



Introduction to Cryptocurrencies

Beginner Level – Short Course

AGENDA

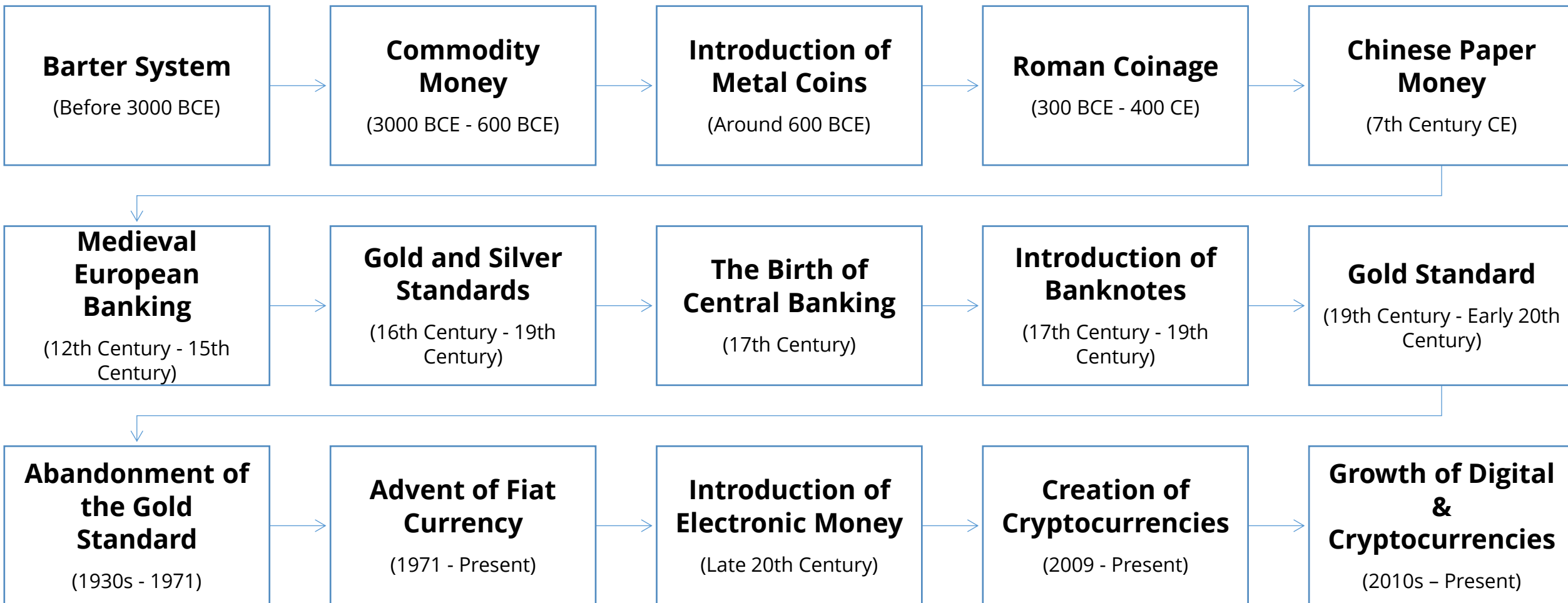
- History and Evolution of Money
- Introduction to Digital Currency and Cryptocurrency
- Overview of Major Cryptocurrencies
- Key Milestones in Cryptocurrency Development

LEARNING OUTCOMES

- Understand the history, evolution, and fundamental concepts of cryptocurrency.

History & Evolution of Money

The Evolution of Money



History & Evolution of Money: Part 1

Need for a Better System: The recognition of barter's inefficiencies leading to the creation of commodity money.

Emergence of Commodity Money: Using items with intrinsic value as money.

Development of Coinage: Innovating standardised coins for more efficient trade.

Transition to a Money Economy: The shift from barter and commodity money to a coin-based monetary system that laid the groundwork for modern economies.

History & Evolution of Money - The Barter System

The barter system was the earliest form of trade, where goods and services were exchanged directly for other goods and services without using a medium of exchange like money.

Limitations:

- **Double Coincidence of Wants:** For a transaction to occur, both parties needed to want what the other offered, which was often difficult to achieve.
- **Lack of Common Measure of Value:** Determining fair exchanges was challenging and subjective without a standardised value system.
- **Indivisibility of Goods:** Many goods couldn't be divided into smaller parts for trade, leading to inefficiencies (e.g., trading a cow for grain).



History & Evolution of Money- Emergence of Commodity Money

Commodity money emerged as items with intrinsic value and widely accepted in trade.

Examples of Commodity Money:

- **Precious Metals:** E.g., Gold and silver
- **Livestock:** E.g., Cattle
- **Grains and Spices:** E.g., wheat or spices like salt

Advantages:

- **Standardization:** Commodity money provided a common measure of value, simplifying trade.
- **Durability:** These items, particularly metals, could be stored and used without deteriorating.



History & Evolution of Money- The Development of Coinage

➤ *To further improve trade, societies began minting metal coins around 600 BCE, with the Lydians being among the first to do so. Coins were stamped with symbols to guarantee their value and authenticity.*

- **Impact on Trade:**

- **Uniformity:** Coins were made to have consistent size and weight, making them easy to recognise and use in transactions.
- **Portability:** Unlike bulky commodities, coins were easy to carry and transport, facilitating trade across regions.
- **Acceptance:** Coins were widely accepted across different regions, which enabled trade between distant communities.



History & Evolution of Money- Transition to a Money Economy

- **Shift from Barter to Money**

With the introduction of coins, societies moved from a barter system to a money-based economy. *This shift made trade more efficient*, as people no longer needed to find someone with exactly what they wanted in exchange.

- **Economic Development**

The use of money allowed for the accumulation of wealth and savings and the development of early banking systems, laying the foundation for today's modern economies.



History & Evolution of Money Part 2

Paper Money: The transition from coins to paper money, initially backed by precious metals (e.g., the gold standard), and later, the shift to fiat currency.

Fiat Currency: The rise of government-issued money not backed by a physical commodity and how it changed monetary policy and the global economy.

Electronic Money: The introduction and widespread adoption of electronic forms of money, including credit cards, online banking, and the precursor technologies to digital currencies.

History & Evolution of Money - Paper Money

Paper money first emerged in China during the Tang Dynasty (618-907 AD), gaining widespread use during the Song Dynasty (960-1279 AD).

Reason for Adoption: As trade expanded, carrying large amounts of metal coins became cumbersome and dangerous, leading to the invention of lighter and more convenient paper money.

Characteristics of Early Paper Money:

- Early paper money was often backed by commodities such as gold or silver, meaning holders could exchange paper notes for a fixed amount of these precious metals.
- The government or a central authority typically issues paper money, ensuring its legitimacy and acceptance.



History & Evolution of Money-

The Spread of Paper Money to the West

*The concept of paper money spread to Europe through trade with the East, but **it wasn't until the 17th century that European nations began issuing their own paper currency.***

- European banks, particularly in Sweden and England, began issuing banknotes that could be exchanged for gold or silver, laying the foundation for modern banking.

