Practical Blockchain: A Gartner Trend Insight Report

Published: 3 March 2017 **ID:** G00325933

Analyst(s): David Furlonger, Ray Valdes

Blockchain is evolving from a digital currency infrastructure into a platform for digital transformation. This report helps CIOs understand its use, and whether the hype is true about how it can help with transaction costs, integration, technology readiness, business-model creation and efficiency.

Opportunities and Challenges

- Blockchain technologies offer a radical departure from the current transaction and record-keeping mechanisms and can serve as a foundation of disruptive digital businesses, for both established enterprises and startups.
- Blockchain technologies enable a standard trust architecture that allows untrusted entities (both human and nonhuman) to undertake commercial transactions and exchange value with a diverse range of assets.
- Many blockchain technology and foundational concepts are immature, poorly understood and unproven in mission-critical, scaled business operations.
- Blockchain technology has operated outside traditional legal, accounting and institutional governance frameworks, threatening long-standing working practices.

What You Need to Know

CIOs involved in building and expanding a digital business must be aware that:

- Blockchain is an alternate computing model that uses distributed and decentralized computing networks to potentially offer greater levels of security and lower costs than traditional methods.
- Blockchain offers a new way to manage trust between untrusted parties by supporting an immutable record of transactions and other types of value exchange.
- Many blockchain technologies are not fully developed, are untested, and will require early adopters to accept significantly increased levels of operational risk over the next five to seven years.

- The vendor ecosystem is neither cohesive, nor fully formed, and consortia are jockeying for attention with professional services firms and startups requiring careful, multilayered evaluation of the market.

Insight From the Analyst

The Blockchain Revolution Promises to Touch Every Industry

 David Furlonger, Vice President and Gartner Fellow

 Ray Valdes, Vice President and Gartner Fellow

> "The blockchain revolution began with bitcoin, which used distributed ledger technology to foster trust in a currency and transaction mechanism not backed by any government or traditional institution."

Visionary entrepreneurs and CIOs building and expanding digital businesses are keeping the flow of transformation going. Their goal is to reinvent the very nature of commercial activity by removing intermediaries and enabling more-fluid business processes to be conducted in diverse ecosystems. This report explains the practical realities facing CIOs, business leaders, developers and other potential adopters of blockchain technology.

This is not just a new technology to improve existing transaction mechanisms; blockchain provides greater levels of security, it creates new forms of assets, and it offers unquestionable provenance of anything conveyed over the network. Financial services was the first industry sector to recognize the technology's promise, particularly its potential for cost reduction (for intercompany reconciliation, for example). However, blockchain technology has applicability to many business areas including government, healthcare, education, manufacturing, energy and supply chain.

The anticipated benefits from these use cases raise a conundrum, in that embracing the efficiency and cost benefits of blockchain may also contribute to an enterprise or institution's demise. For example, and perhaps ironically, while financial services firms (and any other entity performing a centralized intermediary role in an industry) see the benefits of improving a variety of processes — from trade finance to securities settlements, as well as transaction and records management — they also face the ultimate threat of total disintermediation from the implementation of a decentralized, distributed P2P network that potentially makes the traditional centralized business model irrelevant. Similarly, technology vendors are faced with the threat of significant stack rationalization as the distributed network and applications, and shared, secure "golden record" of data, potentially negate the need for convoluted transaction reconciliation, databases, and assorted other technologies.

Many business leaders, however, have read magazines or seen TV reports about blockchain without fully grasping what it is, and what impact it might have on their businesses, industries and even

society. CIOs have a role to play in providing guidance in business language that allows the risks and opportunities to be properly understood. Because blockchain is not a tactical response to a standard technology problem, clear strategic foresight must be developed — and often enhanced with multiple business-use-case proofs of concept (POCs). CIOs that invest in studying and experimenting with this emerging technology will be in a better position to address their boards and senior executives with greater clarity and with a stronger fact base.

It is critical at this stage in blockchain's evolution that hype is recognized, and the emergent nature of the technology and its capabilities are clearly understood. Moreover, much of the discussion about blockchain focuses on the technology itself, and diverts attention away from the radical societal and business shifts it could enable (through the introduction of smart contracts that execute without human intervention, the facilitation of thing-to-thing, thing-to-person and thing-to-business relationships, or changing the nature of commercial identification and transaction authentication, for example).

