in Washington, DC. In this position, Bryant led strategic initiatives aimed at fostering greater collaboration between public entities and the blockchain industry, guiding policies and practices to help shape the landscape of blockchain implementation within governmental structures.

Continuing his journey in leading the integration and advancement of blockchain technology, Bryant has taken on the role of CEO for the Web3 Certification Board based in Washington DC. In this capacity, he is steering the development of web3 standards and certifications, working towards a future where the transformative potential of

blockchain technology is fully realized and universally accessible.

Bryant's impressive career trajectory also includes tenure as Director of Training for Bullish Global, a global crypto exchange. His ability to bring clarity to complex topics was equally evident in his role as the Director of Training for Block.one, the EOSIO blockchain protocol developer.

An accomplished writer, Bryant has authored hundreds of insightful articles on topics ranging from training and developer relations to certifications and personal motivation. His pieces serve as a valuable resource for readers, reflecting his deep understanding of the blockchain industry and his ability to articulate intricate concepts with remarkable clarity.

Adding to his credentials, Bryant has also achieved academic excellence, recently graduating with a Master's degree in Blockchain and Digital Currency from the University of Nicosia. This globally recognized institution is well known for its advanced programs in digital currencies, further enhancing Bryant's understanding of this disruptive technology.

Bryant currently resides in Arlington, Virginia, with his wife. His journey, driven by relentless curiosity and a passion for innovation, inspires those interested in the intersection of technology, business, and society. As he forges ahead in his exploration of blockchain technology, his insightful contributions continue to impact the next generation of blockchain enthusiasts and innovators.

# Foreword



**A**s we stand on the precipice of a technological revolution that will undoubtedly reverberate across industries, economies, and societies, I am honored to introduce you to this critical work, "TECTONIC SHIFTS - How Blockchain Technology Changes Everything."

Written by an individual whose understanding of the blockchain landscape is surpassed only by his passion for teaching and sharing knowledge, this book is both a compass and a guide to the expansive world of blockchain technology. Bryant Nielson, whose credentials speak volumes - Chairman of the Board for the Government Blockchain Association, Director of Training for Bullish Global and Block.one, the Executive Director of The Blockchain Academy - brings a unique perspective to the table, a blend of the visionary and the practical that is rarely seen in the sphere of technological advancements.

I had the pleasure of first meeting Bryant in 2017, a period that can rightly be called by some the early days of blockchain. We found ourselves on the same journey, driven by the same mission - to expand the awareness and adoption of blockchain technology by governments worldwide. What started as a shared interest soon transformed into a partnership that transcended borders and time zones.

This book, in many ways, is a testament to that journey. It is a treasure trove of insights, hard-earned lessons, and actionable strategies meticulously collected and curated over the years. It is designed to educate you about blockchain

technology's intricacies and empower you to leverage its potential for your business.

"Tectonic Shifts" is not just about the technicalities of blockchain. It delves into the heart of the subject, exploring the philosophical underpinnings of decentralized technology and its transformative potential. It dissects the potential of blockchain technology to disrupt the status quo, enable new business models, revolutionize economies, and democratize access to resources.

At the same time, Bryant maintains a playful, engaging tone, making even the most complex concepts digestible and enjoyable. This book is not just for the tech-savvy or the blockchain enthusiast. It is for anyone who dares to dream of a future shaped by innovation, anyone ready to embrace the tectonic shifts brought about by blockchain technology.

As you embark on this enlightening journey through "Tectonic Shifts - How Blockchain Technology Changes Everything," I would like to offer some advice to help you digest the content and prepare you for your journey with blockchain technology.

**Keep an Open Mind.** With its radical potential, blockchain technology requires an open and innovative mindset. While it's essential to grasp the technical aspects, also focus on understanding the transformative potential of this technology on your business and society at large.

**Take Time to Reflect.** Each chapter in this book offers insights that will require reflection. Don't rush through the pages. Take time to digest the content and think about how the discussed concepts relate to your current business processes and future aspirations.

**Engage in Active Learning.** Consider the book as a conversation between you and the author. Question the ideas presented, make notes, and formulate your thoughts. This

engagement will help deepen your understanding and retention.

**Think Long-Term.** Blockchain technology, though evolving rapidly, is a long-term play. As you strategize for your business, think about how blockchain can shape your company's future and not just solve immediate challenges.

**Start Small and Scale Gradually.** When implementing blockchain technology, it's okay to start small. Begin with pilot projects or specific use cases before scaling to broader applications. This approach will help manage risks and allow you to learn and iterate along the way.

**Embrace Collaboration.** Blockchain is about decentralized networks and collaboration. Engage with stakeholders, including employees, customers, partners, and competitors. Their perspectives can provide invaluable insights.

**Stay Curious and Keep Learning:** The blockchain landscape is evolving rapidly. Stay updated with recent developments, emerging trends, and best practices.

Remember, this journey may appear daunting at first, but with every page you turn and every concept you grasp, you'll come closer to understanding the transformative potential of blockchain technology. As you go along, you'll find that the possibilities are endless, and the barriers you once thought insurmountable are just stepping stones leading you to the next phase of technological evolution.

Embrace the challenges, revel in the learning, and above all, enjoy the journey. The future awaits, and it's more exciting than you could ever imagine.

As we step into this new era, armed with the knowledge and tools provided by this book, let us remember that the journey to understanding and implementing blockchain technology is not a solitary one. It is a collective effort, a global endeavor. Let us embrace this tectonic shift with open minds

and hearts, ready to shape and be shaped by the technology that promises to redefine everything we know.

In "Tectonic Shifts," you will find not only a thorough, comprehensive overview of the present state of blockchain technology but also a roadmap to the future. The author's experience, wisdom, and foresight will guide you through the trials and tribulations, the opportunities and challenges that lie ahead.

Enjoy the journey.

Gerard Dache, Executive Director  
Government Blockchain Association  
Washington, DC, May 25, 2023

# Preface



The world stands on the brink of a tectonic shift. As the digital age matures, a new revolutionary technology has emerged to redefine our understanding of value, trust, and decentralization. This transformative force is known as blockchain technology, and its potential is only just beginning to be understood.