Key Milestones:

- The Stockholms Banco issued Europe's first banknotes in 1661.
- The Bank of England began issuing banknotes in 1694, which became the standard for the British economy.



History & Evolution of Money- The Gold Standard

- A monetary system where a country's currency is directly tied to a specific amount of gold. Under this system, paper money could be exchanged for a fixed amount of gold.
- The gold standard provided **stability and confidence** in the currency, as the value of money was backed by a tangible asset.
- The gold standard became the **dominant monetary system** in the 19th and early 20th centuries, with countries like the UK, the USA, and Germany adopting it.
- It facilitated **international trade and investment** by providing a stable and predictable exchange rate system.



History & Evolution of Money- The Decline of the Gold Standard

- The gold standard **limited governments' ability to print money**, which constrained economic growth and flexibility during crises such as wars or depressions.
- The economic pressures of the **Great Depression in the 1930s** led many countries **to abandon the gold standard** to allow for more flexible monetary policies.
- After World War II, the Bretton Woods Agreement established a modified gold standard, in which currencies were pegged to the US dollar, which was convertible to gold.
- In 1971, President Richard Nixon ended the US dollar's convertibility to gold, effectively ending the Bretton Woods system and leading to the current fiat currency system.



History & Evolution of Money- The Rise of Fiat Currency

*Fiat currency is money with **no intrinsic value and is not backed by physical commodities** like gold or silver. Its value derives from people's trust and confidence in the government that issues it.*

The government declares **fiat currency legal tender**, meaning it must be accepted to pay debts.

Benefits of Fiat Currency:

- Governments can control the money supply to manage economic stability, allowing for more responsive monetary policies.
- Fiat currency supports modern economies by enabling the expansion of credit and investment.



History & Evolution of Money-**The Decline of Fiat Currency**

- **Inflation Risk:** E.g., government prints too much money without corresponding economic growth.
- **No Tangible Backing:** Fiat currency has no intrinsic value, unlike commodity money. It relies solely on public trust, which can be fragile in economic instability.
- **Excessive Debt:** Governments that accumulate unsustainable debt may print more money to pay their obligations. This devalues the currency and can lead to inflation or hyperinflation, eroding the currency's value and credibility.



History & Evolution of Money -The Decline of Fiat Currency

- **Political Stability:** Political turmoil, corruption, or uncertainty can lead to a lack of confidence in a country's financial system. This can cause capital flight, where investors move their money out of the country, leading to a decline in the value of the currency.
- **Central Bank Policies:** Poor monetary policy decisions by central banks, such as keeping interest rates too low for too long, can lead to inflation or asset bubbles. These policies can reduce the currency's purchasing power and lead to economic instability, undermining the currency's value.



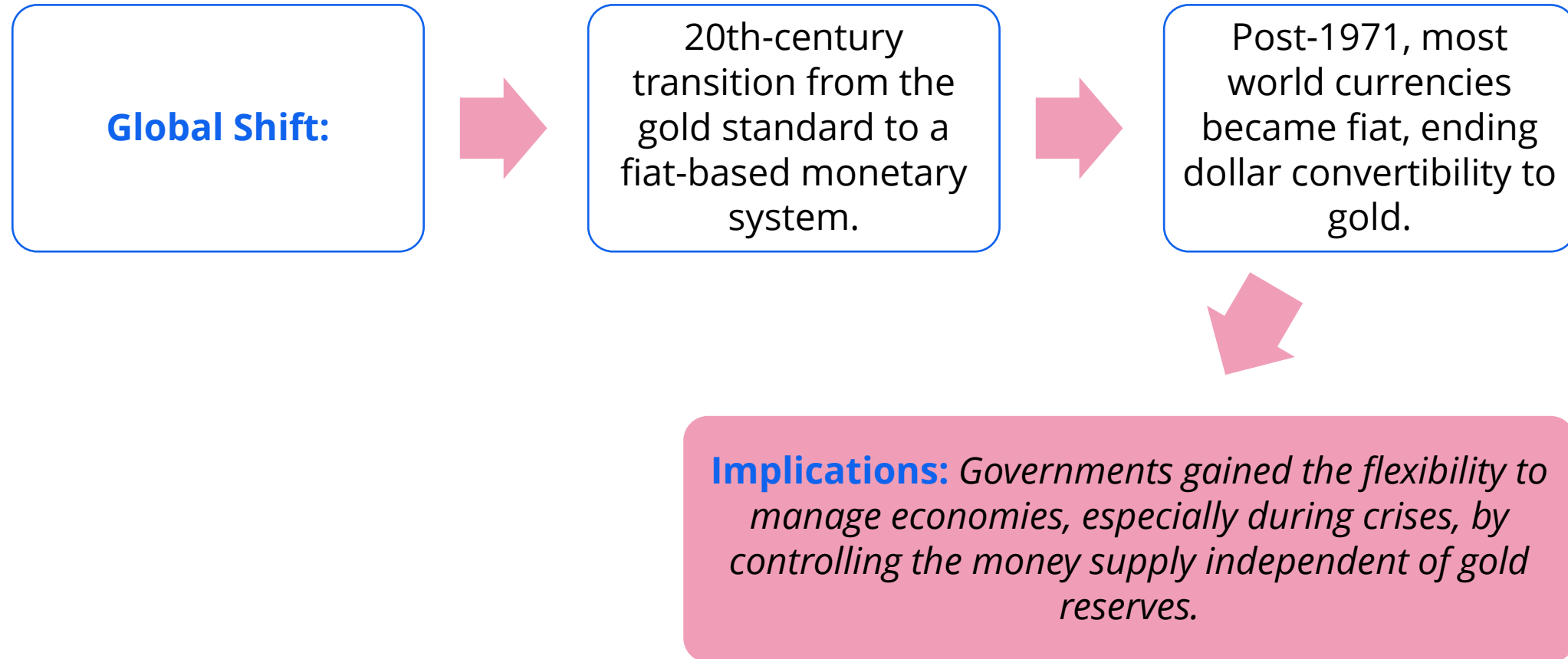
History & Evolution of Money-**The Decline of Fiat Currency**

- **Global Economic Shifts:** Shifts in global economic power, such as the rise of new economic powers or changes in global trade dynamics, can impact the demand for a particular fiat currency. If a currency loses its status as a global reserve currency or if there is reduced demand for it in international trade, its value may decline.



History & Evolution of Money-

The Transition to a Modern Monetary System



History & Evolution of Money-

The Transition to a Modern Monetary System

Establishment of Central Banking

Role of Central Banks:

Regulate money supply, set interest rates, and act as lenders of last resort (e.g., Federal Reserve).

Monetary Policy Tools: Use of open market operations, reserve requirements, and discount rates to influence the economy, manage inflation, and ensure stability.

Economic Stabilization:

Ability to inject liquidity (e.g., quantitative easing) during downturns, aiding growth—harder under the gold standard.

