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Strategic Blockchain

Practical use cases and lost causes in the blockchain gold rush

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Introduction

Since its popular breakout in recent years through cryptocurrencies, blockchain has occasioned breathless hype. Articles and books abound heralding its capacity to revolutionise nothing less than the entire digital infrastructure of modern life. We have seen increasing numbers of CEOs expressing a commitment to invest in blockchain technologies, as well as skyrocketing interest in cryptocurrencies, from prominent figures in government and central banking as well as casual investors and hobbyists.

We cautiously acknowledge the substance behind this hype: blockchain could indeed be a game-changing technology for some sectors. Yet we urge caution to executives considering taking the blockchain plunge in the near future. There are still many barriers to widespread adoption, and many use cases that are at best unproven and at worst spurious. Decision makers need to be clear about the individual use case for their sector and business, and assure themselves that blockchain is the right answer to a real problem.

What is the State of the Art?

Bitcoin is the application that first brought blockchain technology to a global audience, and cryptocurrencies remain the lightning rod through which public engagement with blockchain is mostly conducted. More recently, meme coins like Dogecoin have attained vast valuations off the back of frenzied speculative activity, leading to concerns that more substantial technological progress in the sector will be overshadowed. As with any nascent technology, blockchain is evolving quickly as innovators of all stripes iterate on its early forms, looking for industry or organisation-specific advances. Thus recent years have seen a proliferation of new, associated technologies and concepts, such as:

- DeFi (decentralised finance)
- CBDCs (Central Bank Digital Currencies)[1]
- Smart contracts (e.g. Ethereum 2.0)
- Stateless ledgers (e.g. Ethereum 2.0)
- Proof of stake[2] (e.g. Hedera, Ethereum 2.0) versus proof of work (e.g. Bitcoin, Dash, Ethereum) versus emerging concept of proof of space (e.g. Chia)
- Lightning network[3] (e.g. Bitcoin)
- On-chain governance models (e.g. Tezos)
- DAOs (Decentralised Autonomous Organisations) (e.g. Olympus, Hector)
- GameFi (e.g Illuvium, Axie Infinity)
- NFT platforms and games (e.g. OpenSea, Axie Infinity, VeVe)

Amongst a range of distinctions between blockchains, one of the most salient is public versus private. Public blockchains, such as Bitcoin, are open to participation by anyone, and allow anonymous users to make and validate transactions. Private/permissioned blockchains, or DLT (distributed ledger technology) restrict participation via administrators, so that only known parties can make and validate transactions. Whilst such private blockchains have obvious appeal to firms concerned about participating in the 'Wild West' of public crypto, and have the capacity to expand the scope of blockchain in the economy, they also sacrifice some of the key features that drive hype around the utility of blockchain, and arguably have made less progress in recent years than public models.

At the governmental level there are wide disparities in approach to blockchain adoption, again mainly focused on crypto. Nations such as Panama, El Salvador, and Ukraine are among those that have moved to legalise and regulate public cryptocurrencies, whilst China has moved to outlaw cryptocurrency transactions altogether, whilst simultaneously pumping resources into better understood alternative blockchain use cases. Dozens of governments have announced proprietary plans for CBDCs but none seen any material traction due to existing competition for readily available stablecoins like USDC and USDT.

[1] CDBC - Digital form of a country's fiat/paper currency backed by the government.

[2] Proof of stake requires participants to put cryptocurrency as collateral for the opportunity to successfully approve transactions. Proof of Work (POW) uses a competitive validation method to confirm transactions and add new blocks to the blockchain, but it's slower and consumes more energy.

[3] A "layer 2" payment protocol layered on top of a blockchain-based cryptocurrency such as bitcoin or litecoin. It is intended to enable fast transactions among participating nodes and has been proposed as a solution to the bitcoin scalability problem.

Potential benefits

Blockchain's greatest evangelists believe it will touch all industries, ultimately becoming no less far-reaching than the internet itself. Such claims are easier to make than to substantiate. We think the potential applications offered by the technology are legion but fall into five primary categories:

1

Security
Through decentralisation blockchains offer the opportunity to massively reduce the risk of corruption, fraud, or unauthorised access.