This report explains the practical realities facing CIOs, business leaders, developers and adopters of blockchain. It is the first of two Trend Insight Reports that will be published in 2017, giving clients a firm basis from which to start business conversations, develop their thinking, and refine their approaches to using blockchain as the foundation for building and enhancing a digital business and creating a new civilian infrastructure.

Executive Overview

Definition

Blockchain promises genuine long-term potential for the global transformation of economies and industries that, over time, will lead to the era of the programmable economy (see "Maverick* Research: The Programmable Economy Is the Ultimate Destination for Digital Business"). A practical approach to blockchain development demands a clear understanding of the business opportunity, the capabilities and limitations of blockchain technology, a trust architecture, and the necessary skills to implement the technology. Blockchain technology addresses use cases across every industry and government.

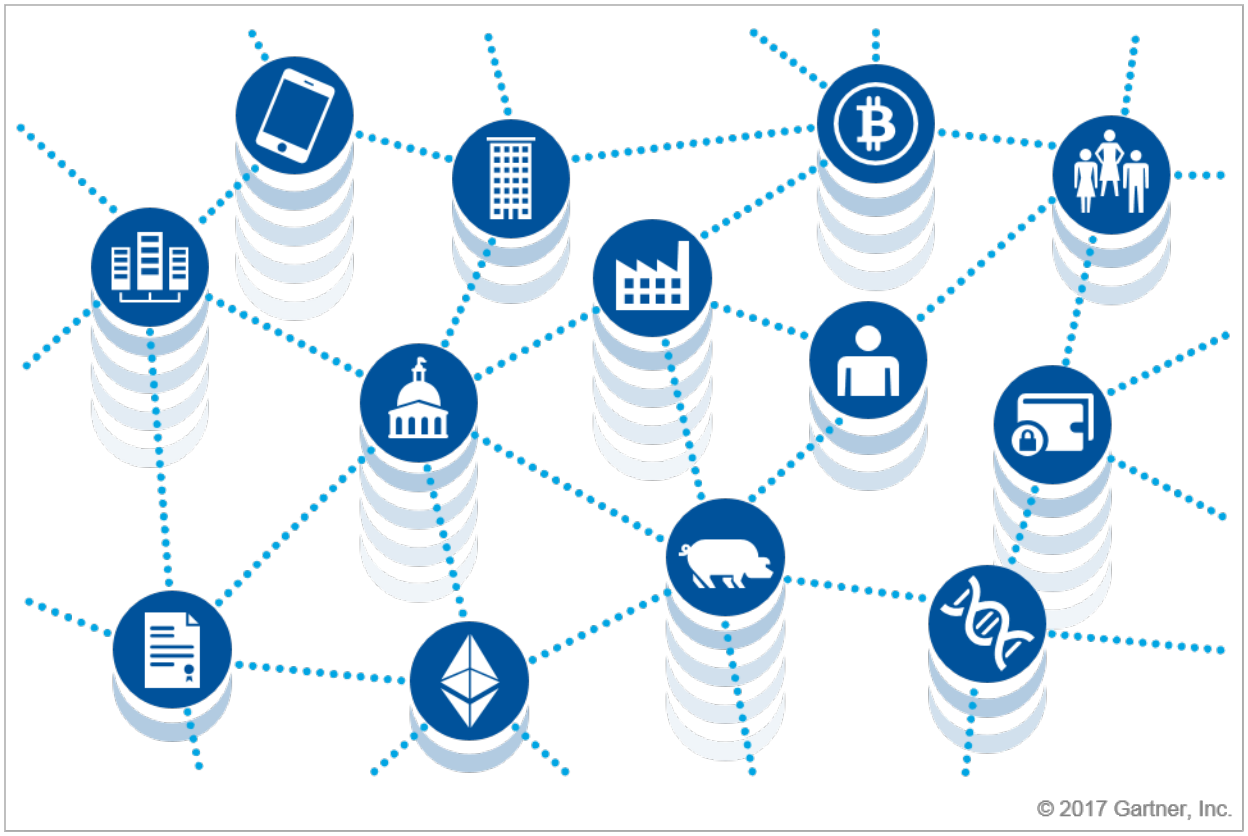
Blockchain's key attributes and potential benefits are:

- Improved cash flow
- Lower transaction costs

- Asset provenance
- Native asset creation
- New trust models

In the first-generation model, blockchain is a type of distributed ledger in which value-exchange transactions (in bitcoins or other digital tokens) are sequentially grouped into blocks. Each block is chained to the previous block and immutably recorded across a peer-to-peer network, using cryptographic trust and assurance mechanisms. Depending on the type of ledger and implementation, transactions can include programmable behavior.

