Digital Disruption Profile: Blockchain's Radical Promise Spans Business and Society

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Blockchain technologies promise new economic, business, social and technological models that can have pervasive impact on business and society. Enterprise architecture and technology innovation leaders must understand the implications to exploit this disruptive, but immature, technology.

Key Findings

- Blockchain is at DD1, the initial level on Gartner's Digital Disruption Scale, and is about to move to DD2.
- Blockchain represents a portfolio of technologies and approaches that create new possibilities in how we manage digital trust, transactions and exchanges of value.
- For all the hype, blockchain still remains a promise. There are glimpses of its potential, but successful instances of its disruption are rare and of limited scope.
- Blockchain technologies mostly evolved in an ecosystem that is well-removed from the ones within which traditional enterprises and its vendors operate.
- To fulfill its potential for disruption, blockchain needs further technology maturity and hardening, in addition to significant changes to business models, operating processes, societal constructs, and regulatory and governance mechanisms.

Recommendations

Enterprise architecture and technology innovation leaders looking to achieve innovation and disruption with blockchain should:

- Prepare for blockchain by understanding the sweeping scope of its capabilities for business benefit, beyond considering it as a technology choice for enterprise projects.
- Perform scenario planning assuming eventual blockchain technology maturity, while not assuming continued existence of current products or processes in their businesses.

- Conduct blockchain trials that include a liberal dose of decentralized business models and processes, not only to explore how you can improve today's processes.
- Ensure that the scope and staff allocated for blockchain experimentation involve both business and technology capabilities.

Table of Contents

List of Tables

List of Figures

Analysis

Definition

Blockchain technologies evolved out of the bitcoin cryptocurrency. At the core of bitcoin are the blockchain data structure and related components. Gartner defines blockchain (or a distributed ledger) as an expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a network (in a peer-to-peer fashion). Each record contains a time stamp and reference links to previous transactions. With this information, anyone with access rights can trace back a transactional event, at any point in its history, belonging to any participant.

A key aspect of a blockchain is use of a consensus mechanism across computers to complete a transaction, rather than using a middleman or a centralized system. A consensus mechanism is a process by which certain assigned nodes in a distributed network agree on proposed transactions and provides a way to record information in the ledger in a manner that ensures data integrity, immutability and consistency. Consensus mechanisms are distributed network governance rules

and protocols that enable the recording, completion and execution of transactions under certain conditions. As blockchain platforms evolve, the distributed ledger will enable fine-grain controls over privacy, for both public and private blockchain deployments.

Smart contracts are another aspect of blockchain technologies. A smart contract is a computer program or protocol, typically running on a blockchain, which facilitates, verifies or executes business processes that could be triggered by events, on-chain transactions or interactions with other smart contracts. It adds dynamic, programmed behavior to transactions, and is potentially very disruptive, but also remains immature and, thus, risky.

Blockchain technologies are the foundation for many cryptocurrencies such as bitcoins. Cryptocurrencies are typically created by private entities without the backing of governments, and transacted using digital mediums (usually relying on a peer-to-peer network of nodes, rather than a centralized server).

See "Hype Cycle for Blockchain Technologies, 2017" and "Hype Cycle for Blockchain Business, 2017" for more information on these technologies and other relevant areas for blockchain.

