Insights: Alert

Distributed Ledger Technology (Incl. Blockchain) Use Cases - Digital Assets, AI, and Beyond

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Distributed ledger technology (which includes blockchain) is transformative in its own right. That said, one of the unique aspects of distributed ledger technology is its ability to benefit numerous, and often dissimilar, technologies and industries. Distributed ledger technology is likely best known as the underlying technology supporting many digital assets (cryptocurrencies, stablecoins, tokenization, and central bank digital currencies (CBDCs)). That said, distributed ledger technology can be utilized and leveraged in various other spheres, including artificial intelligence, traditional finance, energy, tech, media, supply chain and logistics, retail, healthcare, real estate, transportation, manufacturing, and others.

I. Distributed Ledger Technology (Including Blockchain)

a. Distributed Ledger Technology

Distributed ledger technology – "such as blockchain technology, uses independent digital systems to record, share, and synchronize transactions, the details of which are recorded simultaneously on multiple nodes in a network. A token is an entry of data encoded on a distributed ledger. A distributed ledger can be used to identify ownership of both fungible tokens (such as cryptocurrency, [stablecoins, and CBDCs)] and [non-fungible tokens (such as tokenized assets)]."[1]

Distributed ledger technology is aptly named and can be largely described by its representative nomenclature. Ledgers, which have been used for centuries, are a "record or collection of transactions, which track the movement of money or goods from one entity to another."[2] Identical versions of the ledger at issue are verified and maintained across distributed networks (i.e., separate computers or servers). The ledger is recorded digitally, and computer systems facilitate its distribution. Hence, distributed ledger technology.

The Congressional Research Service (CRS) and U.S. Government Accountability Office (GAO), which provide invaluable information on myriad complex issues, published the below image to help demonstrate the difference between distributed ledger systems and more traditional centralized ledger systems.[3]

Centralized vs. Distributed Ledger Systems

b. Blockchain

Blockchain – is "a **distributed digital ledger** of cryptographically signed transactions that are grouped into blocks. Each block is linked to the previous block after validation. As new blocks are added, older blocks become more difficult to modify. New blocks are replicated across copies of the ledger within the network."[4]

Blockchain is a type of distributed ledger technology. Similar to the naming conventions of distributed ledger technology, blockchain relies on a chain of blocks. The blocks are verified transactions (these transactions don't have to be fiscal in nature). In essence, blocks are new authenticated entries stored on the ledger.[5] As new blocks of verified information are added to the chain, the blocks and chain become harder to modify (this is often referred to as "immutability"). Put another way, immutability "is the property of not being subject to change[,] and [i]n the context of data, it refers to data that can only be written, not modified or deleted."[6]

Diagram of a Blockchain

> The U.S. Department of Commerce - National Institute of Standards and Technology defines a blockchain as follows – "a blockchain is a collaborative, tamper-resistant ledger that maintains transactional records. The transactional records (data) are grouped into blocks. A block is connected to the previous one by including a unique identifier that is based on the previous block's data. As a result, if the data is changed in one block, it's unique identifier changes, which can be seen in every subsequent block (providing tamper evidence). This domino effect allows all users within the blockchain to know if a previous block's data has been tampered with. Since a blockchain network is difficult to alter or destroy, it provides a resilient method of collaborative record keeping."

[7]

For sake of clarity, there are two major types of blockchain, permissionless and permissioned. In a "permissionless blockchain, anyone can serve as a transaction validator; in a permissioned blockchain, the ability to validate transactions is limited to a group authorized by the operators of the system."[8]