2

Traceability
Transactions or events can be tracked in real-time, offering huge benefits for industries where provenance or fraud are concerns.

3

Transparency
Decentralisation allows information to be shared immediately and completely with all involved parties' consensus, offering unprecedented visibility to multiple stakeholders in complex supply chains or business ecosystems.

4

Efficiency
Streamlined and automated processes without inclusion of third parties or middlemen can reduce potential human error and cycle time of processes, eliminating third party mediation, ledger reconciliation and paper-based transactions.

5

Costs
Less documentation can lead to lowered costs as, for example, physical paperwork, third-party mediation and postal services are no longer needed.

Barriers to adoption

Despite the many claims made for the technology, highly visible adoptions of blockchain are still rare, with only FTX currently betting on Solana to build it's Decentralised Exchange (DEX) Serum[4]. Understandably there is still a great deal of scepticism across industries, driven by multiple factors. Blockchain is a novel and complex technology and true domain expertise is still in short supply, resulting in skyrocketing demand for blockchain engineers. This can make it difficult for organisations to understand their own use cases, as well as expensive to develop and implement solutions. As a consequence, some early-adopting organisations developed blockchains with poor use cases that might easily have been traditional databases instead.

There is currently a lack of standardisation within organisations, companies, and industries, with a range of providers out there that many organisations are ill-equipped to assess. This lack of standardisation drives slow rates of adoption and can stymie integration with incumbent providers of ERP or other enterprise management systems.

Transaction processing speed is slow compared to other technologies, with Bitcoin and Ethereum managing thousands of times fewer transactions per second compared to e.g. Alibaba or Paypal [5] [6], due to the fundamental constraints of block size, block time, network traffic. This gap is expected to narrow as blockchain technology evolves, and there are already significantly quicker transaction speeds out there (e.g. Avalanche, Stellar, Polygon, Solana), but it remains to be seen to what extent blockchains can improve transaction speeds whilst holding onto the key features that underpin much of their revolutionary potential, namely security and decentralisation.

Rapidly increasing corporate focus on ESG is a problem for blockchain tech, which is currently associated with exorbitant energy usage (predominately from the existing usage of Proof of Work still being dominant within large cap crytos like Bitcoin and Ethereum 1.0) and thus environmental harm, whilst at the same time the vaunted privacy gains have not proven as robust as predicted as analytical techniques have allowed observers to identify transactors.

Our view on which barriers can be mitigated

Some of the above barriers are less stubborn than others. We expect the range and number of blockchain experts and engineers to grow as higher numbers are attracted to the sector by the salaries on offer. Transaction processing speeds are already highly variable and are likely to be increased by future generations of blockchain, just as energy use and mining costs can be brought down substantially by proof-of-stake models. Privacy-oriented blockchains such as Monero aim to deliver on the technology's early promise of radical privacy. On ESG, it is clear that most major blockchain players have already acknowledged the potentially limiting effects of being associated with poor environmental outcomes. In response, there are efforts to institutionalise emissions offsets, whilst industry supporters are also keen to point out blockchain's potential utility for solving ESG-related problems such as product provenance, traceability, and ESG reporting. In short, every barrier to blockchain adoption is likely to be addressed by one project or another, but it is far less likely that any one project will solve them all together.