History & Evolution of Money-

The Transition to a Modern Monetary System

Impact on International Trade

Currency Exchange Rates:

Crucial for trade; rates can be floating (market-driven) or fixed (pegged to other currencies).

Global Trade Dynamics:

Exchange rates affect trade balance, with weaker currencies boosting exports and stronger ones reducing import costs.

Fiat Currency and Globalization:

Flexibility of fiat currencies has spurred global trade and investment; the U.S. dollar remains central to international trade and finance.

History & Evolution of Money-

The Transition to a Modern Monetary System

Modern Economic Framework:

- Fiat currency has enabled advanced financial systems, such as modern banking, credit markets, and capital markets.
- Supports investment, innovation, and economic growth enabled by fiat currencies.

Challenges and Considerations:

- Requires careful management to avoid inflation and maintain public trust.
- **Flexibility of fiat systems can lead to instability, as seen in the 2008 financial crisis due to excessive credit expansion and poor regulation.**

History & Evolution of Money-

The Transition to a Modern Monetary System

Modern Economic Framework:

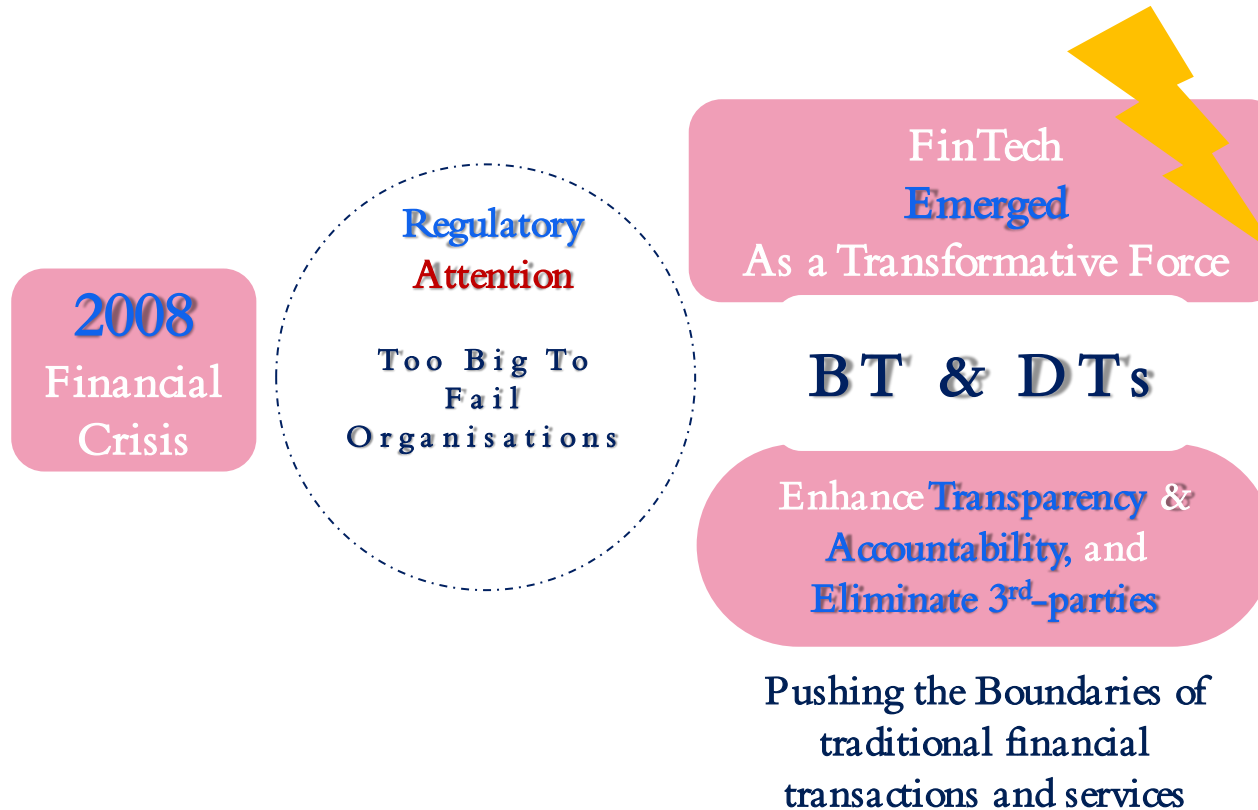
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Introduction to Digital Currency and Cryptocurrency

History & Evolution of Money– Digital Currencies



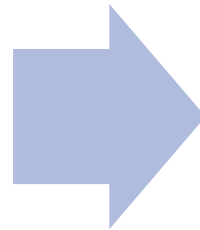
Introduction to Digital Tokens

Digital currency is a form of currency that *exists only in electronic form* and *is not tangible* like physical money (coins or banknotes).

KEY FEATURES

Security:

Cryptocurrencies use cryptographic methods to secure transactions and control the creation of new units, making them difficult to counterfeit or double-spend.



Transparency and Immutability:

All transactions are recorded on a public ledger (blockchain), which is transparent and unchangeable, ensuring trust among participants.

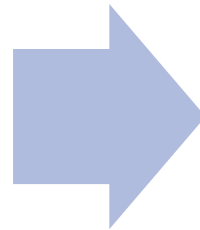
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KEY FEATURES

Global Accessibility:

Cryptocurrencies can be accessed and transferred anywhere in the world, providing financial services to people who might not have access to traditional banking systems.



Lower Transaction Costs:

Transactions, especially international ones, can be processed with lower fees compared to traditional banking and financial systems.

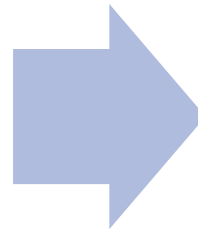
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KEY FEATURES

Potential for Innovation:

Cryptocurrencies and blockchain technology open up new possibilities for DeFi, smart contracts, and NFTs.



Anonymity/Pseudonymity:

Digital currencies offer varying degrees of privacy, with some offering **greater anonymity** than traditional financial systems.

