

The two pharmaceutical companies that are most likely to distribute COVID-19 vaccines, Moderna and Pfizer, require the administration of two doses per person in order to be effective. That amounts to roughly 15 billion doses globally-including 100 million in the United States, 600 million in India, 300 million in Europe and 100 million in Mexico. Considering the high number of doses, there are unique challenges that must be addressed in order to do so effectively.

## UNIQUE CHALLENGES

1. Information is stored in silos, slowing down the process and creating room for error
2. It is very complex to monitor the correct storage conditions (temperature, humidity, etc.) throughout the distribution chain. And these vaccines have very specific requirements
3. Recalls are complex and slow
4. Counterfeit vaccines are a constant issue. In fact, the WHO believes 30% of all drugs in developing countries are counterfeit
5. Without the precision and accuracy that these vaccines require, it could be a matter of life or death



## Blockchain-Hyperledger Based COVID-19 Vaccine Traceability Solution



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Vaccines are one of the most complex topics in supply chain management. There are many different entities that need to work together seamlessly when distributing something so perishable, temperature-sensitive and in-demand around the globe. MedXtrac solves these complex issues by leveraging blockchain, the internet of things(IoT), artificial intelligence and mobility.

## Deliverables: Building Digital Trust



Blockchain technology allows multiple parties to manage and share a decentralized database. These parties can create and share a transparent source of truth that they mutually agree upon.

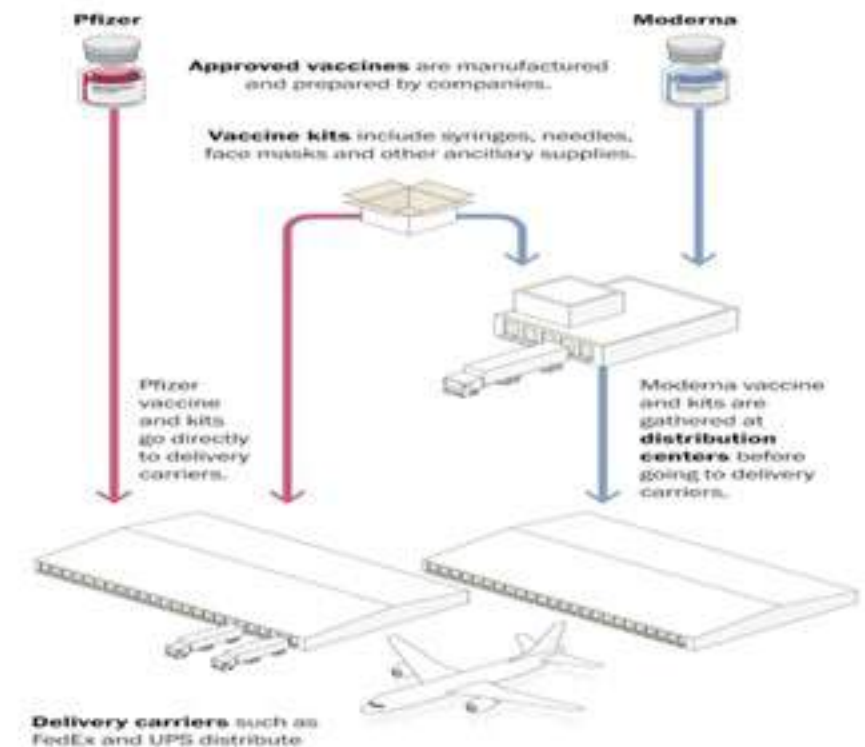
Data is transferred via private, secure channels that provide trust between health facilities, vaccine recipients, insurers and the government.

It is not owned by anyone, but rather provides a generic, standardized protocol that all participants along the supply chain can join and share relevant data with interoperable healthcare systems using Self-Sovereign Identity (SSI).

The system is immutable, meaning existing information cannot be deleted-only appended, which consequently drives a higher level of accountability by each participant that writes new data.

