Blockchain Technology Spectrum: A Gartner Theme Insight Report

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Blockchain carries higher stakes for the enterprise than most technologies, but the landscape is fluid and understanding incomplete. This special report offers models and frameworks along with research into technologies and security to help enterprises make the right investments at the right time.

Opportunities and Challenges

- Blockchain technologies offer capabilities that range from incremental improvements to operational models to radical alterations to business models.
- The impact of blockchain's trust mechanisms and interaction paradigms extends beyond today's business, and will affect the economy, society and governance.
- Many interpretations of blockchain today suffer from an incomplete understanding of its capabilities or assume a narrow scope.
- Blockchain's capabilities are neither scalable nor adequately addressed by current enterprise technology frameworks and models.
- Inadequate understanding, lack of proven scalable models, inability to think beyond today's business paradigms, lack of talent, and internal and external pressure to do something lead to tepid proofs of concept (POCs).

What You Need to Know

- By 2023, most of the technical challenges with blockchain will likely have been resolved.
- Enterprises that fail to do sufficient scenario planning and delay consideration of blockchain's decentralization and tokenization risk being disintermediated or failing to seize the most business value from blockchain.
- Leaders who want to make good investments in blockchain need a clear model of the blockchain universe, its evolution, and various aspects of technologies and their importance. They will also need to understand the impact of these capabilities on the enterprise's operating model initially and its business models eventually.

Insight From the Analyst

Enterprise Thinking About Blockchain: Limited View of Blockchain's Capabilities, But an Exaggerated View of Its Readiness

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Most enterprise blockchain initiatives today are POCs that do not have merit, and only 5% to 10% of current POCs will graduate to a preproduction solution, with major refactoring of requirements and architecture. Even the ones that proceed beyond POCs:

- Use a subset of blockchain capabilities
- Preserve current business models
- Offer little or no decentralization and tokenization, the most valuable features of blockchain

A combination of factors has led to this situation:

- The immaturity of technology solutions to support enterprise needs
- Inadequate or incorrect understanding of capabilities
- Unwillingness or inability to think beyond today's business models and processes
- Inability to secure buy-in from all parties needed
- Lack of proven enterprise success

But that does not mean you should simply wait for full-blown blockchain solutions to appear. You still need to prepare for blockchain. Unlike most emerging technologies, blockchain can bring dramatic changes to your business and operating models. Enterprises must develop a clear understanding of blockchain's capabilities and apply systematic approaches to determine potential uses. This understanding will help leaders apply the right dose of investment at the right time. This approach is vital for you to participate in the programmable economy, empower peer-to-peer transactions or do the other things that blockchain will eventually support.

To help the enterprise prepare exploit blockchain, Gartner's Blockchain Center of Excellence (COE) performed a deep-dive into blockchain technologies resulting in this special report. This is the third in our series of special reports, after "Practical Blockchain: A Gartner Trend Insight Report" and "Blockchain-Based Transformation: A Gartner Trend Insight Report."

Executive Overview

Definition

The use of blockchain is at a pivotal stage. Enterprise leaders hear of its potential to revolutionize how businesses can work, and there is never a day without an announcement of a new blockchain POC or pilot or partnership. But as leaders dig deeper, they cannot articulate how exactly blockchain will impact their business, and there are no precedents that they can learn from either. This lack of clarity leads them to loose and light experimentation with blockchain for current processes. Loose experimentation is usually a good way to learn about emerging technologies but often inadequate. Executives should take a carefully thought-out approach with blockchain.