II. Distributed Ledger Technology Use Cases

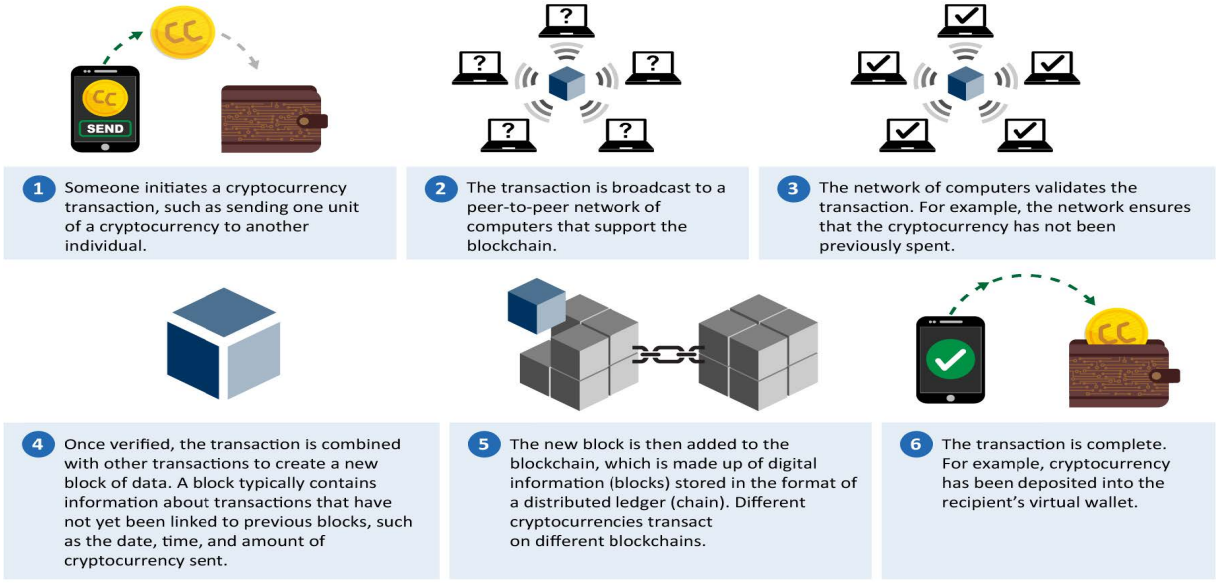
Regardless of the sector, the primary benefits of distributed ledger technology, particularly in the context of blockchain, are immutability (the records are unalterable), transparency (verified users can see all transactions on the ledger), and decentralization (information is verified and stored across numerous systems). The import of these benefits, as well as potential issues, vary depending on the use case. Several potential distributed ledger technology use cases are addressed below.

a. Digital Assets

Digital assets – "refers to all CBDCs, regardless of the technology used, and to other representations of value, financial assets and instruments, or claims that are used to make payments or investments, or to transmit or exchange funds or the equivalent thereof, that are issued or represented in digital form through the use of distributed ledger technology. For example, digital assets include cryptocurrencies, stablecoins, [tokenized assets,] and CBDCs. Regardless of the label used, a digital asset may be, among other things, a security, a commodity, a derivative, or other financial product. Digital assets may be exchanged across digital asset trading platforms, including centralized and decentralized finance platforms, or through peer-to-peer technologies."[9]

The best-known current use of distributed ledger technology is in the context of digital assets. While each type of digital asset may use distributed ledger technology in a different way, most digital assets are supported by blockchain technology. Below is a particularly useful, though somewhat simplified, illustration from the GAO on how a cryptocurrency transaction can occur through blockchain technology.

Figure 6: Example of how a company might send cryptocurrency to another company using blockchain technology



Source: GAO. | GAO-22-104625

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b. Artificial Intelligence

Artificial intelligence ("AI") – "can broadly be thought of as computerized systems that work and react in ways commonly thought to require intelligence, such as the ability to learn, solve problems, and achieve goals under uncertain and varying conditions. The field encompasses a range of methodologies and application areas, including machine learning (ML), natural language processing, and robotics."[11]

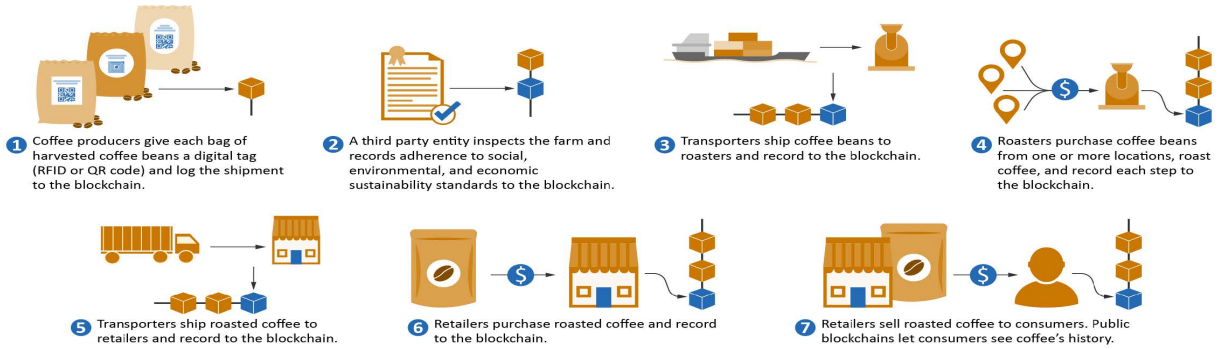
AI's use cases, specifically in the context of large language models, has increased exponentially in recent years. Much like distributed ledger technology, AI can be applied across various sectors and industries. Also, like distributed ledger technology, each given use case poses its own benefits and challenges.