Introduction to Digital Tokens

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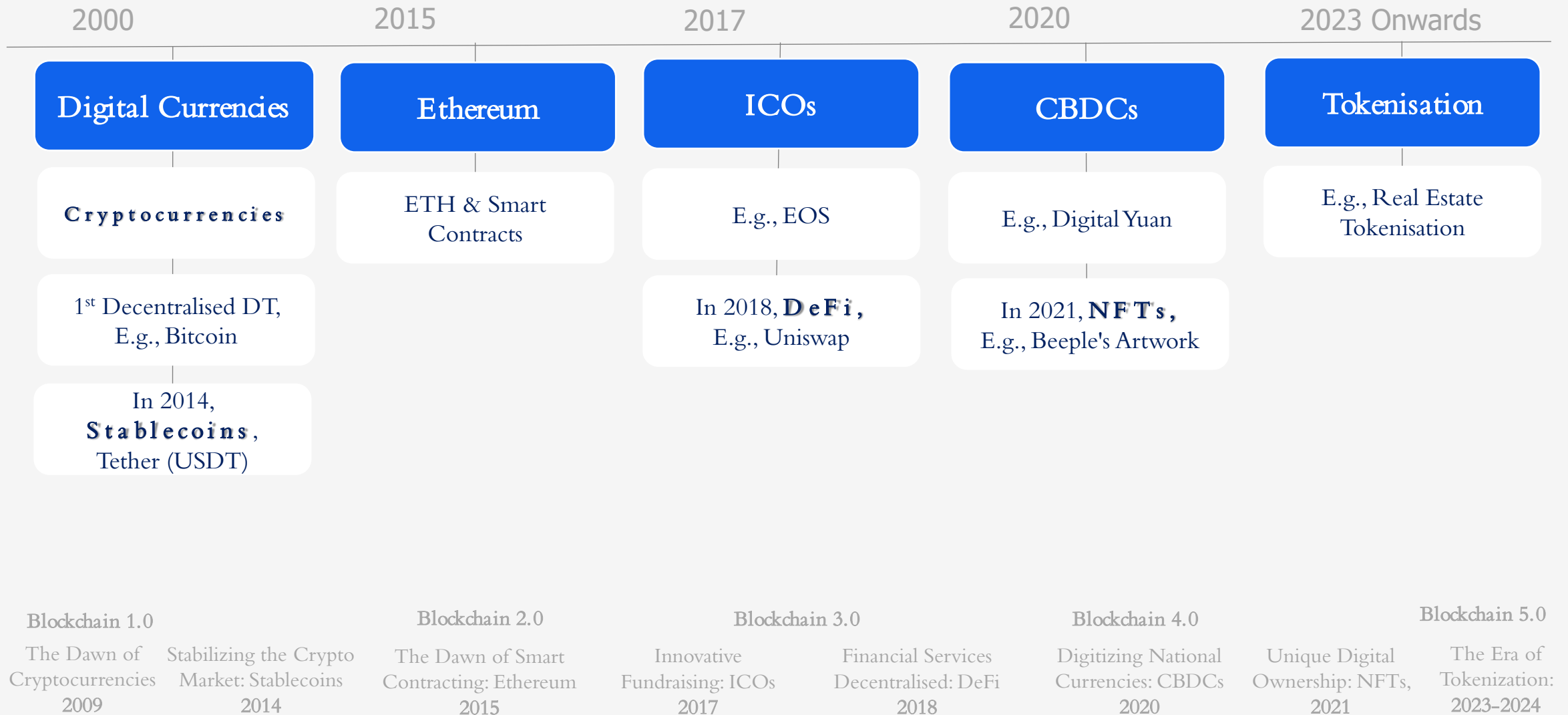
KEY FEATURES

Speed and Efficiency:

Transactions can be processed **quickly**, often in **real-time**, across borders without intermediaries.

THE METAMORPHOSIS OF DTs

The Metaverse: The rise of the Digital Universe. (Whoswholegal, 2021)



Introduction to Cryptocurrency

Cryptocurrency is a type of digital or virtual currency that uses cryptography for security and operates on decentralised networks, typically based on blockchain technology.

Decentralization: Unlike traditional currencies, cryptocurrencies are not controlled by any central authority (like a government or bank). Instead, they operate on a decentralised network of computers (nodes) that verify and record transactions.



Blockchain Technology: The backbone of most cryptocurrencies, a blockchain is a distributed ledger that records all transactions across a network of computers. It ensures transparency, security, and immutability.



Cryptography: Advanced encryption techniques secure transactions, control the creation of new units, and verify asset transfers.

Challenges & Considerations

Volatility

Cryptocurrency prices can be highly volatile, leading to significant financial risk for investors and users.

The legal status of cryptocurrencies varies widely across countries, and regulatory frameworks are still evolving, which can impact their adoption and use.

Regulatory Uncertainty

Security Risks

While cryptographic security is robust, exchanges and wallets can still be vulnerable to hacking, theft, and fraud.

Environmental Concerns

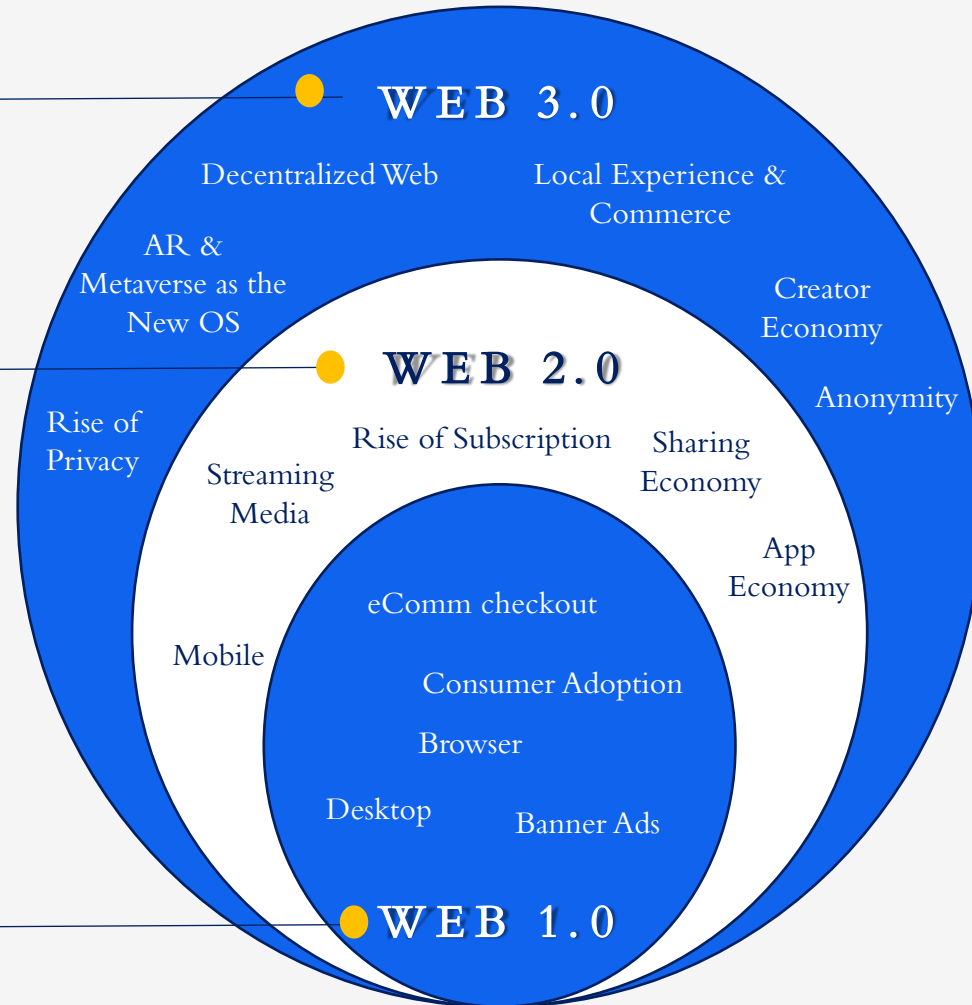
The energy-intensive mining process, especially in pow systems like bitcoin, has raised concerns about the environmental impact.