Figure 1. Blockchain Instills Trust in all Parts of a Transaction Chain



Source: Gartner (March 2017)

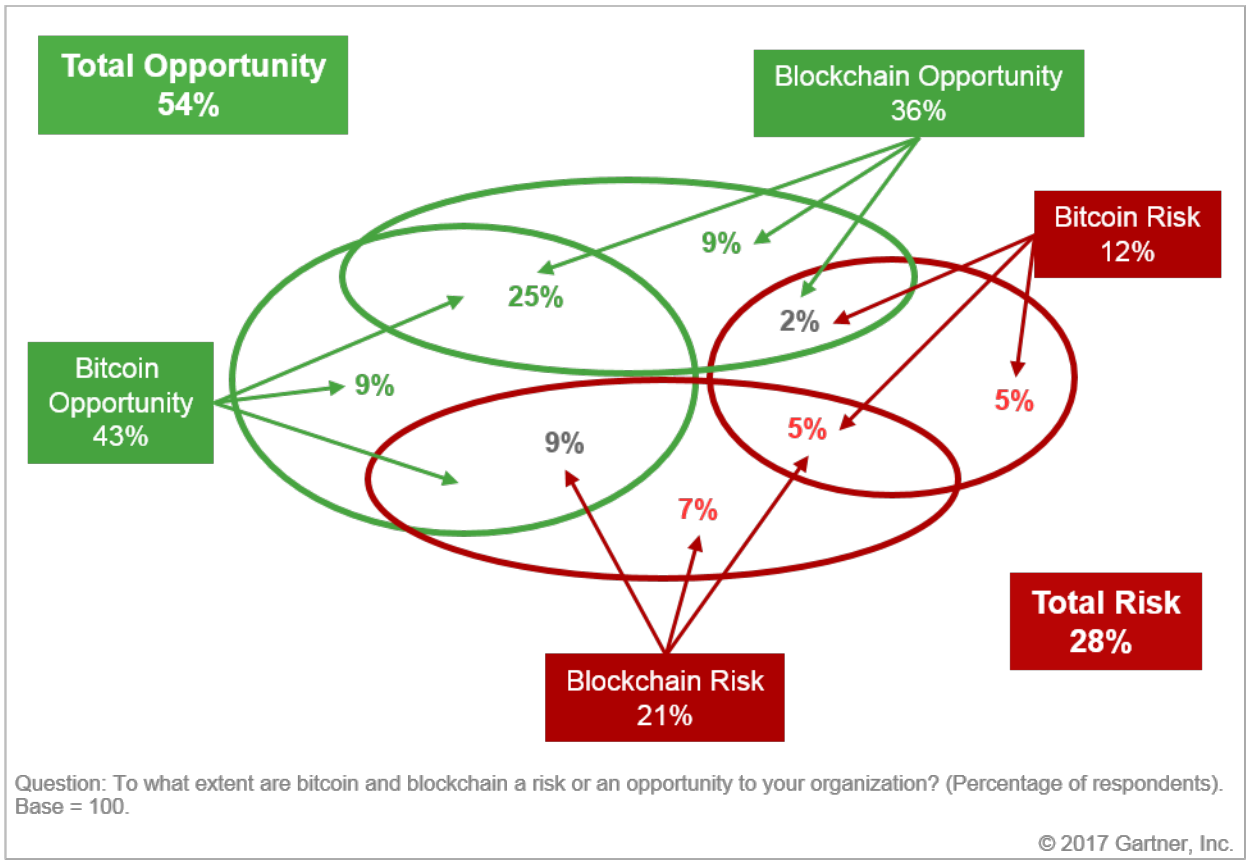
Research Highlights

Priming the Pump: Get Your Enterprise Ready

"Blockchain is generating huge interest from multiple industries and continues to rank as one of the highest growth searches on gartner.com."

The buzz around blockchain has placed it at the Peak of Inflated Expectations in Gartner's "Hype Cycle for Blockchain Technologies and the Programmable Economy, 2016." Moreover, based on Gartner's boards of directors survey (see "Survey Analysis: Boards' View of Digital Business Will Force CIOs Out of Their Comfort Zone") blockchain and digital currencies are seen as an opportunity that must be investigated (see Figure 2). This interest — at the most senior levels — is putting pressure on CIOs to quickly gain a clearer understanding of the nature of the technology, its economic potential, and its relevance to meeting business demands.