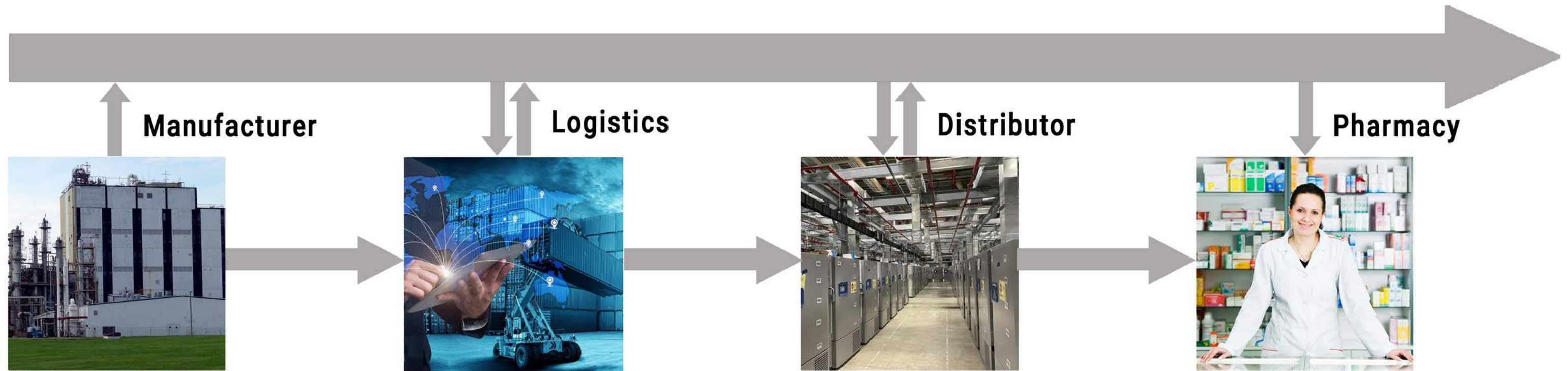
## Distinct Participants in the COVID-19 Vaccine Traceability Enterprise

1. Raw Supplier
2. Manufacturer
3. Distributor
4. Logistics
5. Hospital
6. Pharmacy
7. Clinics
8. Labs
9. Vaccine Recipient
10. State Health Department
11. Doctors Office
12. Long-term care Facility
13. Federal Entity Site
14. Military Treatment Facility
15. Regulator Agency
16. Consortium Admin



COVID-19 vaccines need to be kept at specific temperatures. Our blockchain solutions offer a unique monitoring solution to integrate with a vaccine's Ultra-Low Sensor or any other IOT Devices.

# Benefits of Blockchain for COVID-19 Vaccine Traceability



- Manufactured record with Unique ID, Lot#, and Timestamp
- Forecast Analysis and make critical decisions
- With Serialization will be able to establish unique identity at a certain level of granularity in packaging for products that are produced by the manufacturer or re-packer
- Use of 2D bar code technology on secondary packaging in the context of traceability systems as preferred product characteristics
- Quick Recall for any faulty vaccines

- Low Temperatures of 94Degrees(F) below zero are Monitored, Traced and Authenticated
- Tracking of Vehicle for timely deliveries
- Pick up, Drop Off and Time Stamp Recorded on all nodes

- Real-Time Monitoring and notifications across parties in Supply chain network

- Protect consumers with authenticity
- Reduce costs lost due to counterfeit COVID-19 vaccine and avoid illegal sales
- Avoid Penalties and Compliance check

- Traceability technology, including bar coding is a preferred characteristic on the secondary packaging for vaccines
- Use of QR code technologies on primary and/or secondary packaging for supplemental electronic access to label and leaflet information
- Use of Vaccine Vial Monitors (VVMs) as a preferred product characteristic
- Minimal investment as it is Open source Block chain and Cloud, the only investment required to start with is a huge advantage
- Automate Payments and Inventory Management
- Asset Transfer Verified and Tamper Proof
- Vaccine Provenance at Edge for Individuals, Provider, Pharmacy, Distributors and State Agencies