WEB 1.0/2.0/3.0

Decentralisation. Democracy.

No Digital Property Rights.

Connecting People Online.



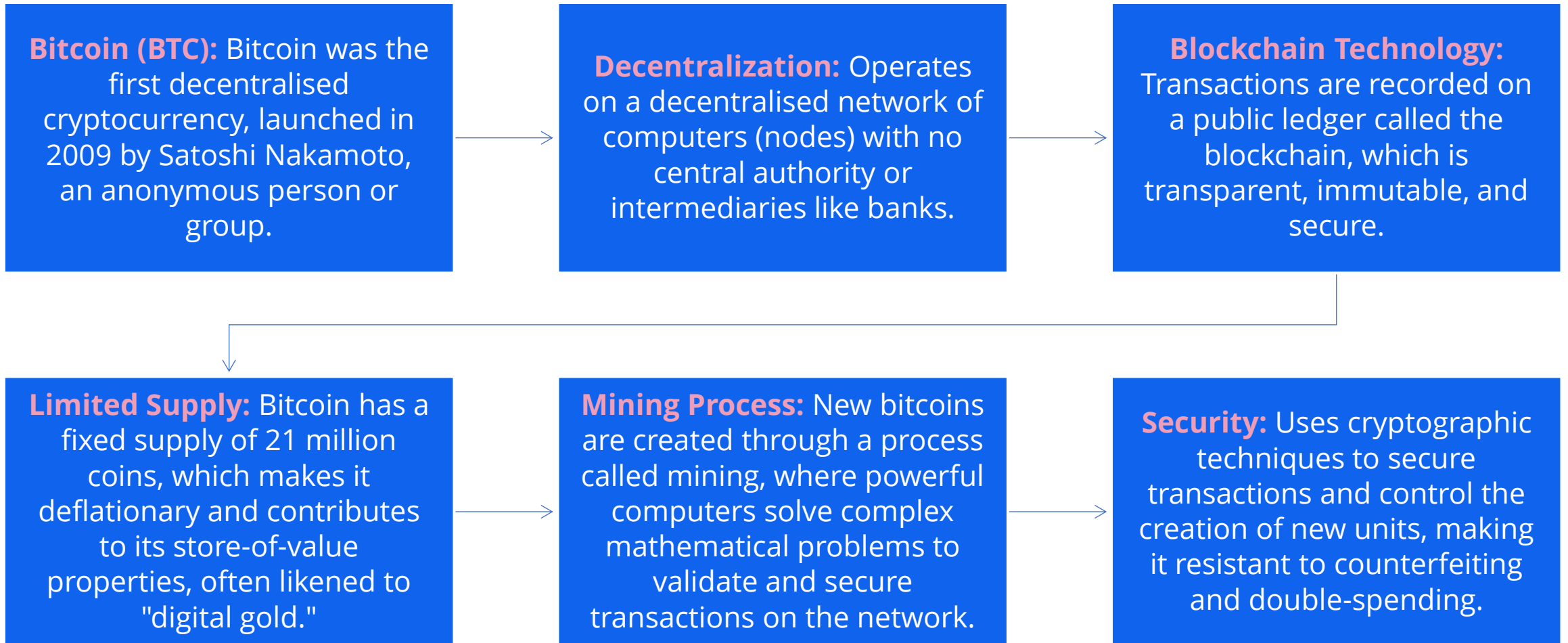
(Sheridan ET AL., 2021)

! The internet was not designed as a top-down, centralized entity.

The Internet was designed as a "network of networks." !

Overview of Major Cryptocurrencies

Overview of Major Cryptocurrencies (Bitcoin)



Overview of Major Cryptocurrencies (Bitcoin)

Volatility: Bitcoin's price is highly volatile, with significant fluctuations in value, influenced by market demand, investor sentiment, and macroeconomic factors.

Global Acceptance: Bitcoin is accepted as a payment method by various merchants worldwide, and it has become a key asset in institutional investors' portfolios.

Regulatory Challenges: Bitcoin is regulated differently across countries, impacting its adoption and use. Some countries have embraced it, while others have imposed restrictions or bans.

Digital Gold: Due to its scarcity and store-of-value attributes, Bitcoin is often called "digital gold," serving as a hedge against inflation and economic instability.

Market Influence: As the first and most well-known cryptocurrency, Bitcoin often influences the broader cryptocurrency market with price movements that impact other digital assets.

Overview of Major Cryptocurrencies (Ethereum)

Launched in *2015 by Vitalik Buterin and others*, Ethereum is the 2nd-largest cryptocurrency by market capitalisation after Bitcoin.

Ethereum is more than just a *cryptocurrency*; it's a *decentralised platform* that enables the creation and execution of smart contracts—self-executing contracts with the terms directly written into code.

Ethereum allows developers to build and deploy *DApps* on its blockchain, leading to innovations in various sectors.

The native cryptocurrency of the Ethereum platform, *Ether*, is used to pay for transaction fees and computational services on the network.

Like Bitcoin, Ethereum operates on a blockchain, but it is *more programmable and flexible*, supporting many applications beyond simple transactions.

Overview of Major Cryptocurrencies (Ethereum)

With the Ethereum 2.0 upgrade, Ethereum is *transitioning from PoW to a PoS consensus* mechanism, aiming to improve scalability, security, and energy efficiency.

Ethereum is *the backbone of the DeFi movement*, which enables decentralised financial services like lending, borrowing, and trading without traditional intermediaries.

Ethereum is the leading platform for *creating and trading NFTs*—unique digital assets representing ownership of content like art, music, and virtual real estate.

Ethereum *introduced standards* for creating tokens on its blockchain, with ERC-20 for fungible tokens (used by most ICOs) and ERC-721 for NFTs.

Transactions and smart contract executions on Ethereum require *"gas" fees paid in Ether*. These fees fluctuate based on network demand, sometimes becoming very high during peak periods.

Comparison Between Bitcoin & Ethereum

Feature	Bitcoin	Ethereum
<i>Launch Date</i>	Jan 2009	July 2015
<i>Founder</i>	Satoshi Nakamoto (pseudonymous)	Vitalik Buterin and a team of developers
<i>Primary Purpose</i>	Digital currency, store of value	Decentralized platform for smart contracts and DApps
<i>Core Concept</i>	Peer-to-peer currency, alternative to traditional financial systems	Programmable blockchain enabling decentralized applications
<i>Blockchain Technology</i>	Public ledger, simple scripting language	Public ledger, Turing-complete scripting language

Comparison Between Bitcoin & Ethereum Cont.

