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How can telecom, media, and entertainment find the value in blockchain?

Many TM&E companies work to convert blockchain investments into transformational change

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For telecom, media, and entertainment companies, there is no question that blockchain can advance strategic objectives—and, perhaps, lay the foundation for a truly networked digital economy. The issue is how to apply the technology.

Introduction: Seeking a path forward

Blockchain is complex enough that after any number of primers[1] and TV segments,[2] earnest and semi-satirical, many people remain confused. Much popular coverage focuses on the hype,[3] the frenetic volatility of cryptocurrencies, and ongoing confusion about terminology and functionality.

But many executives—including those in telecom, media, and entertainment (TM&E) businesses—seem to already grasp blockchain's real-world potential to advance strategic objectives and, perhaps, to lay the foundation for a truly networked digital economy.

Deloitte's 2018 global blockchain survey[4] polled 1,053 blockchain-savvy executives across seven countries, including 180 in the technology, media, and telecom (TMT) industry. Eighty-four percent of all respondents believe that blockchain will broadly scale and reach mainstream adoption, 59 percent believe blockchain could disrupt their industries, and 29 percent have already joined a blockchain consortium. Perhaps most importantly, 39 percent intend to invest US$5 million or more in blockchain within the next year.[5] In short, many executives are trying to see for themselves how to apply blockchain capabilities directly to their businesses—from dynamic 5G networks, digital identity, and the Internet of Things (IoT), to stemming piracy, enabling micropayments, and returning more royalties to content creators.

There's still likely far to go, though, for TM&E companies to convert blockchain investments into transformational change. It can be hard to see a clear path forward.

Many companies in finance, banking, and logistics are leading the way in proving viable paths to commercializing blockchain, using it to help improve business processes and unlock new opportunities. These sectors have typically complex ecosystems of partnerships and interdependencies, and blockchain is proving its value as a framework for optimizing, automating, and accounting for transactions across such ecosystems.

The technology's potential ranges from narrow and technical to sweeping. Deploying blockchain as the validating authority for counterparty and M2M transactions can cut costs, reduce disputes, mitigate fraud, secure assets and manage their provenance and use, and modernize accounting and payments. These, in turn, can lay the foundation for much larger revenue opportunities in digital identity, IoT automation, next-generation network services, and comprehensive management of content rights, royalties, and advertising. At a higher level, blockchain can offer a way for entire networks to respond to events and manage themselves more effectively.

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If these opportunities seem grandiose, it's because blockchain technologies have the potential to be transformational, across a broad spectrum of industries. The *Harvard Business Review* compared blockchain to TCP/IP, the transformational technology that specifies how information

DEMYSTIFYING BLOCKCHAIN

Blockchain is fundamentally a network technology but while many networks rely on single servers to store files, blockchain networks are decentralized. A blockchain is distributed across every member of the network, similar to earlier P2P music sharing. There is no single point of failure, and no user is trusted more than any other. When a new transaction is attempted, the entire network is asked to validate the event. If a majority of participants agrees on its validity, a new block containing the transaction entry is added to the chain and the whole network updates. Once a block is added, it can be read but not modified.

Since the entire network holds the data and operates on the chain in unison, it is robust and resilient, limiting centralized chokepoints and intermediaries. Likewise, validation can occur automatically without any need for human oversight. This can help enable fast, secure, and reliable transactions.

Blockchain is also an economic technology, managing and recording the exchange of value. It can function on a broad array of transaction types, such as financial exchanges, escrows, recognizing and provisioning identity, and tracking interactions with networked devices such as smartphones and sensors.

For further explanation of how blockchain works, see Deloitte Insights' *Blockchain: A technical primer*.[6]

is packaged and routed on the internet.[7] But while developers architected the internet to govern how information is managed across networks, they did not design it for the digital economy that was built on top of it. Blockchain is a truly network-native economic technology for the online age, using computation and cryptography to help enable any number of trusted and autonomous transactional services. It's this versatility that has helped drive so much breathless talk of its potential—and the rising forecasts of its future.

Funding has grown along with interest: Revenues from blockchain-based initiatives and companies are expected to grow from US$340 million in 2017 to US$2.3 billion in 2021.[8] In the first half of 2018, venture capitalists moved US$1.3 billion into blockchain startups.[9] Since 2009, the number of blockchain projects on the open-source development platform GitHub has grown significantly, nearly 27,000 new projects were recorded in 2016 alone.[10] For many, interest in blockchain is finally turning into action.

