



Global Forum
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Temperature Controlled
Life Science Supply Chains

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BLOCKCHAIN ADOPTION IN PHARMA SUPPLY

CURRENT STATE VS FUTURE POTENTIAL

Featuring insight from...



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Experts have asserted that despite recent developments, pharmaceutical supply chains are still far from reaching their full technological potential. Blockchain holds significant promise to advance the digital strength of medicine supply.

What is blockchain?

Bob Celeste the founder of The Centre For Supply Chain Studies (C4SCS) defines blockchain as 'a continuously growing list of records, called blocks, which are linked and secured using cryptography.' This network usually peer-to-peer managed and follows set rules when validating new data block.

Marc Gardette, CTO Public Sector at Microsoft France notes that by placing a block into the chain you can prove the chronology of events and origin of transaction. He adds that the blockchain records are immutable, authentic (signed by a private key) and time stamped.

The distribution of data is secure and a data transaction is conducted at a minor fee. Data governance rules are enforced to preserve integrity when inputting or retrieving information. After input, data and program modification or removal is usually impossible.

These attributes provide all users with a consistent view of the ledger in its latest state.

In their presentation at Adents' Serialization Innovation Summit, Microsoft's Marc Gardette and Cloud Architect - Stephan Goudeau noted that there are several types of blockchain. These include:

- Public - In which anyone can participate, design is needed to protect from bad behaviour, consensus by proof of work.
- Consortium/Permissioned or private- Private being a special case of permissioned involving sub parts of the same organization.

Why blockchain?

Currently in the drug supply chain, trading partners connect via individual systems for exchanging contracts, agreements and transactions, which can duplicate work and in some cases produce slightly varying conclusions.

A blockchain provides a single source of truth for partners to work with and so minimizes required communication activity and limits the risk of exposing proprietary information. Mark Toohey of TBSx3 noted: "If there's one word that really sums up why blockchain, that word is collaboration."

Various stakeholders in a drug supply chain can share, cross match and store information and be assured of its integrity.

The general idea is that all involved stakeholders decide and agree on each block before it is added to the chain. After that, no one has the right to go in and change any element. This technology is focused on certainty, it is not a rapid process because lots of transactions are built into a block before that block is added to the chain.

"We all know how important data is in the world, and that collaborative synergy, for want of a better term, unleashes some new possibilities that we haven't had in the commercial world before.," Mark adds.



Current state

Geoffrey Glauser, Senior Consultant Supply Chain, HHS/ASPR/BARDA notes that although in his opinion blockchain doesn't do much to improve supply chain efficiency, what it does have the power to do is enhance security and provide verification at a further level of safety.



Nodes in the blockchain could be used to securely log when medicines change hands, giving real time tracking to other stakeholders. He said: "It improves the supply chain by having more strength in the security system associated with the movement of goods from node to node. Therefore, the shipper should not ship anything until they know that the receiver is registered with a regulatory agency and vice versa so there's a transaction history exchanged between the two components, the shipper and the receiver."

Prototype system LifeCrypter has a similar set-up for distribution systems to log movements from the manufacturer all the way to the patient. The transparency of the technology will improve trust by allowing for responsibility to be pinpointed from the manufacturer through the various sites in a medical supply chain.

Many in pharma are currently **looking to blockchain to upgrade traceability efforts in line with serialization**. DHL this year announced a collaboration with Accenture to bolster serialization services and coordinate transactions using blockchain. **Imperial Logistics** is utilizing blockchain for its pharmaceutical clients to provide real time authentication services, as often visibility to verify the authenticity of medicines can be limited.

Future Potential

Temperature controlled logistics

At **Temperature Controlled Logistics live**, Bob Celeste presented insight and intelligence C4SCS gathered from the simulated ReferenceModels in its recent "DSCSA & Blockchain" Study.

The research examined the possible benefits of applying blockchain technology to the cold chain. The study looked at testing different process flows, data sets and alerts as well as defining a common set of cold chain data criteria. Researchers also wanted to see how blockchain could demonstrate the movement, use and trading partner reaction to temperature control sensor and other input measures (i.e. humidity, vibration, light, etc.)

The findings outlined that blockchain could be used to support DSCSA and serialization measures as an additional layer of security to store tracking data, links to tracing systems as well as the current status of the product.

In regards to temperature control in supply chains, blockchain could be used to share trading partner assertions, support temperature data verifications and guide **temperature excursion investigations**.

An array of data types could be hosted to do so:

- Temp Indicators (visual and digital)
- Temp Sensors
- Temp controlled areas
- Temp controlled transport
- Temp protective packaging

In the case of a potential break in the cold chain, blockchain can save time in temperature excursion disputes and map out where the disruption to storage conditions occurred and at the hands of which stakeholders in the chain of transportation.

Clinical trial management

With the globalization of clinical studies, before a trial's launch blockchain could record the study's protocol, in the form of a smart contract, to preserve continuity over the entire lifecycle.

Anca Petre, PhD student in digital health, Paris Sud University –Paris-Saclay Universtist

notes that blockchain may revive some of the trust towards pharma which was damaged by the lack of transparency around drug development, safety and costs.

Blockchain could bring consensus to a variety of stakeholders to trace and verify patient consent. Alternatively, a private chain governed by regulators and pharma companies with encrypted data could record test results and thereby eliminate any possibility of data fraud.

Other potential uses:

- Leveraging R&D data for collaborative research
- Dynamic pricing managed for raw materials
- Compliance and quality tracking
- Pharmacovigilance reports
- Insurance claim adjudication

- Prescription administration
- DNA sequencing
- Secure patient data sharing by care providers so patients have the best information to direct their own personal health decisions.

Challenges

In resource lacking environments, such as emerging markets, larger public blockchains (like for bitcoin) may struggle to perform. In these cases, the technology relies on consistent high-speed network connectivity and rich computing power to remain completely up to date.

However, for smaller private chains, like the ones pharmaceutical companies will use, much less computing power will be required. This will open up the use of blockchain for medicines being transported through emerging markets. Also, nodes in the chain can be decentralised and placed where power is available and cheap.

When asked what mistakes or assumptions should pharmaceutical firms avoid as they size-up blockchain, Marc Gardette, from Microsoft said: "Don't be tempted by the hype. Of course, there are always a lot of technical and architectural questions to be resolved before [a] system is in production. But first, it is a business point.

"Think about: What is the process? What kind of business problem are we trying to solve? What are the participants in the process? What are the responsibilities? What is the situation before and after?

"Be very clear on why you are [considering] blockchain [and] who are the participants."

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