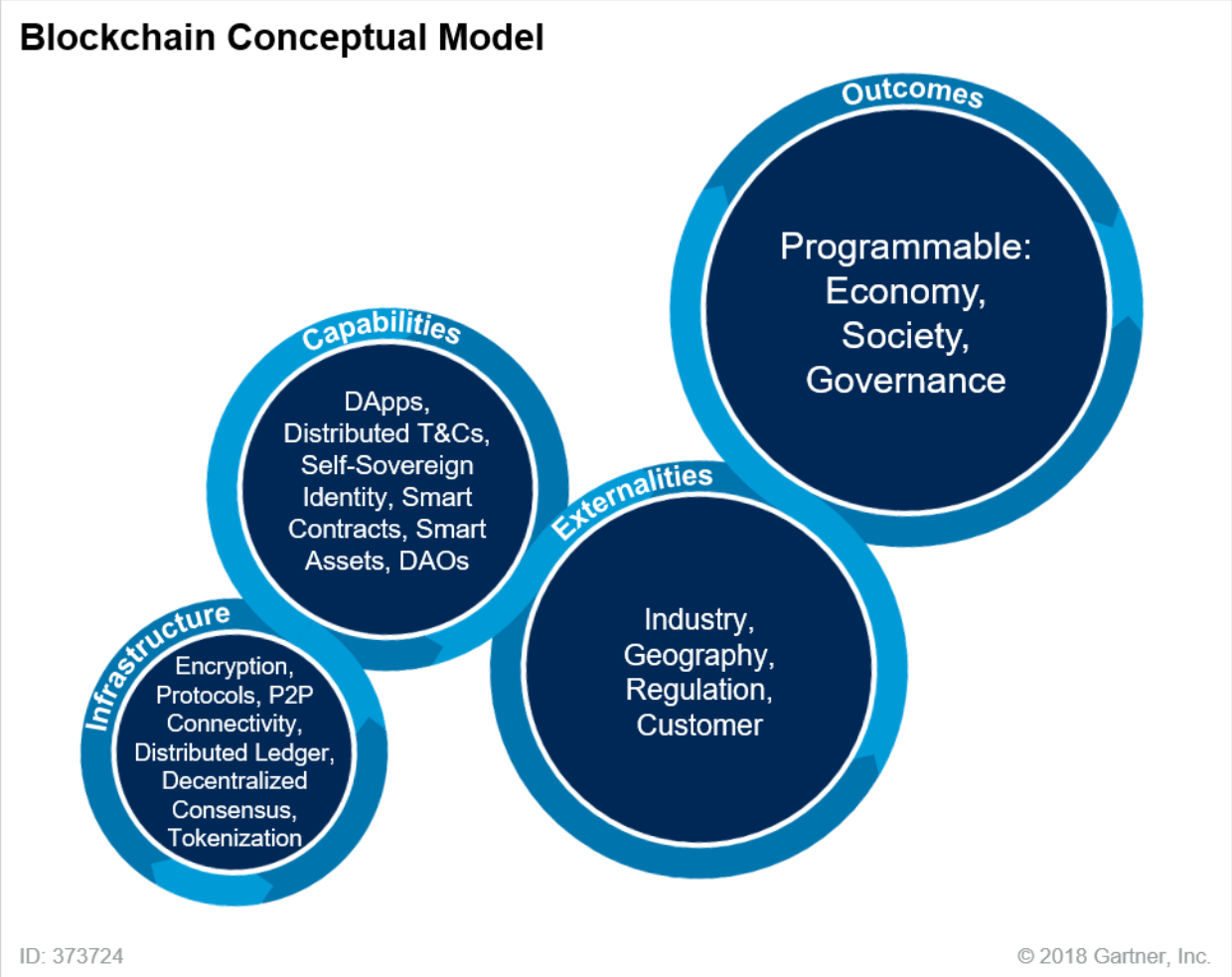
Analysts in Gartner's Center of Excellence have worked with enterprise executives worldwide, and our research leads to two key conclusions:

- Enterprises operate from a model for blockchain that is inadequate for the different capabilities offered by blockchain technologies, the scope of its impact, and what it will take to achieve that impact.
- Enterprises' planned usage of blockchain does not account for the evolutionary nature of blockchain that leads to a spectrum of possibilities over time.

We have created three tools — the Blockchain Conceptual Model, the Blockchain Spectrum and the Blockchain Scalability Model — to address these challenges (see Figure 1, Figure 2 and Figure 3).

> The Blockchain Conceptual Model portrays the scope of transformation enabled by blockchain and its key aspects. Blockchain technologies offer a set of technology infrastructure components that allow for a set of capabilities to build digital systems. These capabilities, while influenced and constrained by a set of externalities, can be used to achieve a set of outcomes across economy, society and governance.