For telecom, media, and entertainment companies, the key may be understanding how such a versatile technology can be applied directly to their businesses. There are now clear paths to implementation—and clear reasons to commit funding. To do so effectively can require an understanding of what blockchain really is and where it can add value.

Blockchain's strengths for TM&E companies

Is blockchain really necessary? After all, plenty of already-existing solutions aim to help telecom and M&E companies mitigate losses, streamline intercompany transactions, and open new strategic revenue opportunities. The answer likely lies with the technology's strength in several areas: Blockchain is cryptographically secure, it automatically records events and transactions into an immutable and shared ledger, it can be built to execute rules, and it is a decentralized and distributed network of peers that all vote to majority validation of any changes.

For the telecom industry, blockchain can prevent fraud, secure user identities, support next-generation network services, and help support IoT connectivity solutions.[11] For M&E, blockchain can

help track and monetize content, address piracy, and manage digital assets from creator to consumer.[12]

Before looking at specific use cases, let's explore some of the core capabilities applicable to TM&E businesses:

1. **Digital identity and trust between parties.** Blockchain can establish a secure record of identities for people, assets, personal devices, and connected IoT endpoints like sensors.[13] This capability can be used to embed "ground truth" into networks, such as a registry of subscribers or media assets. This can reduce fraud and strengthen trust between transacting parties while laying the foundation for identity-as-a-service. The potential here is great. In Deloitte's 2018 blockchain survey, half of the executives polled say their company is working on blockchain identity solutions.[14] Identity can be used to reduce fraud, track content usage, and properly direct royalties. For example, the security company Civic is using blockchain to bring secure identity solutions to users and enterprise, without the need for usernames or passwords.[15]
2. **Automating transactions and accounting.** Blockchain excels at handling transactions and recording them into an unalterable ledger. That ledger is distributed across the blockchain network, making it more secure than centralized solutions. Smart contracts can automate and execute business logic creating settlement efficiencies among parties based on a set of commonly agreed-upon rules. These rules can be encoded into the blockchain to transparently govern how transactions will be treated. For example, this capability can help automate telecom roaming settlements, reducing time-to-payment, creating an immutable accounting record, and improving the working capital cycle for participating entities.
3. **Engagement and movement of assets across a value chain.** Using digital identity, a blockchain can register every interaction with an asset wherever and whenever it occurs. For example, De Beers has begun using a blockchain to track individual diamonds.[16] By validating against the blockchain, a buyer can trust that a particular De Beers gem isn't a conflict diamond. The same identification can apply to digital assets such as music to help ensure royalty payments and bring more transparency to content engagement.
4. **Stronger security and resiliency.** Blockchain can enable companies to bring greater security to users, devices, content, and accounting records.[17] Transactions stored in a blockchain are encrypted, time-stamped, and synchronized across the entire network. Likewise, the identities of transacting parties and devices are cryptographically unique and registered on the blockchain.

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These capabilities are becoming operational for leading businesses in multiple industries. There are many practical applications for telecom, media, and entertainment businesses.

How can TM&E businesses use blockchain?

Emerging technologies often suffer from uncertainty and an unclear path to implementation. This can make it difficult to secure budget when CFOs have other, more direct priorities. But blockchain is now mature enough that there are concrete use cases—and industry examples—with clear steps toward implementation, making it possible to know the costs, establish KPIs, and measure the results.

Telecoms have a unique position in managing the connection between people and content, as well as between devices, sensors, and systems. Media and entertainment companies provide much of the content we access through our digital devices and the ways those interactions are managed and monetized. Blockchain could be a natural upgrade.

The following use cases show examples of how blockchain applies directly to telecom, media, and entertainment businesses. We start with the current challenges of existing solutions, then show how blockchain can be a better solution while unlocking larger strategic opportunities.

Blockchain use cases for telecom

From enormous physical infrastructure and multiparty networks to complex billing, roaming agreements, and an array of services, telecom businesses often face challenges across their value chain. Typically, profits have been steadily eroded by aggressive competition, plateauing growth in subscribers, and disrupters across the market. Costs to develop next-generation networks have generally continued to climb, with minimal returns from subscriber fees. Growth is often increasingly focused on M&A to move up the content stack. And yet telecoms may be uniquely positioned to unlock value by applying blockchain to their core assets: networks, devices, and customers.