Figure 2. Board-Level Opinions on Blockchain and Digital Currencies



Source: Gartner (March 2017)

Enterprises face multiple dilemmas when contemplating the use of emerging and complicated technological developments. They are keen to exploit the advantages that blockchain purports to offer, yet they are simultaneously — and justifiably — wary of the potential risks, both from a technological and a business standpoint.

In the short term, that wariness will make all but the most pioneering firms fall behind in their development of blockchain's potential. In the long term, however, blockchain won't merely make enterprises more cost-efficient; it could change the very business models they operate under, and transform whole industries and even the larger global economy.

"While faced with uncertainty and a confusing set of messaging from vendors and promoters — as well as concerns about legality and legitimacy — Gartner believes that CIOs and business leaders should be cautious about the anticipated evolution of blockchain, and its ultimate ability to be a game-changer."

Regardless of vendor claims, Gartner anticipates that, through 2018, 85% of projects with "blockchain" in their titles will deliver business value without actually using a blockchain. Regardless of whether the technology challenges can be overcome (see "The Bitcoin Blockchain: The Magic and the Myths"), multiple business issues persist, including legal and regulatory considerations, institutional frameworks, and the very nature of how society functions in a distributed, autonomous, P2P context.

Consequently, CIOs and business leaders must take a measured approach to understanding how to balance the current reality of blockchain technology maturity, the potential for divergent (and therefore not easily interoperable) blockchains, and capturing the anticipated business opportunities. A SWOT analysis (see Figure 3) can ground conversations with senior executives and prepare their enterprises for more radical change as part of their digital business transformation initiatives.

Figure 3. Blockchain Strengths, Weaknesses, Opportunities and Threats (SWOT)

Strengths	Weaknesses
▪ Distributed resilience and control ▪ Decentralized network ▪ Open source ▪ Security and modern cryptography ▪ Asset provenance ▪ Native asset creation ▪ Dynamic and fluid value exchange	▪ Lack of ledger interoperability ▪ Customer unfamiliarity and poor user experience ▪ Lack of intraledger and interledger governance ▪ Lack of hardened/tested technology ▪ Limitation of smart contract code programming model ▪ Wallet and key management ▪ Poor tooling and poor developer user experience ▪ Skills scarcity and cost ▪ Immature scalability ▪ Lack of trust in new technology suppliers
Opportunities	**Threats**
▪ Reduced transaction costs ▪ Business process acceleration and efficiency ▪ Reduced fraud ▪ Reduced systemic risk ▪ Monetary democratization ▪ New business-model enablement ▪ Application rationalization and redundancy	▪ Legal jurisdictional barriers ▪ Politics and hostile nation-state actors ▪ Technology failures ▪ Institutional adoption barriers ▪ Divergent blockchains ▪ Ledger conflicts/competition ▪ Poor governance

Source: Gartner (March 2017)

In addressing the issues raised in this analysis, CIOs and business leaders need to:

- Have a firm grasp on how to address the flow of questions from the CEO and board of directors. There is a clear need for gathering education and increasing awareness at this time, especially in the context of risk management, business-model impact, and future designs of industries.
- Manage business expectations as vendors, professional services firms and general market commentary put pressure on planning cycles. Enterprises do not need to sign million-dollar deals to investigate blockchain's potential. Involvement in various consortia may help improve general grounding in the concepts and technology capabilities, as well as allowing access to broader/deeper skill sets. This is all on the condition that there is a clear recognition as to the cost of involvement (in terms of time, money and intellectual consideration) with no immediate prospect of a return.

- Undertake measured R&D/innovation efforts with the primary objective of identifying realistic use cases and learning how to support the adoption of this technology.

CIOs should also undertake a digital readiness assessment to ensure the organization is capable of adopting such radical changes to its business model, processes, appetite for risk and existing technologies (see the Gartner Recommended Reading section).

Related Research

"What CIOs Should Tell the Board of Directors About Blockchain": Many boards of directors will call upon their CIOs to brief them on blockchain due to the current market hype. CIOs should focus on three points: a description of blockchain, frictionless markets and the cross-industry business impacts of a programmable economy.

"Blockchain: Managing Business Expectations": Inflated expectations caused by blockchain hype make it crucial to ensure that everyone in the enterprise understand what benefits the technology can realistically provide.