Figure 1. Blockchain Conceptual Model

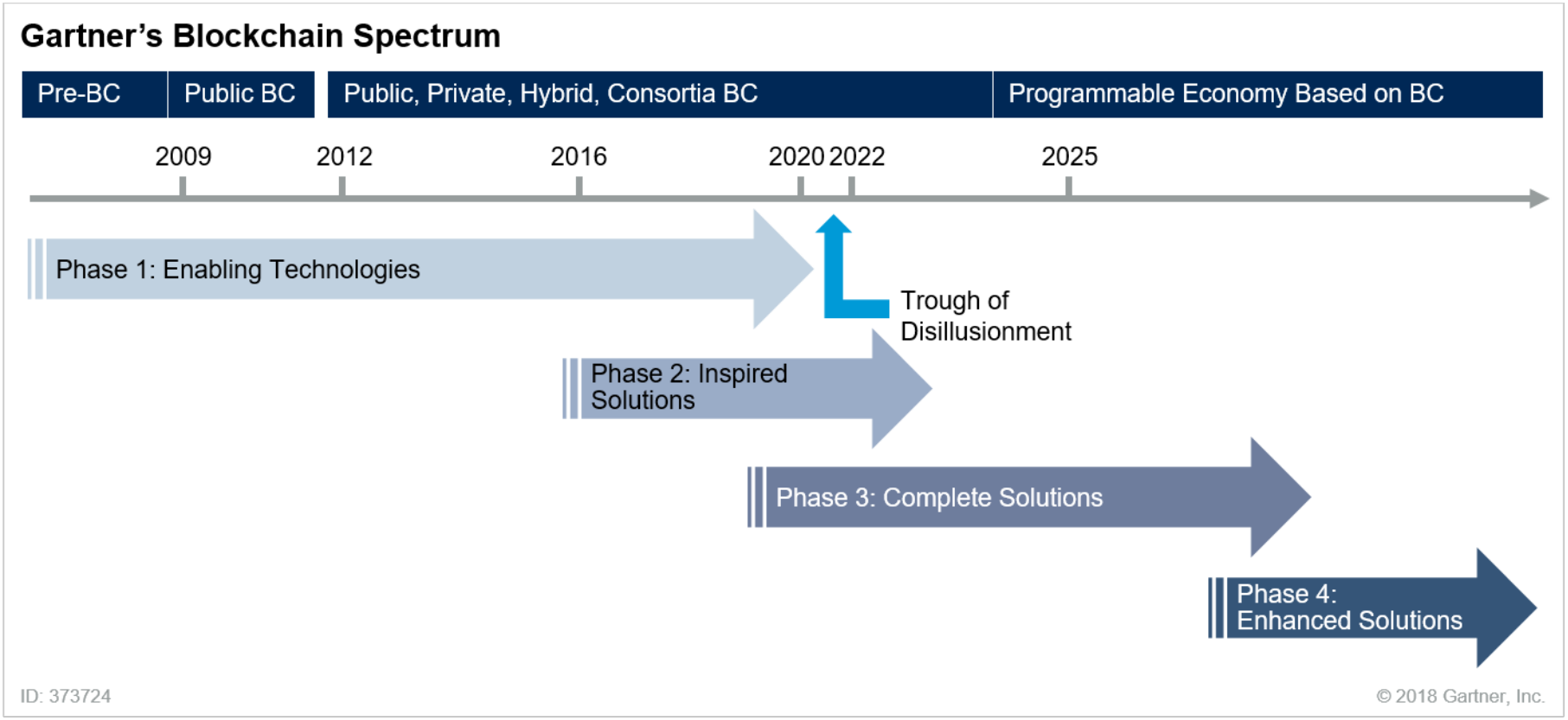


DApps = decentralized applications; DAOs = decentralized autonomous organizations; P2P = peer-to-peer

Source: Gartner (October 2018)

Gartner's Blockchain Spectrum provides a model for examining the evolution of blockchain solutions and how its phases align to the value that businesses can derive. The spectrum will clarify different archetypes for three main solution phases: blockchain-inspired, blockchain complete and blockchain-enhanced solutions.