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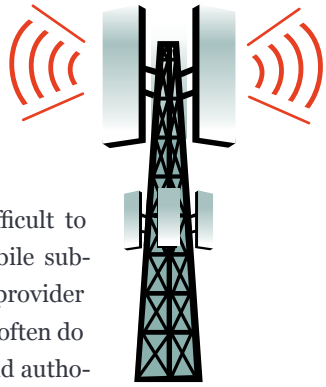
Here are three impactful use cases that reinforce and expand the strengths of telecom businesses:

FROM FRAUD MITIGATION TO IDENTITY-AS-A-SERVICE

Consumer identity on digital networks is typically scattered across a host of services and devices, making it difficult to track customer complaints, resolve intercompany disputes and settlements, and optimize working capital requirements. Many existing solutions are complex and have many points of vulnerability while making it difficult to detect fraud.[18] And while every mobile subscriber has a relationship with their provider through their smartphone, telecoms often do not play a broader role in identity and authorization beyond their subscriber accounts.



What can telecom companies accomplish with blockchain? Telecoms can benefit from blockchain's ability to redefine and streamline a number of business processes such as simplification of billing system reconciliation, reducing revenue leakage from roaming and identity fraud, and automating settlements through the use of smart contracts. Many leading telecoms are already investing in these capabilities. T-Mobile has deployed a blockchain-based solution internally to manage user identity, access, and approvals.[19] Bubbletone, a telecom-focused blockchain solutions provider, executes smart contracts that are based on tariff plans published by different operators to autonomously settle international roaming charges.[20] Another example is the CBSG Consortium for telecoms to develop a blockchain data roaming service with support for secure and monetizable data-sharing between users.[21]

The strategic opportunity: The 2017 Global Fraud Loss Survey estimated that revenue fraud costs telecoms US$29.2 billion annually.[22] By using blockchain, telecoms could mitigate losses from fraud while unlocking new revenue streams for identity. With subscriber profiles and real-time connectivity to every customer through their smartphones, telecoms can play a more central role in digital identity. Such services

could include data marketplaces for users to manage and monetize their personal information—or restrict it accordingly. Deloitte's 2018 Digital Media Trends survey found that 73 percent of American consumers are concerned about sharing their personal data online; their willingness to share data for personalized advertising declined 10 percent from the previous year.[23] Many consumers are losing trust in companies' ability to protect their data. Blockchain can potentially restore that trust. A comprehensive identity solution could be even more valuable when applied to the billions of devices interacting across IoT networks.

SECURING AND MANAGING IOT NETWORKS FOR A CONNECTED WORLD

A 2017 survey of 400 IT executives found that 48 percent had experienced at least one IoT breach, and that associated costs can exceed 13 percent of revenues.[24] Generally, IoT networks are complex, and devices are fragmented with a myriad of protocols. Devices at the edge of networks are often common targets that get compromised, their data stolen, and their processors conscripted into botnets. Furthermore, IoT networks are often anchored to centralized gates that are targeted by malicious actors. When vehicles, infrastructure, and critical industrial and municipal systems become networked, vulnerabilities can turn into catastrophes.

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What can telecom companies accomplish through blockchain? Many telecom companies are becoming some of the leading providers of IoT services. With blockchain, they can offer greater security, resiliency, and automated management of device identity, authorization, provisioning, and transactions. This can lower authentication times, prevent intrusion and spoofing, and potentially unlock demand-based revenue streams for device data.[25] Decentralization can remove common chokepoints and minimize the attack surface for vulnerabilities, while smart contracts extend or revoke provisioning of failing or compromised devices.

The strategic opportunity: IoT technology is growing rapidly, approaching an estimated 30 billion connected devices by 2020.[26] The governments of China, Dubai, and Estonia are piloting blockchain capabilities for identity, trade, and civic service.[27] Similar efforts are under way across the United States.[28] Some, like Nokia's Sensing as a Service platform, seek ways to monetize data from IoT systems by building a data-as-a-service marketplace.[29] Blockchain and smart contracts can help telecoms establish next-generation IoT services with cryptographic security, identity-as-a-service, autonomous management and orchestration, and new revenue opportunities through M2M microtransactions and monetized data. For telecoms, securing and managing networks for billions of IoT endpoints can play directly into their plans for 5G networks.