"How to Determine If You Need a Blockchain Project, and If So, What Kind?": Many successful blockchain proofs of concept fail to turn into projects meant for real use. By following a structured process, CIOs can determine if they need a blockchain project, and if so, what kind.

"How to Develop a Business Case for Blockchain Projects": Business cases for blockchain projects should focus on the unique strengths and challenges of this nascent technology. This research note outlines the key benefit, cost and risk elements that CIOs need to address in blockchain business cases.

"Market Guide for Blockchain Consulting and Proof-of-Concept Development Services": Many organizations are looking to consultants for help in understanding the applicability and impact of blockchain for their business. Qualified resources are scarce. Sourcing and vendor management leaders can use this research to identify potential partners.

"Top 10 Mistakes in Enterprise Blockchain Projects": Blockchain technology is at the Peak of Inflated Expectations in Gartner's Hype Cycle, which means that the Trough of Disillusionment is not far off. CIOs should be aware of the common mistakes that can lead to disappointment and failure in enterprise blockchain projects.

"Toolkit: Blockchain Consortium Initiatives": With so many blockchain consortium initiatives, CIOs feel lost. This Toolkit provides an overview of current consortia and their key characteristics. Bank CIOs will gain a better understanding of the landscape to improve decision making concerning selection and potential membership.

"Five Essential Actions to Prepare TSPs for the Enterprise Blockchain Market": The enterprise IT market shows significant early interest in blockchain and there is a new blockchain ecosystem with little presence of traditional TSPs. Technology business unit leaders must adopt Gartner's five preparatory actions now to capitalize on forthcoming enterprise adoption of blockchain.

"Market Trends: What CSPs Should Do About Blockchain": Leading communications service providers (CSPs) have begun exploring blockchain as they seek to innovate and offer new services. CSP technology business unit leaders can use this research to tackle the disruptive nature of blockchain to generate, manage and transform innovation into business opportunities.

"Report Highlight for Market Trends: Look Beyond Technology to Succeed in Blockchain": Significant interest in blockchain from the banking, securities and insurance industries is confined mostly to proofs of concept, without ensuing production-level projects. To achieve growth, technology product management leaders must help clients build convincing business cases.

Blockchain's Varied Uses

Once executives are educated about the strengths, weaknesses, opportunities and threats of blockchain, and the enterprise is prepared for radical change, CIOs and business leaders need to gain a clear understanding of the mission-critical priorities that blockchain could address. A solid footing for proof-of-concept initiatives and business use cases will be key.

"CIOs and business leaders need to be aware that, of the several hundred use cases being discussed in the market, none are in full production — even in the financial services Industry."

In November 2016, at one of Gartner's regular Blockchain SteerCo meetings,[1] we asked the attending financial services firms (mainly Tier 1 pioneers, exchanges, large payment utilities and central banks) how many had embarked on a blockchain POC over the previous two years. All 32 organizations raised their hands. We then asked how many of these were still operational — only four hands stayed aloft, and of those, only one had live code running (and that was in a test environment).