"TECTONIC SHIFTS: How Blockchain Technology Changes Everything" is your guide through the fascinating, complex, and game-changing world of blockchain. Its purpose is to enlighten and empower, demystifying the complex while providing you with a practical understanding of how this technology could impact you, your business, and the wider world.

From its humble beginnings to its futuristic potential, we will trace the story of blockchain. This is not just a tale of technology but of transformation and disruption and of the incredible opportunities that lie ahead for those ready to embrace them. The book is as much about people and society as it is about technology. It's about the pioneers, the innovators, and the visionaries who dare to challenge the status quo and redefine the boundaries of the possible.

Along the way, we will grapple with the challenges that face blockchain's ascendancy and the risks that come hand-in-hand with such a disruptive force. No revolution comes without its battles, and blockchain is no exception. But with challenge comes opportunity, and those who control talent, navigate

change, and embrace creative destruction will find themselves in a position of extraordinary potential.

Whether you are a seasoned tech enthusiast, a business leader eyeing the next competitive edge, or a curious individual interested in understanding the technology shaping our world, this book is for you. It's an invitation to join the dialogue, question, and imagine the unimaginable.

"TECTONIC SHIFTS: How Blockchain Technology Changes Everything" is your companion to the future. It will equip you with the knowledge, insights, and strategies you need to navigate the blockchain revolution.

We find ourselves in a world where digital is not merely an aspect of our lives but the framework within which we live, work and communicate. As digital natives or immigrants, we are witnessing a revolution that is fundamentally altering how we engage with the world around us.

"TECTONIC SHIFTS: How Blockchain Technology Changes Everything" will challenge your existing paradigms and inspire a new perspective on technology, commerce, and digital society. But this book is not just about observing and understanding; it's about participating and creating. It's about preparing for a new world order, where blockchain technology is at the helm, steering us towards unprecedented potential horizons.

We will explore blockchain's practical applications across a diverse range of sectors - from finance to healthcare, from supply chain management to arts and entertainment. We will also delve into the core strategies required to navigate this technological evolution and emerge as leaders in a decentralized economy.

As we turn the pages, we will meet visionaries, skeptics, and innovators, each playing their part in this digital symphony.

We will ask hard questions, face uncomfortable truths, and bask in the glow of opportunities yet to be seized.

"TECTONIC SHIFTS" is not just about blockchain as a technology but about its impact on us as individuals, as businesses, and as a society. It's about our collective journey towards a new paradigm powered by decentralization, transparency, and the reimagining of power structures.

As you navigate through this book, I hope you'll be enlightened, challenged, and inspired. May it help you understand the seismic shift blockchain is creating and find your place and role within it. Together, we will witness the unfolding of a technological revolution that will change everything. Thank you for joining me on this journey. The future is not something that happens to us; it's something we create. Let's create it together.

Ready for the journey? Let's begin.

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# Chapter One – Origin Story



*“Modern technology has become a total phenomenon for civilization, the defining force of a new social order in which efficiency is no longer an option but a necessity, imposed on all human activity.”*

— Jacques Ellul

The world around us is evolving rapidly, and so are our lives. Technology has revolutionized humankind. It has put helpful information and essential resources right at our fingertips. Indeed, the advancements have paved the way for many tangible and intangible multifunctional devices, compact and accessible, to make our everyday lives easier.

One revolutionary trend in the limelight for the last decade is blockchain. Though relatively new to many, you might have heard the phrase ‘Blockchain is the future.’ But have you ever wondered why?

If you are unaware of the relevance of this technology and its implementation in the modern business outlook, then worry no more! You just picked the right book to find out all about it. Let’s start with a basic definition to set a foundational understanding of blockchain.

Blockchain technology is a digitally distributed transaction ledger. It operates on a peer-to-peer domain with identical copies maintained on each network’s members’ computers. All transactions are monitored, recorded, and reviewed by all parties involved. The transactions made are recorded in the

sequence of one after another in a chain of blocks — hence the name “blockchain.”

If you still are confused about its implication in practical life, then let me remind you that blockchain-based networks, distributed ledgers, and decentralized apps are becoming an integral part of our daily lives. In fact, it is what makes up for most of our digital life!

The link between these blocks and their content is protected via cryptography, ensuring previous transactions are not distorted or forged; this allows the possibility to trust the transaction network and the ledger without a central authority.

Blockchain is not the new household buzzword — though due to its influence and sophistication, it is comparable to the Cloud or IoT (Internet of Things). Of course, you can't see or touch either of these innovations, but they have still transformed normal lives.

Today, technology plays a critical role in our day-to-day life. Each year, our internet use for core functions of economies, governments, and societies is expanding due to consistent growth opportunities and steady advancements. For instance, you make transactions through online banking, order food on apps, shop from online stores, and watch your favorite shows online. All of this highlights the intervention of technology in our lives.

When it comes to the success of blockchain, the numbers are pretty staggering. In 2022 alone, there was collective spending of \$2.7 billion on blockchain technology, and the numbers keep growing.

Think of blockchain as a historical fabric underneath the surface, recording everything that happens — every digital transaction, exchange of value, goods, and services, or private data — exactly as it occurs.

When we talk about digital currency, Bitcoin's the first thing that pops up in our minds. Almost a decade ago, Bitcoin emerged as the first cryptocurrency. However, a lot has happened since then. There's a series of events that took place before Bitcoin was launched.

The idea of digital currency or cryptocurrency is not something that just popped out of nowhere. In fact, many attempts were made before the cryptocurrency as we know it was created. However, all the initial attempts had a common problem in their operation — the double-spending problem. For a digital asset to be prevented from getting pirated or counterfeited, it must be used only once.

Let's explore the history before cryptocurrency finally came into existence.

## **RSA/Cryptography**

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Before the advent of RSA cryptography, the main approach to encrypting messages involved using symmetric keys. This is similar to a secret passcode that is known only to the host and the participant of a private meeting. In symmetric key algorithms, the sender and receiver use the same cryptographic keys to encrypt plain text or decrypt ciphered text.

The use of symmetric keys had its limitations and drawbacks. One major problem was the need for both parties to have already shared the secret key before communication could take place. This posed a significant challenge because it required finding a secure way to exchange the key without it being intercepted by anyone else.