[4] https://cryptobriefing.com/ftx-bets-solana-ethereum-decentralized-exchange/

[5] https://www.publish0x.com/thecryptoblog2/ethereum-20-explained-xryvrnz

[6] https://alibabagroup.com/en/ir/presentations/Investor_Day_2018_CTO.pdf

Synopsis of maturity across sectors

Blockchain's applications are more obvious in some sectors than others. Blockchains will have greatest utility in complex and interdependent business ecosystems where:

- There is a real need for decentralisation
- There is a real need to store state[7]
- Not all transactors are known or trusted
- Current solutions necessitate middleman fees or delays

As such, some sectors are riper than others. By far the leading sector in terms of adoption is financial services, where a high proportion of leaders are considering or implementing blockchain-based solutions. Across the economy, we think opportunities are clearest in:

	Use Case	Examples
Financial Services	■ Quicker, cheaper, and more secure money transfer ■ Easier compliance with KYC regulation ■ Enhanced security and transparency	JP Morgan has developed Quorum, an enterprise variant of Ethereum, for a range of transactions including debt issuance. [8] The Australian Securities Exchange has announced its intention to move to a blockchain for the management of shareholdings, and the clearing and settlement of equity transactions. However, the project has suffered delays. [9] HSBC is using the Contour platform, developed and invested by a consortium of eight banks (Bangkok Bank, BNP Paribas, Citi, CTBC Holding, HSBC, ING, SEB and Standard Chartered) and three delivery partners (Bain Consulting, CrytpoBLK, R3) to issue letters of credit (LCs) Traditional asset managers such as Baillie Gifford and Ruffer have taken the leap into investing in crypto or crypto satellite businesses, whilst traditional custodians are investing in or launching institutional level digital custodianship services, including BNYM, State Street, and Northern Trust with Standard Chartered. [10]

[7] Blockchain is decentralized and hence there is no central place for it to be stored. That's why it is stored in computers or systems all across the network. These systems or computers are known as nodes. Each of the nodes has one copy of the blockchain or in other words, the transactions that are done on the network.

[8] https://www.ledgerinsights.com/jp-morgan-quorum-debt/

[9] https://www.ledgerinsights.com/asx-delays-blockchain-settlement-system-chess/

[10] https://www.fintechfutures.com/2020/12/standard-chartered-to-launch-crypto-custodian-in-uk-next-year/

	Use Case	Examples
Supply chain monitoring	■ Reduce fraud and double selling ■ Raise transparency, traceability and efficiency levels ■ Reduce costs	GlaxoSmithKline and Treum partnership to provide unit-level track and traceability of items, in line with the U.S Drug Supply Chain Security Act mandate. H&M/New Look/Next piloting blockchain for supply chain transparency. [11] WWF supporting blockchain solution to provenance transparency in fish supply chain. [12] VeChain / Chinese agri transparency[13] to enable agri companies to track harvests through the production process, creating a public ledger record of each component step, which can later be checked by the consumer to ensure authenticity of products (e.g.. Olive Oil).
Gaming	■ Eliminate payment gateways/fees for in-game transactions ■ Reduce fraud and theft ■ Monetisation of in-game assets and cross-game compatibility (using NFTs primarily)	Axie Infinity has enabled players of the game with a separate stream of income with some in Philippines and Vietnam even earning higher than their full time jobs. [14] Spells of Genesis mobile game utilising blockchain for card trading. Age of Rust post-apocalyptic game powered by Enjin blockchain enables players to not only earn BTC rewards for gameplay but also rent in game assets to other players using smart contracts.
Real Estate	■ More secure purchase price transactions ■ Quicker execution through smart contracts ■ Enhanced trust ■ Fractionalised Real Estate investing	Propy is a leading startup looking to entirely digitise the real estate sale business via blockchain. [15] Harbor is one of many startups looking to make real estate a tokenised asset class. [16]

[11] https://www.edie.net/news/8/Fashion-giants-collaborate-for-blockchain-powered-supply-chain-transparency-trials/

[12] https://www.wired.co.uk/article/food-supply-chains-blockchain-wwf

[13] https://coinveli.com/2021/11/vechain-partners-to-bring-transparency-to-chinas-emerging-olive-oil-industry/

[14] https://www.bloomberg.com/news/articles/2021-08-25/axie-infinity-how-game-is-turning-pandemic-jobless-into-crypto-nft-traders

[15] https://techcrunch.com/2021/05/25/blockchain-startup-propy-plans-first-ever-auction-of-a-real-apartment-as-a-collectible-nft/