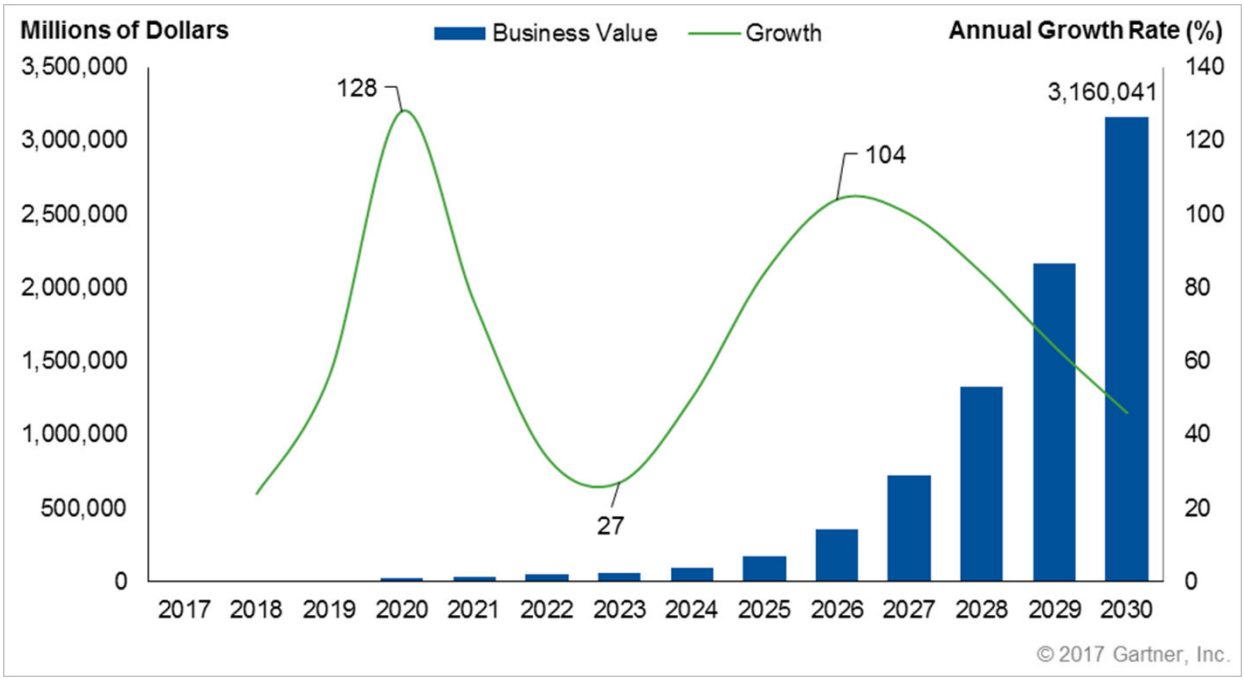
The bottom line is that no enterprise has yet been able to take a POC to scale. This is partly a technology issue, but inhibitors also include multiple business challenges (including legal, risk, accounting, culture and strategy). That said, discovery and experimentation is critically important. POCs help improve cross-enterprise collaboration and uncover the "art of the possible."

Outside of focused problem solving, the opportunity to assess the strategic picture for an entire industry should be considered. Like the internet before it, blockchain has the potential to reshape industry dynamics and disintermediate central actors (such as banks, government agencies and lawyers) in their market context. No industry is immune, and neither are governments. The ability of blockchain to provide information transparency and immutability, the potential for smart contracts, and the opportunity to create new business models should force CIOs and business leaders to review the fundamental aspects of their value chains, and urgently conduct scenario planning and/or implication theory analysis.

Clearly these opportunities paint a landscape of future economic development and potential growth that is worthy of assessment, especially as Gartner predicts that:

- By 2022, at least one innovative business built on blockchain technology will be worth $10 billion.
- By 2030, 30% of the global customer base will be made up of things, and those things will use blockchain as a foundational technology with which to conduct commercial activity.
- By 2025, the business value added by blockchain will grow to slightly over $176 billion, then surge to exceed $3.1 trillion by 2030 (see Figure 4).

Figure 4. Forecast: Blockchain Business Value, Worldwide 2017-2030



Source: Gartner (March 2017)

Having a grasp on the economic potential for blockchain is essential to better analyze investment spend and prioritization, by industry and geography. As with many prior emerging technology-enabled changes, the "s curve" of growth is quite pronounced, and this Trend Insight Report offers Gartner clients a forecasting tool that will help them to better understand the impact on their business.

Related Research

"Blockchain Trials Across Industries Show the Pulse of a Rapidly Moving Professional Services Market": Gartner analyzed 129 blockchain consultancy engagements carried out by providers, giving essential insight into the market. Sourcing and vendor management leaders can use this

insight to understand the emerging professional services market for blockchain and leverage it for maximum business benefit.

"Toolkit: Government Use Cases for Blockchain": Government interest in blockchain technology is intense and diverse. This Toolkit provides CIOs and executives with use cases and guidance to help them evaluate and make more informed choices about blockchain-related innovation for their organizations.

"Toolkit: Overview of Blockchain Use Cases": Many industries are looking at blockchain. CIOs and business executives can use this Toolkit to understand the conceptual focus of blockchain developments and organizations conducting R&D. Thus, they can increase strategic dialogue internally and engage customers early in blockchain innovation.

"How CIOs Can Identify Viable Blockchain Use Cases in Insurance": Blockchain promises to revolutionize the insurance industry, but it is still an emerging technology with a lack of standards and unproven use cases. CIOs should use this research to help their innovation teams focus on blockchain use cases that align with their organization's strategic objectives.

"Blockchain in Utilities: Promise and Reality": Utility industry interest in blockchain technology is rising. By understanding the potential uses of blockchain, utility CIOs can make more informed choices about their aspirations for and approaches to blockchain-related innovation.