Figure 2. Gartner's Blockchain Spectrum

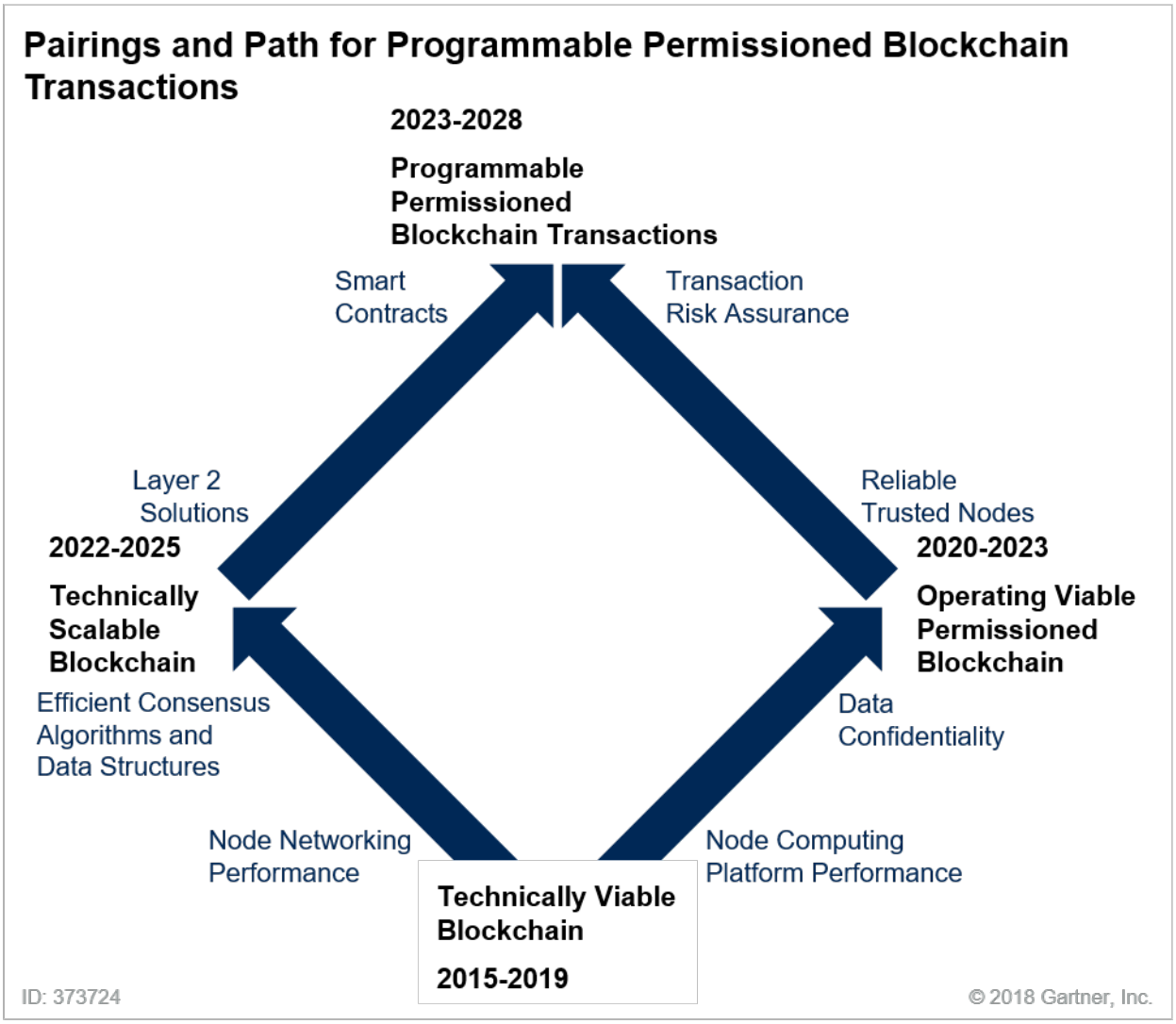


BC = blockchain

Source: Gartner (October 2018)

Gartner's Blockchain Scalability Model defines eight hurdles that must be overcome in order to achieve programmable permissioned blockchain transactions. Four hurdles relate to technical performance while maintaining decentralization, and four refer to operating model challenges that must be overcome so that businesses can successfully participate in private blockchain transactions.

