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Blockchain for Your Life Sciences & Healthcare Organization

By Alfredo Cepero

What is blockchain?

Blockchain is a distributed ledger technology that maintains a digital record of transactions. Data is stored in blocks, and as those blocks are filled, they are linked to the previously completed block, in chronological order. This forms a chain, hence the name "blockchain."

What are the characteristics of blockchain?

These are the main characteristics that make blockchain unique:

- **Enhanced security.** Blockchain helps prevent fraud and unauthorized activity by creating a record that cannot be altered and is encrypted end-to-end.
- **Greater transparency.** All transactions are immutably recorded and are time- and date-stamped, which eliminates any opportunity for fraud.
- **Instant traceability.** Blockchain creates an audit trail with all documented transactions. Traceability of data can also expose companies' weaknesses.
- **Increased efficiency.** Traditional paper-heavy processes (which are time-consuming, prone to human error and may require third-party mediation) can be completed faster and more efficiently with blockchain.
- **Advanced automation.** Blockchain transactions can even be automated with 'smart contracts', which increase efficiency and speed up the process even further.

What isn't blockchain?

One of the most common misconceptions about blockchain is that it's synonymous with cryptocurrency. Blockchain is actually the underlying technology rather than the cryptocurrency itself. Non-fungible tokens (NFTs) also use blockchain technology but are not a cryptocurrency. Most business use cases for blockchain technology will not involve cryptocurrencies or NFTs.

Another common misconception is that blockchain is 100% tamper-proof. While one of the major advantages of blockchain is its heightened security, nothing is completely tamper-proof, and there's always security risks involved with digitizing information.

What are the different kinds of blockchain?

There are three different variations of blockchain. Let’s take a look at what differentiates them and their advantages and disadvantages:

	Public Blockchain	**Private Blockchain**	**Consortium Blockchain**
Definition	These blockchains are open to the public and permission-less. Essentially, anyone with internet access can join a public blockchain. These are the types of blockchain that support cryptocurrency.	This variant is characterized by a restricted network and operates under the control of a single entity. It has permission levels for enhanced security.	These blockchains are also called federated blockchains and act as a type of hybrid between public and private blockchains. In a consortium blockchain, multiple organizations manage the chain. So, there’s no one controlling organization, but it also isn’t open to the entire public.

Advantages	• Highly secure due to complete decentralization	• Can prevent third parties from accessing information • More scalable than public blockchains • Faster than public blockchains • More efficient than public blockchains	• Enables communication with collaborators outside of your organization • More scalable than public blockchains • Faster than public blockchains • More efficient than public blockchains
Disadvantages	• Can be slow • Not as scalable • If hackers can gain 51% or more of a public blockchain, they can unilaterally alter it	• More centralized, so there's some debate over whether these count as true blockchains • More centralization opens the possibility of attacks from bad actors	• More centralized, so there's some debate over whether these count as true blockchains • More centralization opens the possibility of attacks from bad actors

How can blockchain be used to benefit life sciences and healthcare companies?

Blockchain can be a game-changing technology for both life sciences and healthcare, as it offers opportunities for efficient collaboration, transparent data-sharing and enhanced security. Here are three use cases to help you better understand the value of blockchain for your organization:

Use Case 1: Managing Pharmaceutical Supply Chains

Fraud is a serious concern for pharmaceutical supply chains because fake drugs and vaccines can be lethal. Blockchain, and in particular a consortium blockchain, can be used to ensure that nothing on the supply chain has been tampered with or stolen. Furthermore, blockchain makes the documentation needed to transport across international lines accessible and easy to find. Blockchain can also be used to simplify track and trace requirements, which can be cost- and labor-intensive for manufacturers.

Use Case 2: Transforming Patient Care

A challenge facing the U.S. healthcare system – and systems around the world – is document sharing. Because of the privacy concerns related to protected health information, it can be extremely difficult to transfer medical records from one provider to another. Some countries, such as Estonia, have implemented blockchain to allow for more efficient and secure medical record management. Other countries like the UK are considering similar approaches. The ability to securely transfer medical records would allow patients to share information among providers more easily and avoid common complications, such as different doctors prescribing medications that cannot be taken together.

Use Case 3: Supporting Clinical Trials

Blockchain makes it easy to store, preserve and access accurate clinical trial data, which is critical to the regulatory process. Blockchain also allows clinical trials to be conducted remotely while still maintaining the same standard of governance as in-person trials. Patients are able to take measurements from the comfort of their homes and upload them into the blockchain, creating an indelible record of their clinical outcomes without needing a clinician to come to their door. This expands your potential pool of clinical

trial participants and allows trials to continue even in the face of delays, such as those posed by COVID-19.

What’s next for blockchain?

Blockchain offers significant benefits, and not just for life sciences and healthcare companies. It’s likely that the technology will achieve wider implementation in the future. As blockchain becomes more commonplace, however, certain questions arise.

One of those questions is related to privacy. Because blockchain allows all users on the network to see the same data in line with their permission levels, and data cannot be altered or removed once it is entered into the blockchain, the technology poses challenges to personal privacy, which is enforced by laws such as the General Data Protection Regulation (GDPR) in the EU, the Personal Information Protection Law (PIPL) in China and the California Consumer Privacy Act (CCPA) in California.

Currently, there isn’t a lot of regulatory guidance in terms of processing private data on the blockchain. As with almost all technology, blockchain is developing faster than regulations are created. As a result, there is some uncertainty as to how blockchain will be permitted to be used in the future, and what its relationship to data protection legislation will be.

For companies considering implementing blockchain, these are considerations that must be weighed now. Fortunately, there are some existing rules in the data protection world that can reduce or mitigate the risks blockchain poses to personal data. For example, companies should take a privacy by design approach to blockchain implementation to ensure there is no unnecessary exposure of protected data. In addition, companies should complete privacy impact assessments prior to deploying blockchain so they are fully aware of the potential risks

involved.

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