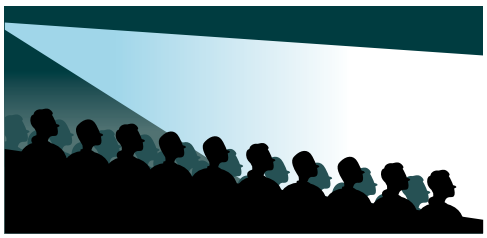
DYNAMIC AND HIGH-PERFORMING 5G NETWORKS

5G networks will likely face greater complexity with dynamic connectivity for billions of devices across an array of access points, including vehicles and smart cities—and the success of 5G will likely require enormous capital and IT investments.[30] With many existing networks, the rules for access are centralized and pushed to client devices. Provisioning of rules is typically not real-time and is slow to respond to changes. Devices can encounter delays in receiving connection policies, rules cannot be easily updated, and there are single points of failure in the client-server model.

What can telecom companies accomplish through blockchain? Telecoms can accelerate their

progress toward 5G by using blockchain to autonomously monitor and regulate their networks. With blockchain, each access point can act as a monitoring node, optimizing bandwidth allocation and securing it dynamically. Rules and agreements for access can be set in smart contracts that execute autonomously and instantaneously from any point across the network. The network can both provision the best connection policy and record the request. This system not only can enable local networks such as private Wi-Fi to monetize access—it can dynamically set local connection prices based on supply and demand.[31] Sprint has partnered with NXM Labs, a secure blockchain company, to develop a high-speed router to handle the data throughput for connected vehicles. They're working to deliver on-demand Wi-Fi to passengers while monitoring vehicle health and safety, all secured with blockchain. The hub will initially run on Sprint's 4G network but will upgrade to 5G.[32]

The strategic opportunity: As a network technology, blockchain can be most effective when used with ecosystem partners.[33] By building strong blockchain consortiums, telecoms can take an industrywide approach to updating their network infrastructure and transactional ecosystems. Such efforts can establish the foundations for next-generation services like 5G, bring greater optimization to network allocation and usage, and enable compensation and reconciliation for innumerable connection points. And they can open new revenue streams by extending service to vastly more endpoints while meeting much greater demand of bandwidth and throughput. Notably, successful telecom consortiums may claim a stronger voice in defining the emerging standards and regulatory frameworks for blockchain itself.



Applying blockchain to media and entertainment

Smartphones and the Web have unleashed a tsunami of publishing and sharing that has helped disrupt the landscape of media and entertainment. The processes for tracking the usage of content and returning royalties to rights holders can be complex, opaque, and underperforming. Revenue losses from piracy and unauthorized use often hurt both creators and content businesses. Blockchain has the potential to mitigate these challenges with a contemporary framework for identifying, tracking, and monetizing content transactions wherever they happen. Yet despite this potential, many of the largest media and entertainment companies have been slow to invest in blockchain.

Blockchain has the potential to mitigate M&E challenges with a contemporary framework for identifying, tracking, and monetizing content transactions wherever they happen.

Here are three key strategic growth areas where M&E companies can use blockchain to strengthen their competitive position.

UNIVERSAL CONTENT REGISTRIES AND RELIABLE ROYALTIES

Tracking content usage is complex and can undercompensate rights owners. There is typically no single source of truth for ownership, and content rights are scattered and sometimes difficult to find. In some cases, ownership of content is impossible to determine, making it more difficult to license and use fairly. All of this adds up to lost revenues for artists and publishers.[34]

What can M&E companies accomplish through blockchain? Blockchain can create better and more

secure content registries that can quickly identify media assets and their owners. The startup Revelator is working to simplify digital rights management and distribute royalties to rights owners more efficiently.[35] The Open Music Initiative, led by IDEO and the MIT Media Lab, has gathered a large consortium of artists and independent publishers.[36] With the stated mission of assuring "proper compensation for all creators, performers and rights holders of music," the initiative is building an open-source protocol based on blockchain to federate search and attestation of media rights.[37] Blockchain can enable content registries that can quickly and automatically identify assets and establish ownership every time the content is consumed.[38]