[16] https://harbor.com/

	Use Case	Examples
Pharma and healthcare	■ Simplify and automate healthcare supply chain ■ Eliminate drug fraud ■ Enhance supply chain transparency ■ Increase transparency of clinical trial data ■ Patient data storage	StaTwig, a UNICEF Innovation Fund portfolio startup, is using blockchain technology to create an efficient food and vaccine distribution supply chain. [17] FarmaTrust is using blockchain to eliminate drug counterfeiting. [18] BlockMedx is using blockchain to send and receive prescriptions, prevent prescription drug leakage and predict at-risk patients. IBM/Merck/Walmart have trialled a blockchain solution to ensure compliance in US pharma distribution. [19]
Retail	■ More efficient inventory management ■ Reduce vulnerability to data breaches and hacking ■ Streamlining sales tax ■ Greater transparency and trust in the supply chain ■ Simplifying loyalty points programmes ■ Greater consumer trust in products	IBM assisting Home Depot with a blockchain solution to reduce vendor disputes. [20] Nestle and Carrefour using blockchain to increase consumer product knowledge. [21] Walmart working with Hyperledger on proofs of concept to radically increase transparency in food supply chain. [22] Singapore Airlines KrisPay (and now Kris+) is a blockchain based loyalty wallet.
Government	■ Reduce opportunities for corruption ■ Increase transparency and efficiency ■ Reduce costs ■ Strengthen land title registries ■ Central Bank Digital Currencies	South Korea has seen over one million drivers move to a blockchain-based digital driver's license. [23] Singapore is one of many jurisdictions experimenting with CBDCs. [24] Estonia is using blockchain to safeguard and store patient information. [25] Slovenia's SI-Chain was the EU's first blockchain testing infrastructure, enabling testing of use cases across the public and private sector. [26]

[17] https://www.unicef.org/innovation/stories/statwig-improving-food-and-vaccines-distribution-systems-more-efficiently-through

[18] https://blockchain-expo.com/global/partners/farmatrust/

[19] https://www.ledgerinsights.com/ibm-merck-walmart-blockchain-fda-pharmaceutical-pilot/

[20] https://mediacenter.ibm.com/media/1_q9q3kvo1

[21] https://www.nestle.com/media/news/carrefour-consumers-blockchain-mousline-puree-france

[22] https://www.hyperledger.org/learn/publications/walmart-case-study

[23] https://blockchain.news/news/blockchain-based-driving-licenses-south-korea-hit-one-million-drivers

[24] https://www.mas.gov.sg/news/media-releases/2021/monetary-authority-of-singapore-and-banque-de-france-break-new-ground-in-cbdc-experimentation

[25] https://nortal.com/blog/blockchain-healthcare-estonia/

[26] https://www.gov.si/en/news/slovenia-launches-national-test-blockchain-infrastructure-and-slovenian-blockchain-partnership/

	Use Case	Examples
Entertainment	■ Verifiable fair ownership of music content ■ Allocation of royalties	Death Row records, recently purchased by rapper Snoop Dogg, plans to become an NFT label. [27] Opensea, among other platforms, have enabled the trade of music NFTs, allowing individuals to purchase and trade the rights to music, straight from the artist, whilst also enabling royalties to be earned on secondary sales. [28]
Utilities	■ The democratisation of utilities ■ The establishment of decentralised power and internet grids	Candela coin has established a decentralised solar power network, enabling individuals to earn money on the solar power they generate, whilst also enabling others to purchase solar energy. [29] Helium has created a decentralised global network of WiFi hotspots, that act as both network miners and wireless access points, to provide connectivity for IoT devices. [30] Filecoin, a well-established cryptocurrency, has enabled users to rent unused hard drive space. [31] A number of crypto projects have emerged, focusing on renting out computing power e.g. Massive and Golem. [32] Render allows individuals to rent out their processing power for 3d rendering. [33]

[27] https://fortune.com/2022/02/16/snoop-dogg-death-row-records-nfts/

[28] https://opensea.io/collection/music, https://medium.com/geekculture/how-to-sell-music-as-an-nft-ae546fdefd05