Another issue was the scalability problem. With symmetric encryption, if multiple users wanted to communicate privately with each other, they would need to establish a unique secret key for every pair of users. As the number of users increased,

the number of required keys grew exponentially, making managing and sharing all those keys securely impractical.

These challenges were overcome with the introduction of RSA cryptography, an example of asymmetric encryption. Asymmetric encryption uses a pair of mathematically related keys — a public key and a private key. The public key is widely shared, while the private key is kept secret by its owner.

In RSA, anyone can use the public key to encrypt a message, but only the person with the corresponding private key can decrypt it. This solves the key exchange problem because anyone can encrypt a message using the recipient's public key, which can be freely shared. The recipient then uses their private key to decrypt the message, ensuring confidentiality.

Additionally, RSA cryptography offers a solution to the scalability problem. With symmetric encryption, each pair of users needed a unique key, but with RSA, each user has their own key pair. As the number of users increases, the number of required keys grows linearly, making it much more manageable.

In RSA cryptography, the security of the encryption relies on the properties of big prime numbers and a type of math called modular arithmetic. This encryption method has become widely used in the digital age, especially for securing online communication. The reason for its popularity is that it allows for secure and private communication without the need to share a secret key beforehand.

Before RSA, if two parties wanted to communicate securely, they had to know the same secret key to encrypt and decrypt the messages. This created a risk because they had to exchange the key in person, and there was a chance that someone could overhear their conversation and get hold of the key. This meant that the information could be leaked and privacy compromised.

However, with RSA cryptography, this problem is overcome. The encryption process involves using mathematical operations with large prime numbers. This makes it extremely difficult for anyone to decrypt the message without the private key. The beauty of RSA is that the recipient can share their public key with anyone who wants to send them a message. The sender uses this public key to encrypt the message, and only the recipient, who has the corresponding private key, can decrypt and read it.

This way, both parties can communicate securely over the internet without needing to exchange a secret key in person. It reduces the risk of information being intercepted or leaked during the key exchange process, ensuring that communication remains private and confidential. Also, there was a risk of third-party involvement that might be keeping a tab on your personal information. And if the information were leaked to a third party, the whole notion of encryption/decryption would be compromised.

Furthermore, the symmetric key encryption concept is not scalable. If you were sending an encrypted message to more than one recipient, you would need to memorize each secret key for each communication line. This obviously was not the easiest approach and would become inconvenient in the longer run. The need for a better model for cryptocurrency networks to exchange value became urgent.

Finally, a solution to these multiple issues was launched to cope with the situation. The modern system was known as ‘asymmetric encryption,’ better known as ‘public-key cryptography.’ Asymmetric encryption utilizes two keys — the public and private keys.

This meant that a user could now publish a public key, which would be used as his address by anyone who wishes to send him an encrypted message. The corresponding host

would then use the private key to decrypt those messages, which will only be visible and accessible to him.

The asymmetric encryption breakthrough was made possible because of the idea presented by the British mathematician James Ellis in 1970. Ellis described the concept in which encryption and decryption are inverse operations (based on two separate keys).

However, the idea was not fully accomplished until 1977, when three genius minds worked on it. Ron Rivest, Adi Shamir, and Leonard Adleman, three colleagues from MIT, introduced the worked-upon model of asymmetric encryption. It does not come as a surprise now that the name “RSA” is derived from the initials of their surnames — RSA.

Created in 1976 and carried forward in 1977 by these three colleagues, a specific type of public-key cryptography PKC was introduced to the market. Fascinated by the research of Martin Hellman and Whitfield Diffie in 1976, Shamir, Adleman, and Rivest built a cryptosystem that enabled secure message encoding and decoding between the communicating parties.

Here’s an interesting fact for you: as Shamir and Rivest worked to develop unbreakable key systems, each time better than the previous, Adleman tried to break each one, not leaving any stone unturned or loopholes open. It took them 42 trials before the trio finally achieved success.

Unlike previous methods that required securely exchanged keys to cryptograph messages, RSA provided a way for encryption and decryption without requiring both parties to share secret keys. Additionally, RSA could also mark messages using a digital signature and enable originators to create messages intelligible only for the intended recipients. This dissolved any chances for third-party intervention and the potential threat of third-party interception.

## Scott Stornetta/Stuart Haber

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You might be mistaken if you associate Satoshi Nakamoto's Bitcoin paper release of 2008 with the first introduction of blockchain to this world. Undeniably, Bitcoin proved to be one of the groundbreaking innovations that have shaped how we deal with finances and daily transactions. Bitcoin's software release in 2009 paved the way for further technological advancements in the same field and spurred progress in peer-to-peer computing.

However, like many other inventions, Bitcoin was a worked-upon idea on previous research and principles rather than a new invention. Distributed computing did not start in 2008, which is often overlooked.

Moreover, many concepts we now routinely use in blockchain technology result from extensive research done in the early times. Let's look at some of the constituent building blocks of blockchain technology that made it what it is today.

Stuart Haber (a former cryptographer) and W. Scott Stornetta (a physicist) laid the foundation for the blockchain mechanism in 1991. Yes, this was almost two decades before the launch of Bitcoin (paper and software)!

The main idea carried out after extensive research, paperwork, and experimentation behind the cryptographically linking block in append-only data was published in an academic paper. The work primarily focused on timestamping documents, a popular blockchain technology use case even today.

Many authorities utilize the public blockchain system to notarize documents. One can prove the credibility that a certain document existed at a certain time and vision by storing the hash values in a timestamped block on the blockchain. Moreover, it has multiple implementations, from contract arbitration to registering intellectual property rights.

Hashing a certain document or a piece of writing, or a picture is a certain type of encryption. For instance, if you were to hash a picture of famous mountains, it would then appear in the form of numeric, alphabets, or figures instead of the actual picture, which can later be deciphered and restored to its original state.

According to the evaluation proposed by Stornetta and Haber's paper, the hash values of the documents were to be calculated and then stored with a timestamp. Finally, the records are linked (we now refer to this as chaining) in a data structure by including hashes of previous certificates of the records.

Other than using hashes to verify data integrity, the timestamping protocol also works at the disposal of using key signatures to sign submitted data. Sounds familiar, right? Well, yes, this is the exact paradigm with which the subsequent Bitcoin blockchain signs transactions and appends the records to the chain.