The strategic opportunity: Blockchain can offer transparency across the media value chain. When every piece of content is uniquely identifiable and rules of use are attached to smart contracts, it can become easier to see customer engagement, compensate rights holders, and license use to third parties. This can help executives in media and entertainment businesses get closer to the customer while pulling more revenue from content use. Establishing a single source of truth for media content could require significant consortium coordination, but publishers could upgrade the commercial infrastructure of their entire industry to be digitally native, much more automated, and with greater transparency. By tracking the origin and path of information, publishers and platforms could more effectively address the "fake news" problem. With blockchain, news items could potentially be published with watermarks containing their origin and authorship, enabling their movement to be traced across digital media.[39] Such efforts can further lend themselves to gaining greater visibility into audience engagement and countering ad frauds.

FINDING THE AUDIENCE AND FIGHTING AD FRAUD

Audiences can be fragmented across numerous channels, making it hard for M&E companies to segment their customers and target them with relevant content and ads. People have more ways to find content, and it has become more difficult to monetize it all. Digital technologies have enabled easy sharing of content, but this is often seen as piracy rather than an opportunity for additional revenue.[40] Many ad tech companies and their partners suffer from diverse data types, there is little transparency into how ads are really being engaged, and worse, advertisers are expected to lose US$19 billion to ad fraud in 2018 globally.[41] Some of the common online advertising fraud involves problems with origin and identity: fake websites, buying traffic, and using bots to generate clicks.

What can M&E companies accomplish through blockchain? When digital assets are cryptographically watermarked and anchored to a validating blockchain, it can become easier to see how they are being engaged and to recoup royalties for every one of those interactions. With cryptocurrency tokens, businesses can enable fractional cent payments for consuming pieces of content, such as accessing a specific article or part of a video.[42] Brave, an ad-free blockchain-based browser, proposes to reward users with tokens that they can use to pay publishers for consuming content.[43] Lucidity is tackling ad fraud by using smart contracts to give advertisers the ability to validate—or invalidate—ads using their brands.[44]

The strategic opportunity: Blockchain can offer rightsholders the potential to see content engagement all the way across their distribution chain and to return usage royalties completely. This can bring media companies much closer to their customers,

enabling better targeting of content and advertising. Engagement could be monetized everywhere it happens, in ways that drive substantial revenues while remaining palatable to consumers. This capability could become a global economic mechanism that overcomes regional barriers to content availability. With blockchain, a media asset could always be linked to its ownership, terms of use, and cost. Such capabilities could grow revenues significantly—and reduce losses to piracy.

When digital content can be easily duplicated and shared, more people can engage with it but fewer are compensated.

SECURING AGAINST PIRACY WHILE ENABLING SHARING

When digital content can be easily duplicated and shared, more people can engage with it but fewer are compensated.[45] Some estimates show revenues lost to media piracy in 2016 alone to be as high as US$31 billion.[46] Casual sharing of content, such as uploading a video of a concert, is either off the radar or regarded as piracy or a DMCA violation. Additionally, many global consumers face geographic barriers, unable to access content in their country.[47] They're either lost as a potential audience or resort to piracy.

What can M&E companies accomplish through blockchain? Blockchain can make piracy harder by acting as the secure validation layer between content and consumers. By using blockchain to embed cryptographic identity into content, assets can be uniquely identified—much like a watermark but connected to a distributed ledger that enables the entire network to respond to usage. Browsers and media players could require validation between the asset and its reference on a blockchain. Australia-based startup Veredictum is trying to combat film and video piracy by adding blockchain watermarks to content to track its digital ownership.[48] The company estimates that its proprietary technology could reduce piracy by 80 percent over the next decade.[49]

The strategic opportunity: Blockchain could significantly reduce piracy, but the larger potential could unlock revenue by monetizing the casual sharing of content. If a person shares a video of their reaction to a big sports event, for example, this can be considered a DMCA violation and the content removed. If egregious enough, the person could be held liable for damages. But perhaps this is a revenue opportunity. With blockchain, it is possible to identify the content, the person sharing it, and the amount of engagement. The user could be charged a small fee to re-share, and every viewer of the content could contribute a micropayment. If the content goes viral, both the rightsholder and the user could be compensated.