Figure 3. Gartner's Blockchain Scalability Model



Source: Gartner (October 2018)

Research Highlights

Smart Blockchain Investments Require Deeper Understanding of the Technologies

Most technologies help you improve your business processes to support your business models, but blockchain is among a few of the foundational technologies that could do more. Blockchain's features such as decentralization, tokenization, self-sovereign identity and smart contracts can upend business processes and business models. But these features are not fully mature, and current frameworks prove inadequate. The complexity and strategic implications of blockchain technologies demand more models and frameworks. On the one hand, few people as yet really understand the various technologies that blockchain includes. On the other hand, few people know the impact that blockchain will have on business models. The Gartner research below will help enterprises seeking to understand both.

Blockchain's Unique Capabilities and Richness Demand New Models and Frameworks

Blockchain is more than a set of technologies — it offers new paradigms in how business can interact, transact or how assets are represented. Hence, it becomes necessary to look at both the capabilities and which aspects of business these capabilities can impact. Furthermore, today's business and technology can prove inadequate to optimally make use of the capabilities of blockchain technologies. Leaders should look at the full scope of what blockchain technologies can bring in and investigate how it can impact their industry and business, in parallel and conjunction to other technologies and other progress.

Related Research

"Use Gartner's Blockchain Conceptual Model to Exploit the Full Range of Possibilities" — There is still a significant lack of clarity regarding the full capabilities of blockchain and the scope of its potential business impact. Enterprise architecture (EA) and technology innovation leaders should leverage Gartner's blockchain conceptual model to explore business and technology possibilities.

"Understanding the Gartner Blockchain Spectrum and the Evolution of Blockchain Technologies" — Blockchain is often erroneously used as a collective noun. This results in blockchain washing of technology solutions. Many technology vendors are misrepresenting their blockchain-inspired solutions and diluting the full potential of blockchain capabilities. Enterprise architecture and technology innovation leaders, CIOs and business leaders must understand the full spectrum of blockchain possibilities to maximize success.

"The Future of Blockchain: 8 Scalability Hurdles to Enterprise Adoption" — Scalability concerns will continue to hinder enterprise adoption of blockchain. Enterprise architecture and technology innovation leaders must assess technical and operating model scalability factors that will lead to global blockchain scalability by 2022, and plan their projects accordingly.

"Use Gartner's Strategic Tokenization Decision Framework to Boost the Value of Digital Business Ecosystems" — Digital tokens, including cryptotokens, are becoming the main catalysts to create

new markets, monetize new data sources and reinvent industries. CIOs driving digital transformation or exploring blockchain technology need to manage tokens as strategic weapons.

Technologies, Platforms and Data: Blockchain Is a Portfolio of Technologies That Evolve, But Not Always at the Same Speed

Blockchain technologies continue to evolve rapidly, but are immature. The hype around blockchain has reached such heights that many vendors label limited solutions as "blockchain," leading to market confusion. Enterprises should understand all the key aspects of blockchain technologies. It is not one monolithic solution. Leaders need to evaluate blockchain technologies skeptically, category by category, and product by product. They need to ask questions about tools, integration capabilities, data management, scalability and other fundamentals.

Related Research

"Planning for Blockchain Solution Adoption" — Blockchain solutions lay the foundation for business innovation via digitalization and autonomous management of assets, as well as embodiment of business processes in technical protocols. As blockchain matures, technical professionals must assess use cases and plan for adoption progressively.

"Emerging Technology Analysis: Don't Sell Blockchain for IoT, Sell Business Innovation Using IoT" — Technology product managers who overemphasize the blockchain dimension of their Internet of Things (IoT) products and services risk being relegated to vanity projects and dead-end pilots. We provide recommendations to ensure that blockchain products will enable customers to deliver genuine business innovation.