Impact and Position

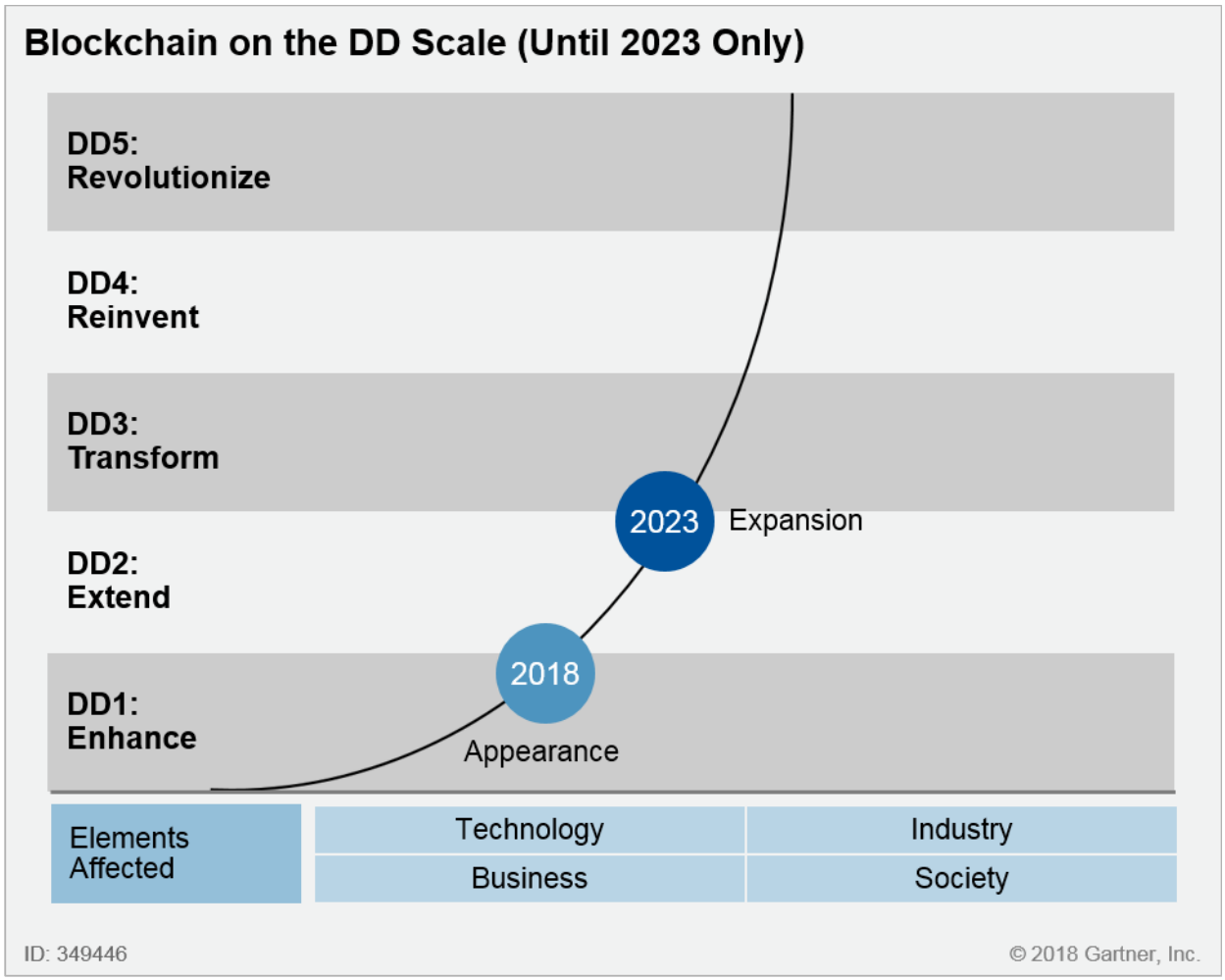
Blockchain technologies offer new mechanisms to establish and manage trust (regardless of status) across entities and, thus, can be impactful in areas that involve transactions and interactions that involve consumers, businesses, governments and things.

While the scope of impact spans technology, business, industry and society, blockchain is still a promise, and successful implementations are very rare. Blockchain technology needs to mature and harden, along with viable business models for the technology, for it to fulfill its potential.

Blockchain is at DD1, the initial stage of disruption, and is expected to enter DD3 by 2023. Blockchain's full potential reaching DD5, will take till 2030, based on technology maturity and market adoption. See Figure 1 for blockchain's progression during the next five years. (For an explanation of the DD Scale, see "Measuring the Impacts of Digital Disruption: Introducing Gartner's Digital Disruption Scale.")

However, Gartner forecasts that the business value generated by blockchain will grow rapidly, reaching $176 billion by 2025 and $3.1 trillion by 2030 (see "Forecast: Blockchain Business Value, Worldwide, 2017-2030" for a detailed analysis).

Figure 1. Blockchain on the Digital Disruption Scale (Until 2023 Only)



Source: Gartner (February) 2018

Elements of Disruption

- **Technology:** Blockchain is built using pre-existing techniques such as cryptographic hash, public key encryption and Merkle tree data structure. But, it combines them in unique ways to help transact without a middleman, create new forms of digital assets (while solving for the "double spend" problem), and provide for immutability and traceability of data and assets (see "The Disruptive Potential of Blockchain Technology").
- **Business:** The ability to execute transactions without a middleman can upend much B2C and B2B activity. Further, digitization of assets enables trading and sharing of value in new ways that were not possible or economical earlier. Lastly, smart contracts have the potential to evolve and allow for encoded and automation of business agreements and contracts, fundamentally changing business operations and societal interactions.