"Blockchain Will Drive Digital Branding in Consumer Goods Manufacturing": Blockchain technology is positioned to provide a platform that could enable consumer goods manufacturers' CIOs to embed digital value in physical products. This could result in more protectable brand differentiation and innovative value propositions.

"Why Retail Payments Systems Don't Need Blockchain": Retail payment systems could benefit from an injection of innovative thinking, but blockchain and distributed ledger technologies won't be ready to transform retail payment value chains for at least five years. Bank CIOs must recognize this barrier to their digital banking strategies.

"Forecast: Blockchain Business Value, Worldwide, 2017-2030": Gartner's new business value forecast methodology is a method to quantify the value of technology innovation rather than the dollars spent upon it. The business value-add of blockchain will grow to slightly over $176 billion by 2025, then surges to exceed $3.1 trillion by 2030.

"Seven Things That Supply Chain Leaders Need to Know About Blockchain": Blockchain has the potential to transform and disrupt supply chains by documenting, validating and securing each step of the chain with an unerasable history. This note provides supply chain leaders with an overview of blockchain concepts and issues, including some early pilots.

Using an Immature Technology in the Best Way Possible

> "Using an immature technology such as blockchain means CIOs and their business peers are pioneers of a sort. Just like any pioneers, they must realize they are entering a world where new rules, new risks and new opportunities can be found"

Studying the new landscape before plunging ahead, or learning how to recover from mistakes, are essential qualities for any enterprise looking to gain a competitive edge by using a new technology. This is especially the case with blockchain, because it brings together several technological components from which enhanced value can be achieved.

These include:

- Consensus mechanisms
- Records management
- Encryption
- Digital wallets
- Distributed networks
- Asset creation
- Transaction execution

Some of these technologies stem from 20th century software (for example, encryption and the Practical Byzantine Fault Tolerance algorithm). Some are newer (such as "smart contract" programmable value exchange).

Blockchain provides an opportunity to radically rationalize application, transaction processing and records management technologies by providing a standard architecture to address business problems including removing the need for reconciliation on an intracompany, and intercompany basis.

However, while many innovation labs are focused on the core development aspects of blockchain technology, it is rare that we find enterprises that have (or are adequately addressing) broader, critical technology process and operational issues.

There are a number of questions for CIOs to consider as they review the technology choices in front of them:

- What platforms or technologies are in the market, and which ones are ready for testing, let alone production use?
- How does the potential development or acquisition of blockchain technologies impact existing IT strategic plan (in terms of the use of open source, APIs or integration)?

- How will distributed ledgers impact existing information management strategies and operations?
- Are the right skills in place to consider blockchain development and deployment?
- How will blockchain usage impact the enterprise's risk policies and procedures (as well as the implications for legal and regulatory guidelines and rules)?
- Which architecture and implementation styles should be considered based on the business context?

Regarding this last point — blockchain has three inherent architectural considerations: platform, solution and ecosystem, as well as differing implementation styles — intraenterprise, private, hybrid and public. CIOs and their business counterparts must evaluate the criteria surrounding public (permissionless) and private (permissioned) deployment styles. Failure to accommodate the right architectural approach could lead to significant operational risk issues, loss of intellectual property and/or missed business opportunities.

Therefore, before any blockchain system can be considered ready for production, Gartner believes it is critical to address the challenges that blockchain's technological immaturity presents. It is also important to understand that, of the approximately 75 blockchain platform providers, not all will survive. The vast majority are startups, and we know that the majority of those will fail.[2]

CIOs need to accommodate a volatile supplier landscape in their planning and research and development initiatives over the short term. As we have previously experienced with major technology innovations (for example, with the e-commerce, social and mobile platform supplier market) several years need to lapse before a stable and more-dominant platform supplier market establishes.

Gartner predicts that, by 2025, five blockchain/distributed ledger platforms will be "mainstream" commerce platform enablers.

Related Research

"How to Make the Most of a 'Pointless' Blockchain Project": Many enterprises undertake blockchain projects that are poorly conceived, misaligned with business requirements, and poorly supported by current blockchain technology. But it's still possible for CIOs to derive some value from these projects, as this document shows.

"Blockchain Usage Depends on Blockchain Wallet Platforms": Existing cryptocurrency wallets are too functionally limited to be sustainable as stand-alone solutions. The real potential for bank CIOs and digital business leads is in being able to manage and integrate blockchain activity — not just transactions — into existing digital interfaces and platforms.