In addition to the 'timestamping server' talk in Stornetta and Haber's proposal, the solution also included distributed consensus. As in the case of Bitcoin, a number of signers on board with the same decision would have to come together as a unified body to falsify the ledger. Other participants could verify and sign at the request of data submitters.

Stuart Haber, a world-renowned cryptographer, and his Physicist colleague invented blockchain as a chronological chain of hashed data in 1991. During those times, the use cases for technology were less ambitious than now. In an interview, Stornetta said, "*Stuart and I envisioned the technology as a way to timestamp digital documents to verify their authenticity.*"

In a paper published in *The Journal of Cryptography*, Haber and Stornetta informed the media that the ability to certify when a document was created/last amended is crucial

for resolving important matters, such as intellectual property rights.

Stornetta continued, *“The first thing I want to point out is I co-invented blockchain. Stuart Haber, my colleague, was the crucial cryptographic component. Also, none of us called it the blockchain at the time, even though what we built was this system of interlink blocks that were widely distributed that created an immutable record. It was a chain of blocks distributed, but we didn’t call it a blockchain or a distributed ledger.”*

He added, *“I think it’s important to understand that many, many people following on us and building on that foundation have created all sorts of value on top of that, for which I’m not trying to take any credit. I’m just grateful to have been part of the early stages and laying the foundation.”*

The invention of the blockchain mechanism we use today is to be accredited to Haber and Stornetta, as they were the founding fathers who laid the foundation for blockchain using cryptography.<sup>1</sup>

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## Consensus Models

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Simply put, a consensus model suggests how a bunch of people can unite over a mutual decision in defining its credibility, whether or not it’s true. Blockchain technology has recently emerged as a big wave of potential that can change the face of the world as we know it.

Out of the different protocols, ledger, and cryptography, consensus has been one of the most important pillars imbued with several other options, such as PoW (Proof of Work), PoS (Proof of Stake), and others. Technology enthusiasts are

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<sup>1</sup> <https://coinrivet.com/founding-father-of-blockchain-discusses-satoshi-nakamoto-and-tasting-the-future/>

particularly interested in the topic of consensus models, as they keep working on improvising and perfecting it.

The consensus pillars form a vital consideration for blockchain for several reasons, which are:

Blockchain enables running a transaction in a trustless environment, involving as many participants (or nodes) in the process as possible. However, there needs to be an agreement, a type of consensus among all the participants involved, to conclude and/or process any transaction. Otherwise, the transaction would be restricted in its absence.

Through maintaining consistency across the shared blockchain state, consensus models define the security of the blockchain.

The blockchain is centered on the principle of fault tolerance. Consensus models offer fault tolerance ability to networks, which can differ based on the type of consensus model being used. By ensuring that all the correct members (nodes) participate in producing a value eventually, consensus models ensure the liveness of the network.

If you were to summarize it, blockchain could not fully serve the purpose it has been designed for without consensus models — why? This is because the core of the trust protocol on the network is driven through consensus models. The implementation may vary accordingly with varying consensus models over public or private networks. However, consensus models are essential for blockchain mechanism operation.

They are a critical component of blockchain technology. They are algorithms or protocols that allow all nodes in a decentralized network to agree on the state of the ledger and the validity of transactions. In other words, consensus models enable the network to reach a consensus on a single version of the truth without needing a central authority.

There are several consensus models used in blockchain technology, including:

## **Proof of Work (PoW)**

The Bitcoin blockchain uses a consensus model called Proof of Work (PoW). In this model, nodes in the network compete to solve complex math problems to verify transactions and add new blocks to the blockchain. This process is known as *mining*.

When a new transaction happens, it is shared with the network, and miners start trying to solve a math problem. The problem requires a lot of computing power and involves finding a specific value, called a “nonce,” that, when combined with the transaction data, produces a unique code with specific properties. This code is known as a hash.

Miners use their computers to make many calculations until one of them finds the correct nonce and solves the problem. Then, the miner shares the solution with the network, and other nodes verify it. Once the solution is confirmed, the miner can add a new block to the blockchain with the verified transactions and receive cryptocurrency as a reward, like Bitcoin.

Proof of Work is considered secure because it takes a lot of computing power to solve math problems. This makes it very difficult and resource-intensive for someone to manipulate the blockchain by changing past transactions or adding fake blocks. The security comes from the fact that altering a block would mean redoing the work for all subsequent blocks, which becomes harder as more blocks are added.

However, Proof of Work has some drawbacks. Solving math problems requires a lot of computational power, which means it uses a significant amount of energy. This has raised

concerns about the environmental impact of cryptocurrencies that rely on Proof of Work. Additionally, the need for powerful computers for mining can lead to centralization, where those with more resources have a better chance of mining blocks and getting rewards.

To address these concerns, alternative consensus models like Proof of Stake (PoS) have been developed. They aim to achieve consensus without the need for extensive computing power and energy consumption. These alternative models are being actively explored to make blockchain networks more scalable, energy-efficient, and decentralized.

## **Proof of Stake (PoS)**

Proof of Work (PoW) has been criticized for its high energy consumption. An alternative consensus model called Proof of Stake (PoS) was introduced to deal with this issue.

In a PoS system, if a node wants to become a validator responsible for proposing new blocks, they need to invest in the corresponding cryptocurrency or tokens. The number of tokens held by a node is often referred to as their stake. The more tokens a node holds, the higher its chances of being chosen as a validator.

Unlike PoW, PoS does not involve traditional mining. Instead, validators are selected based on the number of tokens they hold and their willingness to lock them up as collateral. Validators take turns proposing new blocks and validating transactions. When a block is proposed and added to the blockchain, the validator receives transaction fees as a reward.

Importantly, in PoS, all tokens exist in the system from the beginning and are not created through mining. This means that the total supply of tokens is predetermined and not subject to the same inflationary or deflationary pressures as PoW-based cryptocurrencies.

PoS has gained attention due to its potential to significantly reduce energy consumption compared to PoW. By eliminating the need for intensive computational calculations, PoS offers a more energy-efficient alternative for securing blockchain networks. It also addresses concerns about centralization that can arise in PoW systems, as PoS allows for a more distributed and democratic approach to block validation.