As AI use becomes more universal, experts propose that distributed ledger technology may be able to address certain resulting challenges. For example, the transparency, immutability, and decentralization of distributed ledger technology could allow companies and regulators to track the data used to "train" models used in AI systems, thereby allowing entities to better understand the information an AI system is relying on to function. Similarly, distributed ledger technology could also be used to record data created by AI models, whether it be composition, computational, art, music, etc. While not specific to AI, distributed ledger technology can also be used to increase the security and integrity of the data at use.

c. Other Use Cases

As noted, one of the most interesting aspects of distributed ledger technology, and specifically blockchain, is that its use cases are broad and vary significantly. While digital assets, and more recently AI, are the use cases most often discussed, blockchain can be applied to various spheres, including traditional finance, energy, tech, media, supply chain and logistics, retail, healthcare, real estate, transportation, manufacturing, and others. As discussed, while a given use case may change their value, the primary benefits of distributed ledger technology are immutability, transparency, and decentralization. Below are some examples provided by the GAO on different ways blockchain can be applied to benefit existing spheres.

Blockchain – Supply Chain (Coffee)



Note: This graphic represents a simplified supply chain.
Source: GAO analysis of literature. | GAO-22-104625

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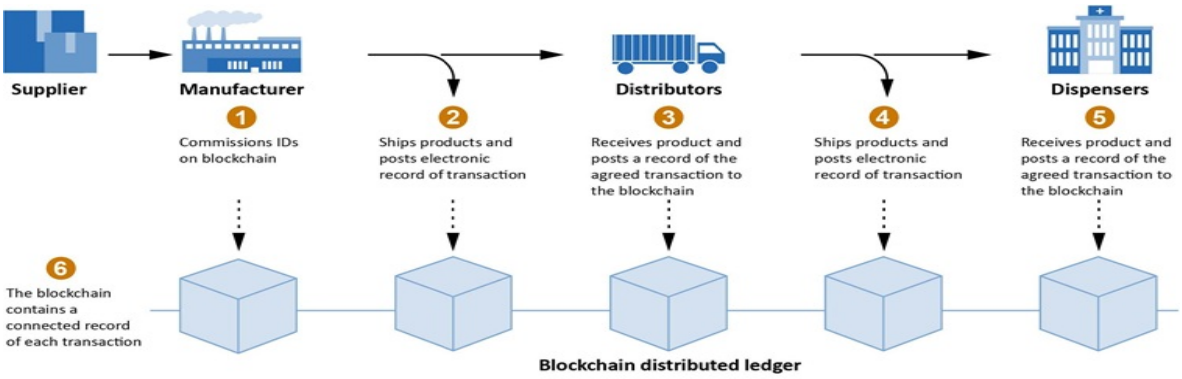
Blockchain – Supply Chain (Pharmaceuticals)



Source: AmerisourceBergen and GAO review of literature. | GAO-22-104625

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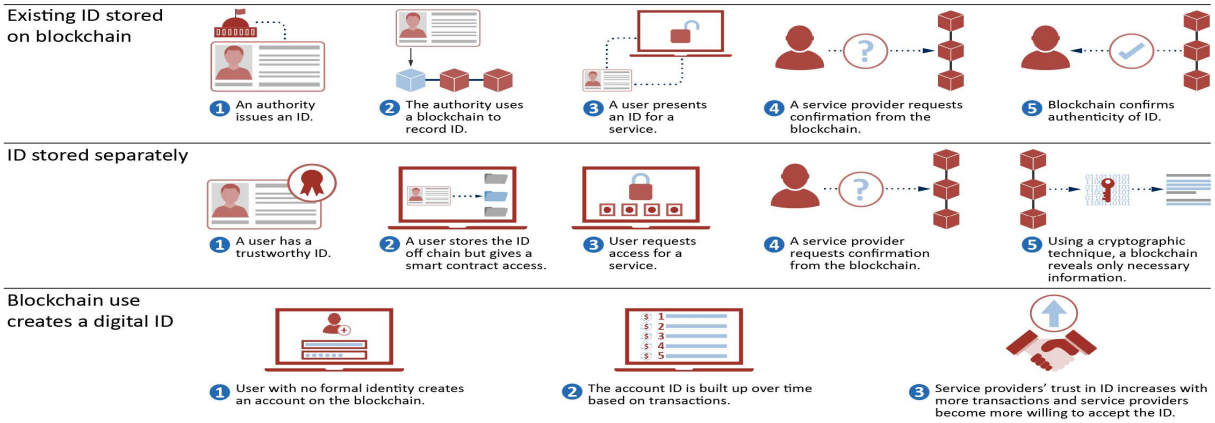
Blockchain – Digital ID's