"Top Applications for Blockchain for IoT in 2018 and 2019" — Blockchain for IoT is extremely immature, so technology strategic planners wanting to move beyond experiments and pilots must choose applications where the potential value outweighs the technological and commercial risks.

"Debunking the Top 3 Blockchain Myths for Data Management" — Hype for blockchain-based data management is creating myths around how the technology will replace traditional data management technologies. Data and analytics leaders must understand these myths and the realities behind them to manage business expectations and temper vendor enthusiasm.

"Blockchain Is Not Ready for Master Data Management" — A single version of trusted data is a long-sought goal for enterprises, and master data management has provided this. Blockchain is being hyped as a solution, but is unproven and immature. Data and analytics leaders need to understand how blockchain will — and will not — benefit their efforts.

"Is Blockchain Ready For Enterprise Software Applications?" — The potential to transform business stakeholder relationships as we know them today has created immense interest in blockchain. Technology product managers should develop solutions within current constraints to start delivering value while helping shape a business ecosystem to support enhancements.

"Architecting for Blockchain Ecosystems: A Business-Outcome-Driven EA Approach" — Blockchain creates opportunities to fundamentally transform business where success is tightly coupled to a

business-outcome-driven EA approach. Enterprise architecture and technology innovation leaders must link strategy and execution to achieve targeted business outcomes through blockchain.

“China Summary Translation: ‘Market Guide for Blockchain Platforms’” — Blockchain technology is both nascent and evolving rapidly. Enterprise architecture and technology innovation leaders must focus on building competence and proper expectations for such an immature set of functions and components that constitute a blockchain platform.

“Cool Vendors in Blockchain Technology” — Blockchain technology and platforms are rapidly evolving to accommodate enterprise-grade use cases. We profile three emerging blockchain technology vendors that enterprise architecture and technology innovation leaders should evaluate for blockchain identity and decentralized application services.

“Blockchain Solutions in Supply Chain: 2018 Market Insight” — Immature technology, overhyped expectations and lack of clarity in blockchain offerings are creating confusion in the marketplace. This research helps supply chain leaders understand the shifting market landscape of blockchain solutions.

“Hype Cycle for Blockchain Business, 2018” — Interest in blockchain continues unabated among enterprises. Much of the focus is educational and experimental as executives struggle to understand concepts and applicability. Industries have made some progress, but maturity timelines are uncertain, and adoption at scale remains very scarce.

“Hype Cycle for Blockchain Technologies, 2018” — Blockchain technical capabilities are evolving, but fail to match the extreme hype and are not yet sufficient for mission-critical enterprise use. Blockchain-inspired solutions lead enterprise conversations. The market will traverse the Trough of Disillusionment before significant value is realized.

“Best Practices for Moving Beyond POCs in Blockchain Professional Services” — The immaturity of blockchain technology and provider focus on technical capabilities of solutions hold back the market for blockchain professional services. Technology product managers need to address 16 core solution criteria in order to move business beyond POCs and build service revenue.

Risk and Security: Blockchain Demands More Focus on Risk and Security Than Most Technologies

The complexity of blockchain raises the risk for the enterprise — not just technology risk but especially business risk. At the same time, the business opportunities that blockchain technologies will create will compel many enterprises to implement them. Enterprise leaders will have to learn how to manage these risks, including how to address the security and privacy concerns of blockchain. They will have to build security in from the beginning, not add it on after a blockchain offering has been developed as often happens with less risky technologies.

Related Research

"How to Prevent or Mitigate Ransomware Attacks That Demand Payment in Blockchain Cryptocurrency" — Organizations hit with ransomware attacks should avoid the need to pay the ransom, especially since payments often do not result in returned files, but paying ransom may be the last practical resort. This document guides enterprise architecture and technology innovation leaders on how to best mitigate damage from a ransomware attack.

"Be Prepared to Assess Blockchain as Part of GDPR Compliance Efforts" — Despite conflicts between blockchain's immutability and the EU General Data Protection Regulation's (GDPR's) right to erasure, enterprises can start investigating deployment of blockchain while enhancing GDPR compliance. Security and risk management leaders must implement safeguards to ensure that any blockchain designs comply with GDPR.