## **Delegated Proof of Stake (DPoS)**

Delegated Proof of Stake (DPoS) is a variation of the Proof of Stake (PoS) consensus algorithm that introduces a voting system to select a limited number of nodes, ideally around 21, to validate transactions and add new blocks to the blockchain.

In DPoS, token holders in the network have the ability to vote for delegates who will be responsible for maintaining the blockchain. These delegates, also known as witnesses or block producers, are given the authority to validate transactions and create new blocks. The number of delegates is intentionally kept small to enhance efficiency and speed.

Compared to PoW and PoS, DPoS offers faster transaction confirmations and higher scalability. With a smaller number of delegates involved in block production, decision-making processes can be streamlined, resulting in reduced block creation times. This makes DPoS particularly well-suited for applications that require quick confirmation times and high transaction throughput.

However, the concentration of power in a limited number of elected nodes is a drawback of DPoS. Critics argue that this centralized aspect of DPoS can lead to governance issues and make the blockchain network susceptible to collusion or manipulation by a small group of influential entities.

To mitigate centralization concerns, DPoS systems often incorporate vote decay, vote rotation, and vote delegation.

These mechanisms aim to encourage broader token holder participation in the voting process and prevent a small group of nodes from maintaining control over the network.

DPoS represents a trade-off between speed, efficiency, and decentralization. Its design favors performance but introduces a higher level of centralization compared to other consensus models. Striking a balance between efficiency and decentralization remains a key challenge for blockchain networks implementing DPoS.

## **Proof of Burn (PoB)**

In the Proof of Burn (PoB) consensus model, the concept revolves around intentionally “burning” coins, which means sending them to an address where they become irretrievable and effectively destroyed. In this model, miners are required to burn a certain amount of their coins to earn the privilege of proposing the next block in the blockchain.

By burning coins, miners demonstrate their commitment and investment in the network. The act of burning coins acts as proof of their dedication and provides a means of participating in the consensus process. Unlike other models, such as Proof of Work (PoW) or Proof of Stake (PoS), where miners or validators need to invest in hardware or hold tokens, PoB allows participants to contribute without the need for electricity or specific hardware.

By burning coins, miners essentially make a sacrifice, as those coins become inaccessible and cannot be used again. This sacrifice grants them the right to propose new blocks and potentially receive rewards associated with block creation.

The PoB model introduces an innovative approach by utilizing the destruction of coins as a means of achieving consensus and securing the network. It offers an alternative to

traditional energy-intensive models like PoW while still maintaining the principles of participation and commitment.

It's important to note that the exact implementation of PoB can vary among different blockchain projects, and the specifics of how much and how often coins need to be burned can differ. However, the underlying concept remains consistent: miners burn coins as proof of their dedication to the network and to earn the privilege of proposing new blocks without the need for traditional mining expenses.

## **Proof of Importance (PoI)**

In this consensus model, the idea is to not only consider the number of coins a mining node possesses but also to value the number of transactions, reputation, and activity. This variety of models focuses on the broader perspective of the 'usefulness' of the nodes to select the one node that may propose the next block.

Consensus models are important in blockchain because they enable trust and security in a decentralized network without the need for a central authority. They also ensure that all nodes in the network agree on the state of the ledger and the validity of transactions, which is critical for the integrity of the blockchain. By ensuring that all nodes in the network are in agreement, consensus models help to prevent fraudulent transactions, double-spending, and other types of attacks on the network.

## **Digital Currency and Its Roots**

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As soon as we hear the word digital currency, our brain automatically suggests an answer: Bitcoin.

Well, that is correct enough; however, do not limit the brain to thinking that Bitcoin is the sole digital currency source.

For most people, bitcoin (or maybe altcoins followed by bitcoin) is the only digital currency they have known and heard of in the context of digital currency. But did this Bitcoin just appear out of nowhere? Was this a novel idea of the mysterious personality, *Satoshi Nakamoto*?

The answer to this is “no” in all accounts. Bitcoin is a refined version of a previous idea, integrating new technology. However, blockchain technology is all set to change the work demographics of how the whole fintech industry operates. Even before Satoshi Nakamoto, many brought the idea of generating digital currency to the table to power the alternative economy. However, none succeeded enough in getting their ideas aboard due to regulatory, technical, or ideological reasons.

The roots of digital currency can be traced back to the 1980s and 1990s when computer scientists began exploring the idea of creating a decentralized electronic cash system. One of the earliest examples was David Chaum’s *eCash*, which he described in a 1983 paper.

However, the first widely known and adopted digital currency was Bitcoin, which was introduced in 2009 by an individual or group of individuals using the pseudonym Satoshi Nakamoto. Bitcoin is based on a decentralized digital ledger called a blockchain, which allows for secure and transparent transactions without the need for a central authority.

Since the introduction of Bitcoin, numerous other digital currencies have emerged, such as Ethereum, Litecoin, and Ripple. While digital currencies have faced regulatory challenges and concerns over their use in illicit activities, they have also gained mainstream acceptance and are increasingly being used for legitimate purposes such as online payments and remittances.

Some of the early pioneers of digital currency include:

## **eCash (1983)**

eCash was one of the earliest examples of a digital currency, first described by computer scientist David Chaum in a 1983 paper. The idea behind eCash was to create a decentralized system of electronic cash that would allow users to make anonymous transactions over the Internet without the need for a trusted third party.

eCash was based on a cryptographic protocol that used digital signatures to ensure the authenticity of transactions and prevent double-spending. Users could obtain eCash by exchanging their national currency for digital tokens that could be stored on a personal computer or smart card. The tokens could then be transferred to other users in exchange for goods or services.

While eCash never achieved widespread adoption, it was an important early example of the potential for digital currencies to revolutionize the way we think about money and financial transactions. Many of the concepts behind eCash have been incorporated into more recent digital currencies, such as Bitcoin and Ethereum.

## **E-Gold (1996)**

During the early days of the Internet, the concept of digital currency emerged, with E-gold being one notable example. Founded in 1996 by oncologist-turned-entrepreneur Douglas Jackson, E-gold gained popularity as a pioneering digital currency. While Jackson achieved success with his innovative idea, he faced challenges in advancing the platform further.