Source: GAO analysis of federal agency documents and other literature. | GAO-22-104625

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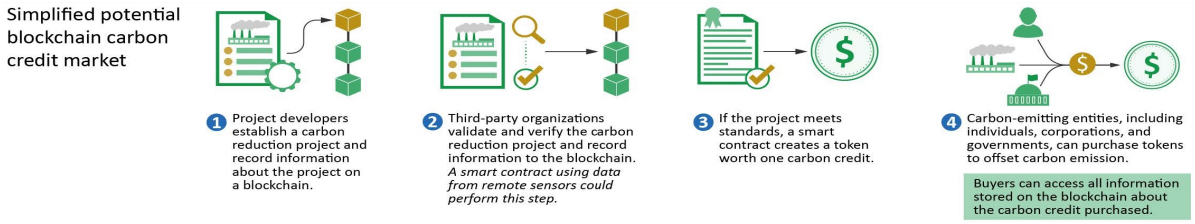
Blockchain – Carbon Credits



Source: GAO and GAO analysis of literature. | GAO-22-104625

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III. Next Steps

Distributed ledger technology has the potential to significantly impact various industries, other technologies (including AI), and the global economy. As such, those directly utilizing, or indirectly impacted by, distributed ledger technology should be cognizant not only of its use cases and potential benefits and challenges, but also the existing and developing applicable legislation, regulations, and compliance requirements that govern this transformative technology.

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Kilpatrick Townsend's Digital Assets Regulation Blog

Kilpatrick Townsend's Digital Assets Regulation Blog (DARB), which is led by attorney Stephen Anstey, covers various aspects of digital assets (cryptocurrency, stablecoin, tokenization, and central bank digital currency (CBDC)),

regulation, development, and administration, as well as related topics, including distributed ledger technology and blockchain. For more information, please visit our website at Digital Assets Regulation (kilpatricktownsend.com).

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Footnotes

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[1] Internal Revenue Service, Notice 2023-27, Treatment of certain nonfungible tokens as collectibles, (March 21, 2023), https://www.irs.gov/pub/irs-drop/n-23-27.pdf.

[2] Kristen E. Busch, Blockchain: Novel Provenance Applications, Congressional Research Service (April 21, 2022), https://crsreports.congress.gov/product/pdf/R/R47064.

[3] Timothy M. Persons, Science & Tech Spotlight: Blockchain & Distributed Ledger Technologies, U.S. Government Accountability Office (September 16, 2019), https://www.gao.gov/products/gao-19-704sp.

[4] *See* supra note 2.

[5] U.S. Department of the Treasury, Crypto-Assets: Implications for Consumers, Investors, and Businesses, (September 2022), https://home.treasury.gov/system/files/136/CryptoAsset_EO5.pdf.

[6] Karen L. Howard, Technology Assessment – Blockchain – Emerging Technology Offers Benefits for Some Applications but Faces Challenges, (March 2022), https://www.gao.gov/assets/gao-22-104625.pdf.

[7] National Institute of Standards and Technology, Blockchain, (December 20, 2021), https://www.nist.gov/blockchain.

[8] The U.S. Department of the Treasury, The Future of Money and Payments – Report Pursuant to Section 4(b) of Executive Order 14067, (September 2022), https://home.treasury.gov/system/files/136/Future-of-Money-and-Payments.pdf.

[9] The White House, Executive Order on Ensuring Responsible Development of Digital Assets, (March 9,

2022), https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/09/executive-order-on-ensuring-responsible-development-of-digital-assets/.

[10] *See* supra note 6.

[11] Laurie A. Harris, Artificial Intelligence: Background, Selected Issues, and Policy Considerations, Congressional Research Service (May 19, 2021), https://crsreports.congress.gov/product/pdf/R/R46795.

[12] *See* supra note 6.

[13] *Id.*

[14] *Id.*

[15] *Id.*

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