- **Industry:** Blockchain's promise lies more in external interactions between companies. This aspect, combined with the threat to centralized interaction models, has resulted in competitors coming together with the intent to reshape industry processes or safeguard industry franchise to achieve operational efficiency and economies of scale benefits using blockchain technologies (see "Toolkit: Blockchain Consortium Initiatives"). Further, a whole slew of startups have emerged whose premise is based on the decentralization concepts of blockchain. The startups are attempting to create new businesses that never existed or offer new industry-specific solutions (see "Cool Vendors in Blockchain Applications, 2017")
- **Society:** Blockchain's trust mechanisms enable creation of decentralized identities and brokerless interactions. They also change the existing notions of privacy, identity and transparency, and can create new forms of social contracts. Growth of decentralized solutions in business and social networks can affect existing communication and interaction models, as well as forge new ones that shift responsibilities, oversight, laws, regulations, value creation, exchange and storage.

Disruptions/Fundamental Shifts

- **What is being disrupted:** The need for middlemen and central entities
  - **Fundamental shift:** The wheels of today's economy and society are turned by central entities and middlemen. These central entities and middlemen bring together parties that do not know or trust each other by providing markets, interfaces and other verification mechanisms to help consumers and businesses find products to suit their needs. Blockchain offers the promise of decentralization — that these transactions can be facilitated by a set of connected peers and verified consensually over an agnostic network. This has implications for all industries and government, for instance, being able to perform e-commerce transactions without a platform or enjoy social media interactions without a social media company in the middle. Startups that apply decentralization to offer new products and services or threaten to upend current markets have emerged (see "Maverick* Research: How Blockchain Undermines the Value Proposition of Platform Businesses" and "Cool Vendors in Blockchain Applications, 2017").
- **What is being disrupted:** Value representation and exchange mechanisms
  - **Fundamental shift:** Today's mechanisms to represent assets digitally lack built-in design components to prevent easy duplication, fraud and double spend, but rather rely on checks and balances in the supporting computer code. This results in friction in exchange of such assets digitally and additional costs in post-transaction clearance and settlement. Moreover, any representation is limited to fiat-based assets. Cryptocurrency technologies (including cryptotokens) enable native representation of any form of asset, while preventing duplication and double spend, and offer much simpler clearance and settlement. Such cryptocurrency technologies can have significant impact on how assets are traded and valued, beyond payments. Further, they will provide for construction of new value-added services using programmatic behavior attached to the transactional context. An example of such a possibility is the evolution of initial coin offerings as a mechanism for raising capital (see the "Initial Coin Offering" profile in "Hype Cycle for Blockchain Business, 2017").

Additionally, a few central banks are considering how these technologies can be used to create fiat-backed cryptocurrencies — a mechanism that can allow for the benefits of cryptocurrencies, while potentially affording nation states and, hence, central banks more control over markets. See our prediction, "By 2022, at least five countries (including at least one G7) will have issued a fiat-backed cryptocurrency" in "Predicts 2018: Top Predictions in Blockchain Business."

- **What is being disrupted:** Management, governance and execution of partnerships and contracts across entities
  - **Fundamental shift**: Smart contract technology in blockchain will allow for creation and representation of agreements across entities that could be automatically executed without human intervention or oversight. They will rely on common operational data stored on a blockchain, avoiding inefficiencies in data management across parties, which can reduce disputes and contradictory claims. Such programmatic representation and automation can dramatically scale the ability of organizations to partner with others and have much more fine-grain yet fluid relationships to manage their business. In addition, codifications of rules of engagement and operation can cut costs, remove errors and be more auditable (see the "Smart Contracts" profile in "Hype Cycle for Blockchain Business, 2017"). Smart contract technology offers promise; however, these are early days in evolution, and more technology maturity and regulatory clarity is needed for growth (see "Be Careful What You Wish for When Engaging Smart Contracts to Support Your Digital Business").

