

## BLOCKCHAIN

Erkan Saka (Istanbul Bilgi University)

### Definition

Blockchain is a decentralized and distributed digital ledger technology that records transactions across multiple computers in a way that ensures the data cannot be altered retroactively. Originally designed for cryptocurrencies like Bitcoin, blockchain has since been adapted to numerous other domains where secure, transparent, and tamper-resistant record-keeping is valued, including voting systems, smart contracts, and supply chain management.

### Context

Blockchain emerged as a radical response to issues of trust and centralization in digital infrastructures. By enabling trustless verification — where participants do not need to trust a central authority — blockchain has been championed as a tool for democratic empowerment and transparency. Its underlying architecture ensures data immutability and distributed consensus, features that have captured interest across political, financial, and technological fields.

Blockchain emerged in the late 2000s as a technical solution to enable decentralized, peer-to-peer transactions without trusted intermediaries. Initially developed to support cryptocurrencies (most notably Bitcoin) it functioned as a distributed ledger secured through cryptographic mechanisms and collective verification. In its early phase, blockchain was closely associated with monetary innovation, cryptography, and critiques of centralized financial and institutional authority.

In the context of digitalization, blockchain technologies intersect with governance, identity verification, and new models of political participation. Advocates tout applications such as blockchain voting as solutions to electoral fraud and exclusion. Others, however, critique blockchain's association with techno-solutionism, high energy consumption (especially with proof-of-work systems), and libertarian ideologies that may sidestep broader questions of equity and accountability. Moreover, the use of blockchain in smart contracts — self-executing agreements with coded terms — raises issues around algorithmic enforcement and legal responsibility. While blockchain can decentralize control, it can also obscure accountability, reinforcing what some scholars term “code as law.”

In the late 2010s and early 2020s, blockchain entered a phase of institutionalization and diversification. Governments, corporations, and international organizations experimented with permissioned blockchains, while new use cases emerged in areas such as supply-chain management, digital identity, voting, cultural production (e.g. NFTs), and decentralized finance (DeFi). At the same time, debates intensified around scalability, environmental impact, regulation, and power concentration.

More recently, the evolution of blockchain has been shaped by Web 3.0 narratives, emphasizing decentralization, user sovereignty, and new forms of digital governance. This phase has been marked by both heightened expectations and growing skepticism, as practical limitations, regulatory interventions, and market volatility have tempered earlier techno-utopian claims.

Academic debates increasingly scrutinize the mythologies surrounding blockchain: Is it truly empowering the many, or re-centralizing control through complex technical knowledge and unequal access? These tensions make blockchain a crucial site for investigating the promises and perils of digital transformation.

## Related Concepts

Algorithm; Cyber security; Digital Sovereignty; Digital Transformation; E-Democracy; E-Governance; Platform Politics; Zero Proof Knowledge

## References

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