"Building Blockchain into Your Data and Analytics Program": Blockchain's distributed trust model promises to remake existing business processes. Data and analytics leaders must recast existing data management and analytics capabilities and add new competencies to manage risk and exploit new opportunities.

"Adapt Your Information Governance for the Rise of Blockchains": The distributed trust model of blockchain technology introduces new business opportunities and promises to unsettle many existing business processes. Data and analytics leaders must adapt their information governance practices to this new reality, if their organizations are to remain competitive.

"The Evolving Landscape of Blockchain Technology Platforms": The competitive arena of blockchain technology platforms consists of more than 70 contenders — either announced or emerging. CIOs must recognize the evolutionary path of blockchain technology, and the competitive dynamics of this sector, if they are to manage the risks of platform selection.

"Toolkit: The Current Landscape of Blockchain Patents": The opportunities for blockchain use-case development seem boundless, so validating and protecting IP will become more important. CIOs will be challenged to codify the specific nature of the technology innovation and, therefore, the quality of the filing and its competitive and legal protection.

"Understanding Blockchain Platform Architectures and Implementation Styles": Market perception is that there are two types of blockchain architectures: permissioned and permissionless, but the situation is much more complicated. CIOs must understand the relevant components and styles to make appropriate choices when developing blockchain use cases.

"Be Careful What You Wish for When Engaging Smart Contracts to Support Your Digital Business": Smart contracts will eventually automate the mass personalization of value exchange. Today the technology is immature, mercurial and once live is irrevocable. CIO's should invoke at their peril.

Related Priorities

Table 1. Related Priorities

Priority	Focus
Building a Sustainable Innovation Process and Culture	The building of a sustainable innovation process and culture initiative helps drive innovation within teams and across the broader enterprise.
Developing and Managing the Governance of IT in a Digital Business Context	IT governance requires a reset as digital business changes its foundations. This initiative helps organizations create a business-IT governance model that encompasses digital technologies.
Aligning IT, IoT and Operational Technology Investments	Aligning IT, Internet of Things (IoT) and operational technology (OT) investments prepares for the integration of these systems and the data they generate in order to succeed with digital business.

Source: Gartner

Gartner Analysts Supporting This Trend

 David Furlonger

 Ray Valdes

 Rajesh Kandaswamy

Related Resources

Webinars

"The Blockchain Scenario: Algorithmic Business and the New Economy"

"Blockchain: How Real Is the Market?"

Podcasts

"Is Blockchain Really Ready for Prime-Time?"

Gartner Peer Connect

"The Future of Blockchain: Viability and Evolution"

Articles

"Top 10 Mistakes in Enterprise Blockchain Projects"

"Blockchain Goes Beyond Financial Services"

"Blockchain Combines Innovation With Risk"

"The CIO's Guide to Blockchain"

Gartner Recommended Reading

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

"Core Banking Renewal: Use This Readiness Maturity Model to Avoid Program Failure"

"Five Key Digital Assessment Trends in U.S. K-12 Education"

"Toolkit: Digital Maturity Assessment for Life and P&C Insurers 2.0"

"Without Adequate Organizational Readiness, Electronic Health Records Program Success Is Unlikely"

"Toolkit: A Checklist Approach to Digital Workplace Execution"

"Retail Digital Workplace Transformation Imperatives"

Evidence

[1] Gartner's Blockchain SteerCo is a peer exchange steering committee initiative to facilitate exploration of blockchain technology and business/government use cases, exploitation opportunities and their attendant risks. These meetings, co-managed by a selected panel of global and regional institutions, and facilitated by Gartner, are intended to cover internal and interenterprise cooperative use cases built on blockchain infrastructure. Attendance is by invitation only, to senior executives (CDOs, COOs, CTOs, CIOs heads of blockchain programs and chief innovation officers). The meetings operate under Chatham House rules to protect confidentiality, and enable meaningful peer-level interactions. They are hosted at Gartner client locations around the world.

[2] "90% of Startups Fail: Here's What You Need to Know About the 10%," Forbes, 16 January 2015.

GARTNER HEADQUARTERS

Corporate Headquarters
56 Top Gallant Road
Stamford, CT 06902-7700
USA
+1 203 964 0096

Regional Headquarters
AUSTRALIA
BRAZIL
JAPAN
UNITED KINGDOM

For a complete list of worldwide locations,
visit http://www.gartner.com/technology/about.jsp