"Innovation Insight for Blockchain-Enabled Data Security Applications" — Blockchain promises innovative decentralized methods to establish trust and resiliency for data security. Yet, it is still immature and industry standards are in their infancy. Security and risk management leaders must manage the hype around blockchain and monitor its potential for data security.

"Innovation Insight for Bring Your Own Identity" — Trusted digital identity is critical for enabling digital trust. To take advantage of digital business opportunities, security and risk management leaders must leverage various trusted digital identity models, including bring your own identity (BYOI), to satisfy consumer needs, enabling simple, convenient and secure access.

"Blockchain: The Dawn of Decentralized Identity" — Privacy-preserving decentralized identity services are becoming more feasible. Blockchain platforms provide a suitable environment for these emerging solutions. This reissued report guides technical professionals on decentralized identity and serves as a foundation for other research on this topic.

"5 Steps to Managing Privacy in the Blockchain" — Blockchain and recent privacy regulations are establishing themselves. Security and risk management leaders should focus on the implications of incorporating personal information in the blockchain and learn to differentiate between potential opportunity and catastrophic liability.

"Manage the Digital Risks of Blockchain Initiatives" — Digital transformation has become business transformation and optimization, and blockchain is a potential critical capability enabling that convergence. Security and risk management leaders require digital risk thinking and action to address blockchain risk.

"Better Safe Than Sorry: Preparing for Crypto-Agility" — Sudden and unpredictable algorithmic and cryptographic compromises can leave application security at risk. Security and risk management leaders must prepare for these events by crafting agile response plans.

Other Viewpoints to Consider

"Maverick* Research: Blockchain and the Illusion of Exterminating Central Power" — Despite overwhelming hype, public blockchains will not eliminate central authorities. But they will enable

new mechanisms for unbundling those authorities, and CIOs and business leaders must prepare now for this paradigm shift. (Maverick research exposes unconventional thinking and advice.)

“Maverick* Research: Crypto-Politics and ‘World Wide Ledger’ Will Rock Your Business Competition” — Blockchain evolution mutates the web to the “World Wide Ledger” where organizations can power up decentralized autonomous business units. These entities enable a programmable economy with new politics that change the competitive landscape. (Maverick research exposes unconventional thinking and advice.)

Related Priorities

Table 1. Related Priorities

Priority	Focus
Digital Disruption and Innovation	Digital disruption and innovation research focuses on how organizations can incorporate elements of willful disruption into business and technology strategies.
Driving Business Transformation Through Technology Innovation	As organizations continue to invest in digital business transformation, enterprise architecture (EA) will be the "tip of their business strategic spear" to understand and implement their strategies.
Building and Expanding a Digital Business	Digital business is the creation of new business designs by blurring the digital and physical worlds. Digital business involves the interaction of people, businesses and intelligent "things."

Source: Gartner

Gartner Analysts Supporting This Trend

Gartner has established a research blockchain COE that coordinates research on blockchain across different research and advisory groups. The COE has more than 30 analysts whose research spans areas across different business areas, various industries and technology domains.

Related Resources

Webinars

“Make Blockchain Work for Your Organization”

“State of Blockchain”

“What Security Leaders Need to Know About Blockchain”

“Can Blockchain Transform Your Customer Experience?”

"Blockchain Potential and Pitfalls"

"Blockchain and IoT: Transformational but Immature"

"How Blockchain Can Help Data Security"

"Build Blockchain Into Your Data and Analytics Program"

Articles

"The CIO's Guide to Blockchain"

"Blockchain for Supply Chain Requires These 5 Lessons"

"Why Blockchain Matters to Supply Chain Executives"

"Assess Blockchain for GDPR Compliance"

Gartner Recommended Reading

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

"Blockchain Status 2018: Market Adoption Reality"

"What CIOs Should Tell the Board of Directors About Blockchain"

"Three Things CIOs Need to Know About the Blockchain Business Value Forecast"

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

"Pay Attention to These 4 Types of Blockchain Business Initiatives"

"Blockchain: Evolving Decentralized Identity Design"

"Understanding Blockchain Platform Architectures and Implementation Styles"

"Building Blockchain Into Your Data and Analytics Program"

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