Secondary Effects

- **Identity management for individuals, business and things.** Blockchain's decentralization capabilities allow for identity management to move away from central players to the identifiable person, business or thing in question. This untethering of identity management from central entities can allow users to exchange value directly with anyone else. Control of related services can shift from the central player to the participants, impacting products, services and processes that consume them. Examples of such services include reputation services, know-your-customer information and payments. See our prediction, "By 2022, blockchain-based identity and access management (IAM) will be present in 35% of consumer IAM initiatives, which is a significant increase from fewer than 5%, popularizing new methods to establish trust and resiliency" in "Predicts 2018: Identity and Access Management. Also see "Hype Cycle for Identity and Access Management, 2017" and "Blockchain: The Dawn of Decentralized Identity" for more information.
- **Recordkeeping, tracking and tracing.** Blockchain's immutability and traceability features, permit multiple constituents to rely upon the information being transmitted, drastically reducing disputes and competing claims. These capabilities can also improve the provenance of physical asset usage and transference by providing a guaranteed statement of ownership and activity. Reduction in the possibility of malfeasance in a system can promote trust and, hence, such systems can offer stronger alternatives for storing important data, whether between a government and its citizens, businesses and their customers or even across individuals. They can also assist in improving capital asset management, which positively impacts working capital financing requirements and operational costs. In addition, these properties of blockchain

can be applied to a number of information security use cases, especially, where there is a need to validate data integrity (see "Innovation Insight for Blockchain Security").

Table 1 shows the digital disruption evidence matrix for blockchain.

Table 1. Evidence Matrix

Areas of Disruption	Examples	Direct Effect	Secondary Effects	Direct Effects (Until 2023 Only)	Secondary Effects (Until 2023 Only)
Product, Market, or Industry Displacement	Startups offering solutions based on decentralization are emerging. See companies such as Gnosis and OpenBazaar in "Cool Vendors for Blockchain Applications, 2017" for decentralized businesses. A new wave of blockchain technology platforms and solutions continue to emerge. See "The Evolving Landscape of Blockchain Technology Platforms" for more information. Entrepreneurs are using ICOs. This new mechanism allows entrepreneurs to raise capital by issuing cryptocurrency tokens for prospective investors, in lieu of venture capital or other traditional means of funding.[1]	High	High	Medium High	Medium
Altered Business Metrics	Decentralization will lead to its own set of new metrics to measure the volume and density of peer-to-peer interactions.	Low	Medium	Low	Low
Workforce Enhancement or Displacement	Decentralized business models and ecosystems can have radically different business processes and governance models for their operation and, hence, impacts the work activity.	Medium	Medium	Medium Low	Medium Low
Altered Work Activity	There will be a need for new skills, including cryptofinance, behavioral economics, game theory and cryptography.	Medium	Medium	Medium Low	Medium Low
Customer Buying Behavior	Decentralized business and identities alter how consumers interact with the business, the actors involved and their roles. Consumers and citizens could be empowered with the ability to securely share their data to receive new and innovative services. See companies and projects such as uPort and Sovrin for decentralized identity systems.	Medium	High	Medium Low	Medium

Areas of Disruption	Examples	Direct Effect	Secondary Effects	Direct Effects (Until 2023 Only)	Secondary Effects (Until 2023 Only)
Amount of Spend	Gartner forecasts the business value of blockchain will be $3.1 trillion in 2030 (see "Forecast: Blockchain Business Value, 2017-2030"). Capital raised using ICOs in 3Q17 surpassed $1.2 billion.[1]	High	High	Medium High	Medium
Macroeconomics	Blockchain technology offers scope for new economic models, business design and societal interactions.	Low	Medium	Low	Medium
ICO = initial coin offering					

Source: Gartner (February 2018)

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Measuring the Impacts of Digital Disruption: Introducing Gartner's Digital Disruption Scale."

"Hype Cycle for Blockchain Technologies, 2017"

"Hype Cycle for Blockchain Business, 2017"

"Forecast: Blockchain Business Value, Worldwide, 2017-2030"

"The Disruptive Potential of Blockchain Technology"

"Cool Vendors in Blockchain Applications, 2017"

"Cool Vendors in Blockchain Platforms"

"Maverick* Research: How Blockchain Undermines the Value Proposition of Platform Businesses"

"Practical Blockchain: A Gartner Trend Insight Report"

"Use Gartner's Framework for End-to-End Supply Chain Traceability"

"Predicts 2018: Identity and Access Management"

Evidence

[1] CoinDesk Research.

More on This Topic

This is part of an in-depth collection of research. See the collection:

- Blockchain-Based Transformation: A Gartner Trend Insight Report

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