Strategic recommendations for TM&E companies

As with AI, mobile, and the Web itself, the hype and confusion about blockchain's capabilities will likely continue while large resources work to realize its value and competitive advantage. Some will likely wait it out; others will advance the technology and their own strategic interests. Every business will likely meet unique challenges in integrating blockchain into its value chain, and some promising applications will doubtless flame out. The technology is still young—it may be three to five years before blockchain applications become commonplace—but its future looks bright.

As a network technology for the digital economy, success in blockchain will likely require collaboration across business ecosystems. In a very real sense, blockchain can offer a solution to entire industries that have been economically interdependent but have lacked an internet-scale protocol designed for global digital economies. If you are a media company

trying to create a blockchain registry of your digital content, you could partner with points of consumption such as web browsers, media players, and device manufacturers, as well as your ecosystem of content creators to manage licensing and royalties. A telecom aiming for a blockchain-based identity-as-a-service platform could coordinate with other carriers to establish a data model for subscriber identity and a registry to manage transactions and changes across carriers. They could then develop an API for accessing the service. Such consortium-building can enable tighter coordination within existing business ecosystems to upgrade their shared value chains.

Blockchain can offer a solution to entire industries that have been economically interdependent but have lacked an internet-scale protocol designed for global digital economies.

However, the technology of blockchain will likely move more quickly than consortiums' willingness and ability to effectively collaborate, meaning that in the near future, most successful outcomes will likely hinge on swiftly building and sustaining high-performing intracompany relationships. In a landscape of limited standards, the strongest consortiums could become the de facto arbiters of blockchain standardization, as well as the most likely to work with regulators. For example, securing and monetizing IoT networks could require significant efforts to standardize how they are architected and how the myriad of devices, sensors, and endpoints communicate with each other and with the blockchains managing them. Only a consortium of strong players could move this forward effectively at scale.

Businesses can take comfort that they don't have to boil the ocean on day one. Consider the following guidelines:

KEY CONSIDERATIONS FOR CFOS

The path to success with blockchain may be getting easier, but many executives still struggle to justify the money needed to move forward. Some companies don't see the urgency; others won't commit to anything less than a very large revenue opportunity. Given blockchain's pace and potential, these postures are potentially riskier than the costs to start experimenting. As an internet-native technology, it is designed to be foundational and broadly applicable. As such, any investment in blockchain will likely be of value, both in near-term capabilities and as a step toward the likely next generation of the economic internet. In this respect, blockchain reinforces existing strategic bets while enabling new ways of thinking about the core assets and capabilities held by telecom, media, and entertainment businesses.

Three recommendations for CFOs:

- Evaluate blockchain projects for the capabilities they deliver, not just how quickly they return their costs.
- Select blockchain use cases that can reinforce your company's big strategic bets.
- Blockchain is quickly moving from a big idea to a real solution. Waiting for others to figure it out could make it hard to gain market share in the future. This is something that leaders in telecom, media, and entertainment businesses should already understand about digital disruption.

- Start small to go big. Commit to experiment with blockchain across a smaller intra-party relationship.
- To minimize initial costs of integrating with historic data and IT, look to deploy blockchain under new initiatives and planned upgrades.
- Don't wait. Many companies are experimenting with blockchain, and early successes are already being proven.
- Leading industry consortiums will likely have a say in standards and regulations for blockchain. Don't let your competitors define your future.

TRANSFORM OR BE TRANSFORMED

Every day brings news of blockchain's progress. It may be a few years before it becomes broadly adopted, but the capabilities are available now. Exploration can not only unlock these capabilities and future opportunities—it can clarify some of the questions about its implementation. What are the architectural best practices? What works best on a blockchain, and what might be more appropriate for an off-chain ledger? How does it integrate with existing systems? What are the potential vulnerabilities? Could effective scaling be costlier than anticipated? What are the tax and risk implications for distributed accounting mechanisms? If leaders wait for others to find these answers, they may end up buying third-party solutions that haven't really solved them. And they may find themselves on the receiving end of someone else's standards and regulatory negotiations.

With technological and economic disruptions driving enormous mergers and acquisitions that further blur the lines between telecom, media, and entertainment, companies should seriously consider how they can play a role in the next disruptions before they become transformational. If an industry leader can justify spending tens of billions to become something new, shouldn't they be comfortable investing a few million to understand a technology that could greatly reinforce what they already are?

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