Feature	Bitcoin	Ethereum
<i>Supply</i>	Capped at 21 million coins	No fixed supply, determined by network governance
<i>Monetary Policy</i>	Deflationary, issuance decreases over time (halving events)	Currently inflationary, transitioning towards a deflationary model post-Ethereum 2.0
<i>Trans. Speed</i>	~7 transactions per second (TPS)	~30 transactions per second (TPS)
<i>Scalability Challenges</i>	Limited by block size and transaction speed; solutions like Lightning Network	High gas fees during congestion; addressed by Ethereum 2.0 with shard chains and PoS
<i>Security</i>	Highly secure, large network of miners	Secure, though smart contract vulnerabilities exist

Comparison Between Bitcoin & Ethereum Cont.

Feature	Bitcoin	Ethereum
<i>Market Capitalization</i>	Largest by market cap, indicator of market health	Second-largest, driving innovation in DeFi and NFTs
<i>Decentralisation</i>	Highly decentralized, no central control	Decentralized but debates on centralization in development and node distribution
<i>Community</i>	Focused on financial sovereignty, decentralization, and "sound money"	Innovative, focused on DApps and blockchain solutions
<i>Ecosystem</i>	Payments, remittances, store of value	Extensive DApps, DeFi, NFTs, and enterprise solutions ecosystem
<i>Monetary Policy</i>	Dominates market trends, viewed as "digital gold"	Significant in DeFi and NFTs, often dictating trends in these sectors

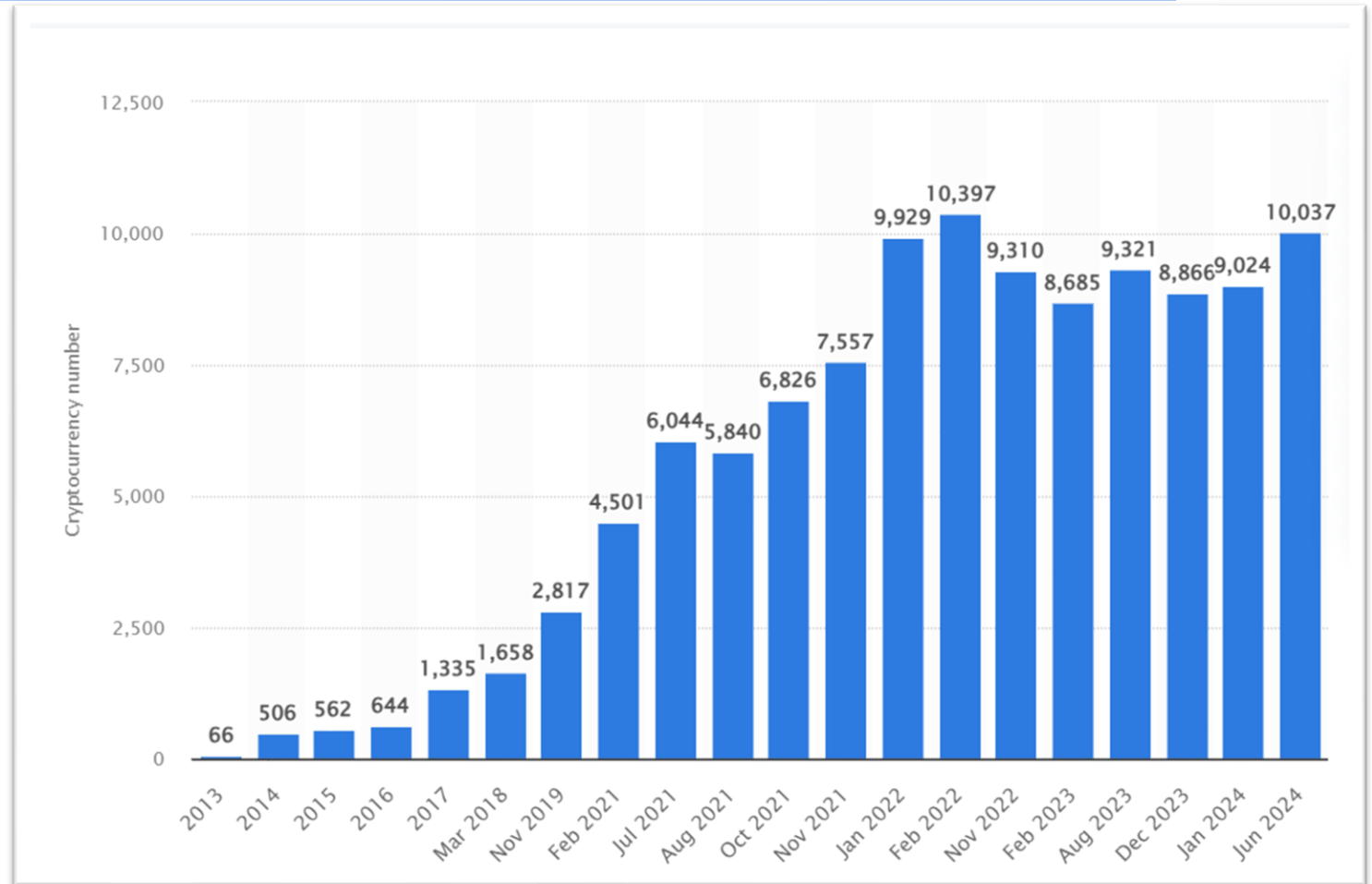
Comparison Between Bitcoin & Ethereum Cont.

Feature	Bitcoin	Ethereum
<i>Consensus Mechanism</i>	PoW	PoW, transitioning to PoS with Ethereum 2.0
<i>Smart Contracts</i>	Not natively supported	Fully supported, enabling complex transactions and applications
<i>Use Cases</i>	Digital currency, transactions, remittances, store of value	Platform for DApps, DeFi, NFTs, ICOs, and more

Overview of Major Cryptocurrencies (Other Key Players)

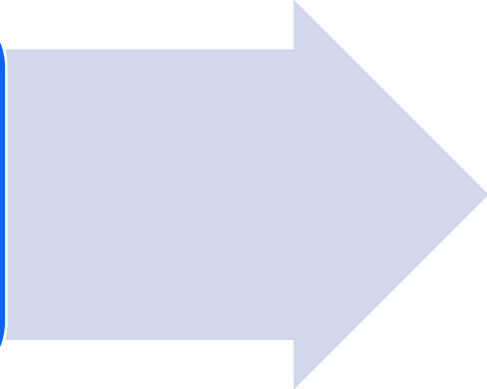
- **Altcoins:**

This category includes thousands of other cryptocurrencies created after Bitcoin, each with its own unique features, use cases, and innovations (e.g., Litecoin, Ripple, Cardano).

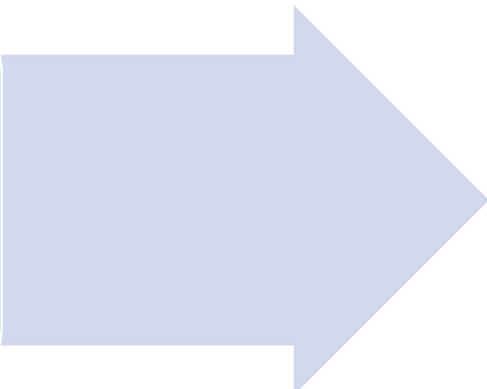


The Role of Cryptocurrencies in the Modern Economy

Financial Inclusion: Cryptocurrencies provide access to financial services for the unbanked and underbanked populations, especially in regions where traditional banking is limited or inaccessible. By enabling peer-to-peer transactions, cryptocurrencies eliminate the need for intermediaries, reducing transaction costs and barriers to financial participation.