By 2009, E-gold had amassed more than 5 million user accounts. The currency was unique in that it was backed by gold reserves, which added a level of stability and trust to its value. However, despite its initial success, E-gold encountered significant setbacks.

Criminals and hackers targeted E-gold, launching relentless attacks that exploited vulnerabilities in the system. These continuous attacks eventually led to the downfall of the platform. Moreover, E-gold's downfall was also influenced by its misuse by money launderers and extortionists who saw it as a favored currency for their illicit activities.

The combination of persistent attacks and the association with illegal financial activities damaged E-gold's reputation and viability as a digital currency. Ultimately, these factors led to the demise of E-gold as a once-promising venture in the realm of digital currencies.

## **WebMoney (1998)**

WebMoney, a Moscow-based company, was established after E-gold started operating in 1998. WebMoney is a form of digital currency for all practical purposes except for the decentralization part. It offers a wide range of financial services, including online billing/payments, peer-to-peer payment solutions (p2p), merchant services, and internet-based trading platforms.

It became the next best thing and the talk of the town just after E-Gold and even managed to attract many of the E-Gold's investors (both good and bad). However, WebMoney operated a bit sensibly and soon made changes to its services, which included building a firewall against potential hacking/criminal/fraudulent activity.

WebMoney is still operating and currently supports many international currencies, including Russian rubles, GBP, USD, Bitcoin, and several others.

## Decentralization

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Decentralization refers to the process of dispersing power away from the main authority. A majority, if not all, of the governmental systems we see today are centralized, meaning they are ruled by a single body in charge of every process. A perfect example is a central bank.

Before we explore decentralization, I want to state that centralization or decentralization is not new. Since the dawn of human civilization, we have had a series of centralized models such as centralized organizations, companies, governments, cities, etc. However, as far as decentralization is concerned, we had several instances of decentralized economies and decentralized ways of doing things even before the advent of IT.

We find some examples of decentralized models in the software industry. These have been around for quite a while now and include BitTorrent. We have used decentralized models for sending files from one network to another. In one way, email is a semi-decentralized protocol — why? Well, because you can access email through any mail service such as Gmail or Microsoft email, or theoretically, you can set up your server.

BitTorrent is an amazing platform for downloading files. Generally, if you use an open-source package, the developers don't even have the resources to set up and maintain the infrastructure to centrally upload and send their software to tens and billions of users. And many times, they use a means of a decentralized network to solve this problem.

In 2009, Satoshi Nakamoto came up with what he called a 'peer-to-peer' electronic cash system, Bitcoin. Since then, the decentralization model and its practical implementation have become a hot topic and the subject of everyone's interest.

Back in the 80s or 90s, the carrying or transfer of cash was minimal to none. There were various kinds of cryptographic e-currency coming up, but one with a working model that didn't rely on one central party that could remove the entire route proved to be the real challenge.

There could be several definitions of the term "decentralization." Many people think that decentralization and distribution are right, but they are wrong. There are three primary classifications of decentralization, according to Vitalik Buterin, the co-founder of Ethereum and Bitcoin Magazine:

- Architectural decentralization
- Political decentralization
- Logic and decentralization

## **Architectural Decentralization**

Architectural decentralization refers to the distribution of a system's architecture across multiple nodes or servers in a network, where each node is responsible for a specific task or function. This decentralization is achieved through the use of a peer-to-peer (P2P) network, where each node communicates directly with other nodes without the need for a central server or authority. In the context of blockchain, architectural decentralization is a key feature that allows for the creation of a decentralized network of nodes that work together to maintain the integrity of the blockchain. Each node in the network has a copy of the entire blockchain ledger and is responsible for verifying and validating transactions, ensuring that the network operates securely and transparently.

Architectural decentralization helps to increase the resilience and security of a system, as it eliminates the reliance on a central point of failure. It also promotes transparency and reduces the risk of corruption or tampering.

However, keep in mind that architectural decentralization alone does not guarantee full decentralization of a system, as other factors such as governance, incentives, and participation also play a role in determining the level of decentralization achieved.

## **Political Decentralization**

This type of decentralization refers to the transfer of power and decision-making from a central authority to local or regional entities, allowing for greater participation, representation, and autonomy of those entities. It involves the redistribution of political, administrative, and fiscal responsibilities from a central government to lower levels of government or to non-governmental organizations.

Political decentralization can take many forms, such as federalism, devolution, or delegation, and can vary in degree depending on the specific context and needs of a country or region. Examples of political decentralization include the creation of state governments in the United States, the devolution of power to regional governments in Spain, and the formation of autonomous regions in Bolivia.

The benefits of political decentralization include increased democratic participation, greater accountability and responsiveness to local needs, and improved service delivery. It can also promote economic development, social cohesion, and cultural diversity, as local communities are empowered to make decisions that are relevant and beneficial to them.

However, political decentralization can also pose challenges, such as the risk of fragmentation, unequal distribution of resources, and potential conflicts between central and local authorities. Effective implementation of political decentralization requires careful planning, coordination, and capacity building at all government and civil society levels.

## Logical Decentralization

Finally, this type of decentralization refers to the distribution of a system's logic or decision-making processes across multiple nodes or servers in a network, where each node is responsible for a specific task or function. Unlike architectural decentralization, which focuses on the distribution of a system's physical architecture, logical decentralization involves the distribution of a system's decision-making processes.

In the context of blockchain, logical decentralization is a key feature that allows for the creation of a decentralized network of nodes that work together to validate and verify transactions. Each node in the network has a copy of the blockchain ledger and is responsible for validating transactions based on the rules encoded in the blockchain's smart contracts or consensus algorithms.

Logical decentralization helps ensure that the network operates transparently and securely, eliminating the need for a central authority or intermediary to make decisions or validate transactions. It also helps to prevent single points of failure or attack, as the network is distributed across multiple nodes.

However, it is important to note that achieving full logical decentralization can be challenging, as it requires developing and implementing sophisticated consensus algorithms and smart contracts that are designed to resist manipulation or corruption. Additionally, logical decentralization does not guarantee full architectural or political decentralization, as other factors, such as governance and participation, also play a role in determining the level of decentralization achieved. When referring to the blockchain, people tend to talk about the benefits of having single databases instead of a local private database used by many institutions and banks — banks that have the world's most complicated and inefficient prices for

reconciliation. This is where logic decentralization comes into the picture, as it has zero probability of system failure.