[29] https://www.prnewswire.com/news-releases/blockchain-startup-candela-coin-has-created-the-first-consumer-facing-transactive-solar-energy-system-301289697.html

[30] https://www.helium.com/, https://www.lightreading.com/open-ran/helium-aims-to-be-largest-cellular-network-in-us/d/d-id/774304

[31] https://filecoin.io/, https://messari.io/asset/filecoin/profile

[32] https://filecoin.io/, https://messari.io/asset/filecoin/profile

[38] https://rendertoken.com/

Implications by audience type

The blockchain revolution might be a more gradual process than its most zealous advocates will have you believe, but even discounting for hype, there is little doubt that the technology has huge disruptive potential across a wide range of industries. Potential use cases can be found in almost every sector, and we urge leaders to consider whether their industry is at risk of disruption, as well as what opportunities blockchain presents today to create value and differentiate their organisation from peers. Finally, we highlight a few specific considerations by stakeholder:

Companies

- Those looking to implement blockchain solutions need to be confident in their due diligence on any proposed use case, which will require suitable disinterested expertise and knowledge
- Any successful blockchain implementation is likely to require workforce upskilling and training for those staff engaged with the back end
- For many companies, the full potential of blockchain will only be realised through adoption as part of a shared business ecosystem. Choosing appropriate forms of the technology, as well as communicating early successes and demonstrating return on investment, will be essential

Policy makers

- Can support interoperability and broad deployment through fostering collaboration between countries
- Can provide appropriate technological and regulatory sandbox infrastructure, helping to de-risk blockchain initiatives and speed learning
- Can lead through implementation in public services

Regulators

- Regulators have a substantial menu of challenges to tackle in order to provide clarity and certainty for businesses considering blockchain solutions, especially around territoriality, liability, definition, recognition, as well as reconciling blockchains with existing legislation such as the 'right to be forgotten'
- Will have to provide the framework for incorporating digital currencies into the monetary system as well as taxing them effectively and proportionately
- Can host pilot regimes for experimentation with innovative but potentially risky ideas, e.g. crypto-assets, as well as local or international sandboxes

Trade bodies/associations

- Trade bodies can play a key role in promoting the benefits of blockchain education at school and university level to ensure sufficient demand for nascent university courses
- The proliferation of competing technologies may require trade bodies to advocate for some degree of standardisation to reduce barriers to adoption
- Can offer workshops and skills development to supplement universities' blockchain educational offerings
- Can highlight commercial applications of blockchain and communicate potential benefits to business and government

Research and academia

- The blockchain skills gap is one of the most obvious brakes on the technology's potential adoption speed. Universities and other research hubs have a key role in providing the knowledge and skills required to meet skyrocketing organisational demand

Practical next steps

CEOs and leadership teams should consider the complex landscape and decision making required around blockchain adoption and deployment. Across the state of the art there are opportunities and threats to be measured, and we suggest that pioneers in the field have completed the following analyses to bring clarity to the applicability, risks and value add of blockchain systems integration across the enterprise.

- Full strategic review to understand business-specific applications of blockchain technologies as well as the available solutions on market (i.e. is a turnkey system available or is bottom-up development required?)
- Modelling cost and revenue implications across a range of blockchain adoption scenarios, and quantifying the risk and resource required to adopt, along with the technology readiness level and trajectory in coming years
- Gap analysis across existing operating and business models to design the future state where blockchain adoption delivers consolidation of costs and expansion of revenues

About KPMG's Global Strategy Group

KPMG's Global Strategy Group works with private, public and not-for-profit organisations to develop and implement strategy from 'Innovation to Results' helping clients achieve their goals and objectives.

KPMG Global Strategy professionals develop insights and ideas to address organisational challenges such as growth, operating strategy, cost, deals, digital strategy and independent economic assessments. In Ireland, we are the largest deal and corporate strategy house, working across sectors including financial services, aviation, life sciences, manufacturing, agri-food and technology.

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