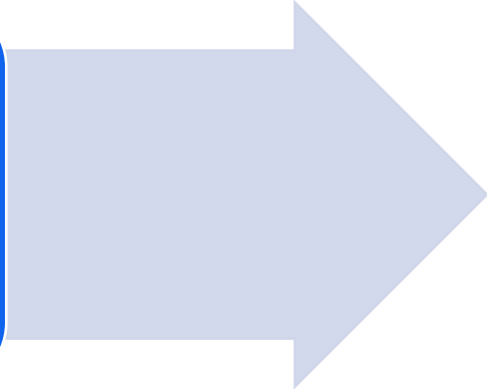


DeFi: Cryptocurrencies power the DeFi ecosystem, which offers decentralised financial services like lending, borrowing, and trading without relying on traditional financial institutions. DeFi platforms leverage smart contracts on blockchain networks, providing greater transparency, security, and accessibility than conventional finance.



The Role of Cryptocurrencies in the Modern Economy

Cross-Border Transactions: Cryptocurrencies facilitate faster and cheaper cross-border transactions, bypassing traditional banking systems that often involve lengthy processes and high fees. This particularly benefits remittances, enabling individuals to send money more efficiently to family and friends in different countries.



Store of Value and Investment: Cryptocurrencies, particularly Bitcoin, are increasingly viewed as a store of value, akin to "digital gold." They offer a hedge against inflation and economic instability, attracting institutional and retail investors. The rise of cryptocurrency as an investment asset class has led to the development of new financial products, including crypto ETFs and futures.



Key Milestones in Cryptocurrency Development

Key Milestones in Crypto Development

Introduction of Cryptographic Currency Concept: David Chaum introduces the idea of digital cash with his paper on "Blind Signatures for Untraceable Payments."

1983

1998

Bit Gold Proposal: Nick Szabo proposes Bit Gold, a decentralised digital currency system considered a precursor to Bitcoin.

Publication of the Bitcoin Whitepaper: Satoshi Nakamoto publishes the whitepaper titled "Bitcoin: A Peer-to-Peer Electronic Cash System."

2008

Bitcoin Network Launch: The Bitcoin network goes live with the Genesis Block (Block 0) mining on January 3, 2009.

2009

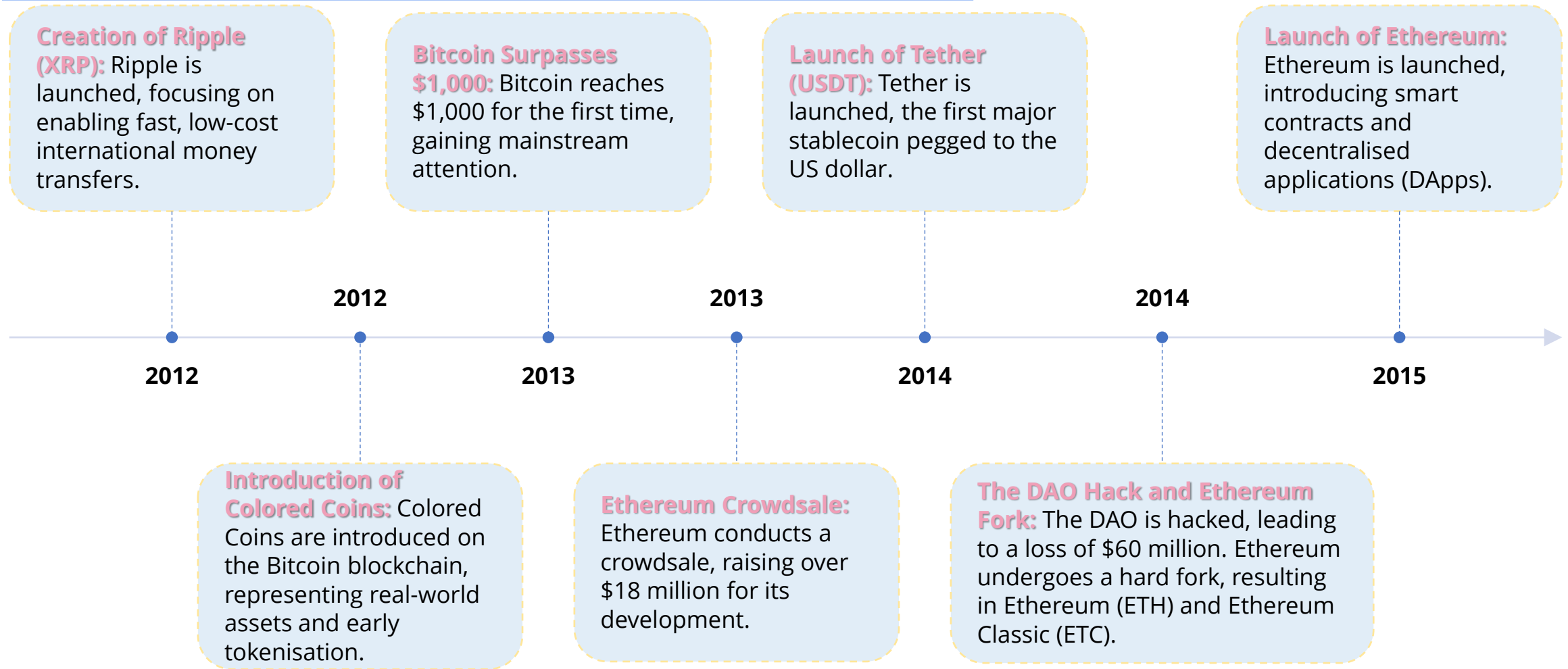
First Bitcoin Transaction for Goods: Laszlo Hanyecz buys two pizzas for 10,000 BTC, the first known commercial transaction using Bitcoin.