Moreover, logical decentralization can tolerate any accidental faults in your system. An attack aimed at disestablishing the system will have a minimal or null effect. Lastly, a local system cannot act independently, which maximizes the efficiency of the decentralized system.

## **Satoshi Nakamoto — The Mysterious Bitcoin Founder**

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The modern world’s biggest mystery is Satoshi Nakamoto — the creator of Bitcoin. Over the years, several people have reached out claiming to be Nakamoto because, let’s be honest, who wouldn’t? Unfortunately, none of those matched the profile of Satoshi. Many conspiracy theories pop up now and then regarding Satoshi Nakamoto, including rogue artificial intelligence, an alien invasion, the intervention of groups such as the CIA, NSA or Yakuza, time travelers, etc. However, none have been proven so far.

The name, *Satoshi Nakamoto*, does not exist in any of the databases since it’s a pseudonym to mask the person’s true identity. This specific person claims to reside in Japan, which the authorities highly doubt as his (or her, who knows) working hours are more in sync with the UK’s.

Satoshi is a Japanese male name that means “one with wise ancestry.” This person has chosen this name with great sophistication. In addition to that, his native-level proficiency in English makes it doubtful that he is Asian.

Nakamoto brought a significant change in the paradigm of digital currency and trading. He was the first to solve double-spending problems for a decentralized digital currency. To do so, he created assets — the likes of which the world had never witnessed before — Bitcoin.

In October 2008, Nakamoto released the original white paper in which he described his blueprints as “a Peer-to-Peer Electronic Cash System.” In January 2009, Satoshi released version 0.1 of the source code and launched cryptocurrency by mining the Genesis Block. He continued working on the software project for another year and then retreated into disengagement.

Nobody knows why Nakamoto hasn’t come out or why he decided to disappear without cashing out some of his (now) billion-dollar worth of coins; this justifies the chaos of conspiracy theories, providing fertile ground for educated guesses and speculations.

However, researchers are always after it, trying to trace Nakamoto back using his remaining over-scattered data points such as his vocabulary, choice of words, way of writing, and so on to find the real match for the mysterious person.

## **Suspected Satoshi Nakamoto(s) and the Truth About Them**

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With so many ongoing claims, accusations, and denials regarding the real person behind Satoshi Nakamoto, these further claims are now referred to as “Faketoshi.” Faketoshi is a term for the claim made about Satoshi Nakamoto — the founder of Bitcoin.

The list of acclaimed persons is too long. But let’s have a look at some of those:

In 2014, Newsweek named him as a Japanese — American physicist, Dorian Nakamoto, who turned out to have more than a little in common with the founder of Bitcoin other than just the surname.

Finnish sociologist — Vili Lehdonvirta, Irish cryptographer — Michael Clear, and Japanese mathematician

— Shinichi Mochizuki have also been suggested as potential candidates.

The name's fame has branched out and crawled into several spaces, including association with the brother of drug lord Pablo Escobar, Roberto de Jesus Escobar Gaviria, who has registered the Bitcoin trademark.

Chinese entrepreneur Wei Liu registered the copyright for the original Bitcoin white paper, "Just to let people know anyone can register copyright. Everyone can be Satoshi Nakamoto." Out of all these claims, the strongest one was made by Australian Computer Scientist Craig Wright, who was outed as Nakamoto. Wired Magazine published the news in 2015. However, this fad also turned out to be another Faketoshi.

## **Permissioned vs. Permission-less Blockchain**

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Since all industries vary greatly from each other in terms of their operations, work conditions, and standardization, they cannot be run with a single standardized blockchain model. This need has driven the invention of further blockchain models, maintaining the same basic structure.

There are two basic types of blockchains: Permissioned and Permission-less. Let's have a look at them.

### **Permission-less Blockchain (Public)**

The biggest and simplest example of this is Bitcoin. Most cryptocurrencies, such as Ethereum and Bitcoin, are powered by Blockchains. The model got its name from a special characteristic: 'no barrier' to accessing this blockchain. Any user can create a personal address and get access to the network. Anyone could employ mining protocols, run a node, write on a blockchain, and so on – hence, permissionless.

This is a type of blockchain network where anyone can participate as a validator, miner, or node without needing to seek approval or permission from any central authority. It is also referred to as a public blockchain.

In a permissionless blockchain, transactions are validated by a network of users, incentivized to participate through rewards like cryptocurrency. These users work together to maintain the integrity and security of the blockchain network by solving complex cryptographic puzzles, verifying transactions, and adding new blocks to the chain.

Because permissionless blockchains are open to anyone, they offer a high degree of transparency and decentralization, which makes them resistant to censorship, hacking, and other types of tampering. Examples of permissionless blockchains include Bitcoin and Ethereum.

## **Permissioned Blockchain (Private)**

The need for a private, secure blockchain gave birth to permissioned blockchains. In contrast to the permissionless blockchain, the permissioned blockchain does not allow open access to all users. Instead, they are more of a closed-loop ecosystem, typically deployed by “centralized organizations” to run internal business operations smoothly.

Here, the network is controlled by a central authority or group of authorities. It is also referred to as a private or consortium blockchain. In a permissioned blockchain, access to the network is restricted to a select group of participants known and trusted by the network. These participants are typically businesses, organizations, or individuals with a stake in the network and are willing to contribute resources to maintain it.

Unlike permissionless blockchains, where anyone can participate in the network, permissioned blockchains require

users to obtain permission or be granted access by the central authority or group of authorities in charge. This centralization provides greater control over the network and its operations but also reduces transparency and decentralization.

Permissioned blockchains are often used in enterprise settings, where privacy, security, and control are critical factors. Examples of permissioned blockchains include Hyperledger Fabric and R3 Corda.

I hope this further clarifies your understanding of centralized and decentralized systems. For example, some private blockchains may allow the users to read, but they may require permission to transact the network to access.

The need for permissioned blockchain arose after several requirements, which are indirectly now the benefits of permissioned blockchains as opposed to permission-less blockchains. Some benefits are:

**Transparency and anonymity:** Businesses can set required levels of privacy and transparency. This usually varies from business to business, as per their operational model.