2010

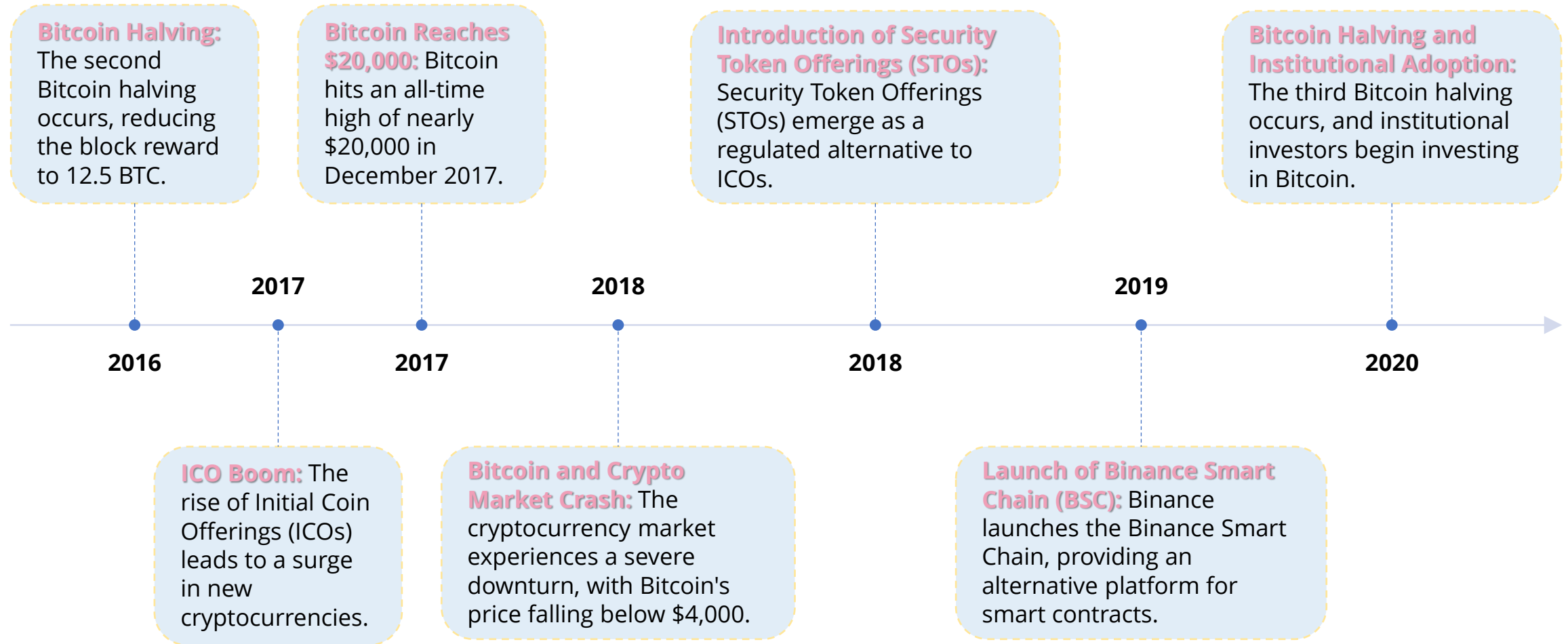
Emergence of Alternative Cryptocurrencies (Altcoins): The first altcoins, including Namecoin and Litecoin, are introduced.

2011

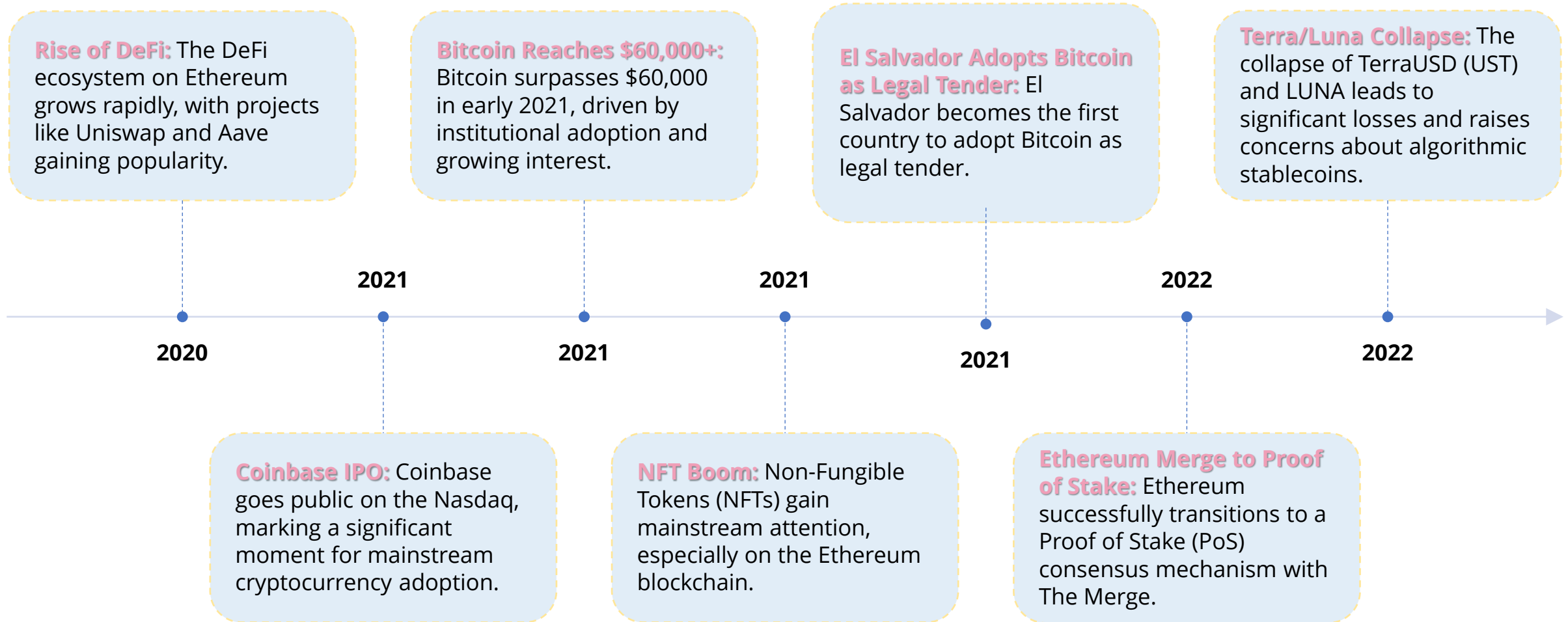
Key Milestones in Crypto Development



Key Milestones in Crypto Development



Key Milestones in Crypto Development



Key Milestones in Crypto Development

Introduction of Zero-Knowledge Rollups (ZK-Rollups): ZK-Rollups gain traction as a Layer 2 scaling solution for Ethereum.

2023

2024

Growing Interest in Central Bank Digital Currencies (CBDCs): Central banks continue to explore and develop Central Bank Digital Currencies (CBDCs), with several countries advancing their projects.

Conclusion

Conclusion

- Transitioned from barter to coins, paper money, and digital currencies. Reflects the need for efficiency, security, and universal acceptance.
- Central banks regulate money supply and manage inflation. Established to maintain financial stability and guide monetary policy.
- Shift from gold-backed to fiat currency post-1971. Gave governments more control but introduced inflation risks.
- Bitcoin's 2009 launch marked the start of decentralized digital money. Led to innovations in finance, including DeFi and NFTs.
- From Bitcoin's creation to the rise of Ethereum, ICOs, and CBDCs. Cryptocurrencies continue to influence global financial systems.
- Digital currencies and CBDCs suggest a future of coexisting money forms. Central banks, fiat, and crypto roles will continue to evolve.

———— Further Reading

Further Reading

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Thank You