**Control over Decentralization:** The centralization level of the network is negotiable and can be controlled by blockchain members. Also, private blockchain users can be ranked into tiers to manage the varying degree of control and access authority over the network.

People often inquire which one is the best — permissioned or permissionless? Well, the answer is both! However, the most suitable one for you is the one that fits the requirements of your company and its operations.

For instance, public blockchains are important for cryptocurrencies and are more open to users, whereas private blockchains are better for businesses to securely manage their internal operations.

## Origination of Cryptocurrency and Tokenization of Digital Assets

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An unpopular fact is that cryptocurrency emerged as a side product to another invention, as Satoshi Nakamoto never intended to invent a currency. Instead, his goal was to design something new that many people failed to establish before: digital cash.

*“Announcing the first release of Bitcoin, a new electronic cash system that uses a peer-to-peer network to prevent double-spending. It’s completely decentralized with no server or central authority.”*

— **Satoshi Nakamoto, 09 January 2009, announcing Bitcoin on Source Forge<sup>2</sup>**

The highlight of Satoshi’s invention was that he found a way to build a decentralized digital cash system. As we already read, there were many attempts to create digital money in the nineties, but almost all failed.

*“... after more than a decade of failed Trusted Third Party based systems (DigiCash, etc.), they see it as a lost cause. I hope they can make the distinction that this is the first time I know of that we’re trying a non-trust-based system.”*

— **Satoshi Nakamoto in an Email to Dustin Trammell<sup>3</sup>**

After seeing all the centralized attempts fail, Satoshi attempted to build a digital cash system similar to a peer-to-peer network for file sharing. This decision led to the

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<sup>2</sup> <http://satoshinakamoto.me/2009/01/>

<sup>3</sup> [https://en.bitcoin.it/wiki/Source:Trammell/Nakamoto\\_emails](https://en.bitcoin.it/wiki/Source:Trammell/Nakamoto_emails)

origination of cryptocurrency. These were the missing pieces of the digital cash puzzle discovered by Satoshi.

Blockchain technology is the new face of the world. It soon will be the ruling reality, expected to transform most financial assets and technological models due to its immutable, transparent, and distributed structure.

Following the timeline of inventions and innovations in blockchain, blockchain technology has brought along many new beneficial trends, tokenization being one of them. Due to these trends and advancements, blockchain today can directly inject liquidity into previously cumbersome markets.

## **Tokenization**

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Tokenization is the process of converting some or complete parts of assets into a token that can be moved, recorded, or saved on a blockchain. In simple terms, tokenization simply converts the value of any object (to be tokenized) into a token that can be transferred and manipulated on a blockchain system.

An excellent example to understand this is Bitcoin, which represents the tokenization of computing power and electrical use into an exchange medium.

## **Why Did Blockchain Emphasize Creating More Digital Assets?**

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To understand this concept, you must first understand why blockchain technology creates new markets and market efficiencies. If we were to filter the simplest definition, blockchain is just a giant computer network in which several computers work simultaneously to verify data on a digital ledger. This network enables data to be verified, stored, and unaltered via code.

The programmability of blockchain enables the facility to erase the middleman, and the ability to erase the middleman comes from blockchain's programmability. Blockchain digital assets utilize rules built into the code of the network and/or the token itself. The most important thing about it is that these standards are continuously audited via the network.

Since the emergence of blockchain technology, this coding has evolved significantly. In today's era, advanced integrated protocols, known as smart contracts, sit at the core of the digital asset revolution.

## **Market Shift to Asset Tokenization**

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So, what led to the tokenization of digital assets and the great market shift? Here are some reasons for the change in market trends and the rise in the emergence of the tokenization of digital assets:

### **No territorial Barriers**

Without any restrictions on being physically present, the investor can invest in any property in any part of the world. This enhances investments and transactions as they become fast, secure, and much more convenient with asset tokenization on the blockchain.

### **Elimination of the Intermediary**

Traditional asset trading processes are often time-consuming, with settlements sometimes taking months.

Validating transaction documentation and conducting eligibility checks for investors typically require involvement from external entities, which adds extra costs and potential capital deficits. However, tokenization eliminates the need for third-party intervention. With blockchain technology,

transparency, and immutability are already provided, reducing the reliance on intermediaries.

This streamlined approach removes delays, reduces costs, and enhances efficiency in asset trading. By representing assets as tokens on a blockchain, the process becomes more accessible, secure, and efficient, allowing for faster settlements and eliminating the need for lengthy validation processes and external intermediaries.

## **Fractional Ownership**

Assets become highly divisible when they are digitized. So, investors can easily invest in small percentages of tokenized assets. For instance, one can only buy 10% of tokenized real estate property shares. It dramatically removes the barrier for millions of investors to enter the market.

## **Improved Liquidity**

Bringing the investment process to the blockchain provides a low-friction environment. Asset tokenization enables the automated transfer of ownership while making sure of compliance. Tokenized assets now present the possibility to invest with fiat money and peer-to-peer trading on regulated exchanges due to the reduced costs and complexity (this improves liquidity).

## **Cost and Time-Effective Transactions**

Tokenization enables automated exchange processes through the use of smart contracts. This eliminates the need for intermediaries, resulting in faster deal execution and settlement.

Automation streamlines trading (buying and selling) and reduces transaction fees, alleviating burdens associated with traditional trading processes. With smart contracts handling

the transaction and token transfer, the exchange occurs seamlessly and efficiently, benefiting participants by enabling swift and cost-effective transactions.

## **Broader Investor Base**

Traditionally, the trading of real-world assets restricts the level of fractionalization. But asset tokenization eliminates the limitation by making it possible to sell or buy tokens representing fractions of ownership. It results in a broader investor base participating in the investment process.

Tokenization has long-term benefits for new investors as it allows them to diversify their investment portfolios with assets they couldn't afford before. This diversification lowers their risk and potential losses. By accessing a wider range of assets, investors have the chance to earn better returns and create a more balanced investment mix.

Tokenization also makes traditionally hard-to-sell assets easier to trade, increasing their liquidity. This means investors can buy and sell tokens more easily. With improved liquidity and accessibility, tokenization makes investing more efficient and inclusive, benefiting new investors and creating a dynamic investment landscape in the long run.