Using Blockchain Technology to Simulate Clinical Supply Chains

We have developed a proof of concept using Blockchain technology, specifically the Hyperledger Fabric (HLF) platform, to simulate clinical supply chains for rare diseases clinical trials & evaluate the technology for feasibility at scale.

Understanding

Blockchain is a system that orders and records transactions, **verifiably** and **securely**.

| Maal gave Maia 20 things | Maia gave Elias 10 things | Elias gave Manu 15 things |

A blockchain-based system would allow relevant parties a real-time view of what is happening in the supply chain.

Pfizer
Patients
Manufacturers
Clinical Sites
Distributors
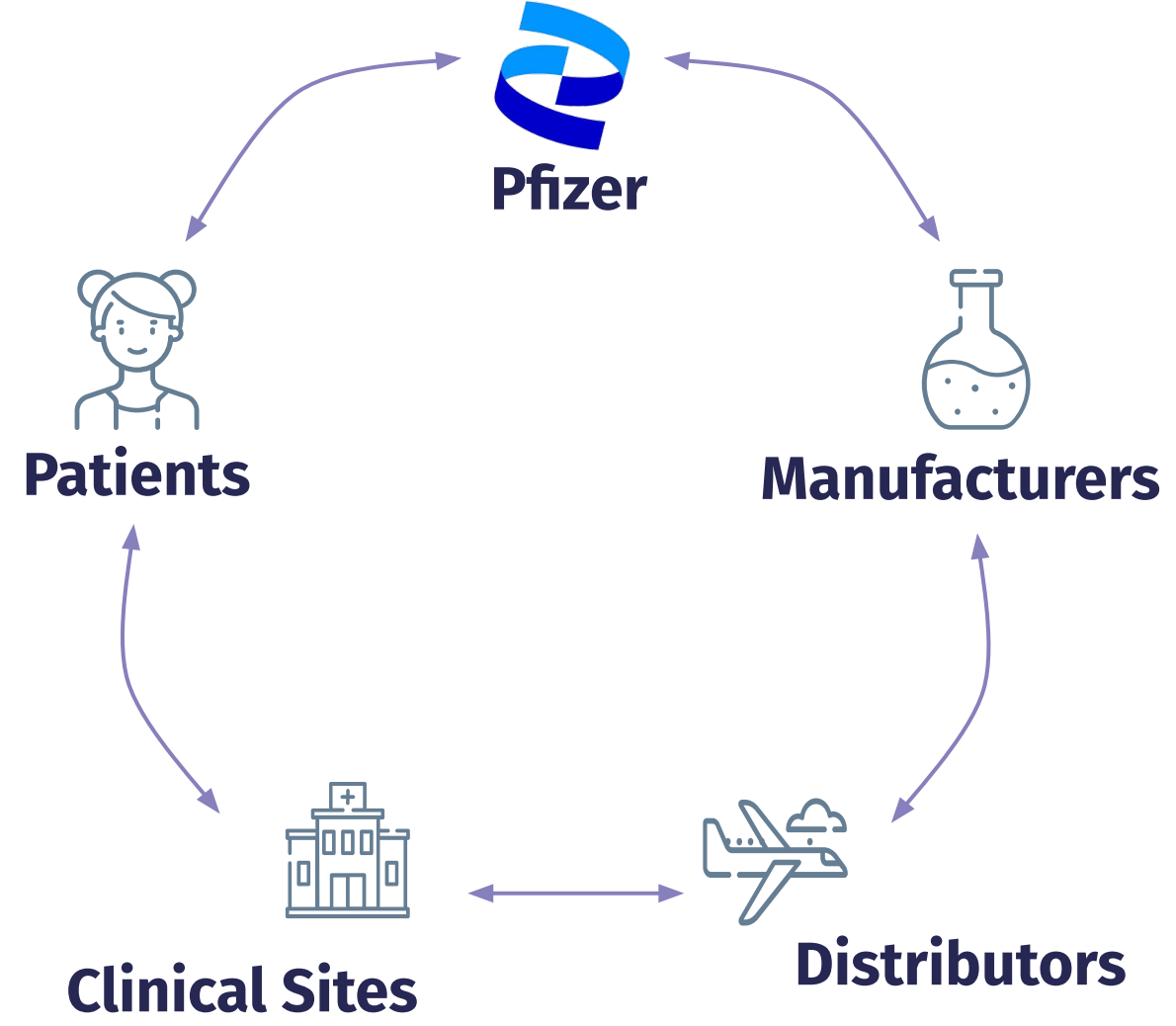
Simulating

We created a testing infrastructure, written in Python, for possible HLF network configurations and evaluation of design criteria.

Tests
Create a system and measure it
Blockchain System
Got it! Here are the results!
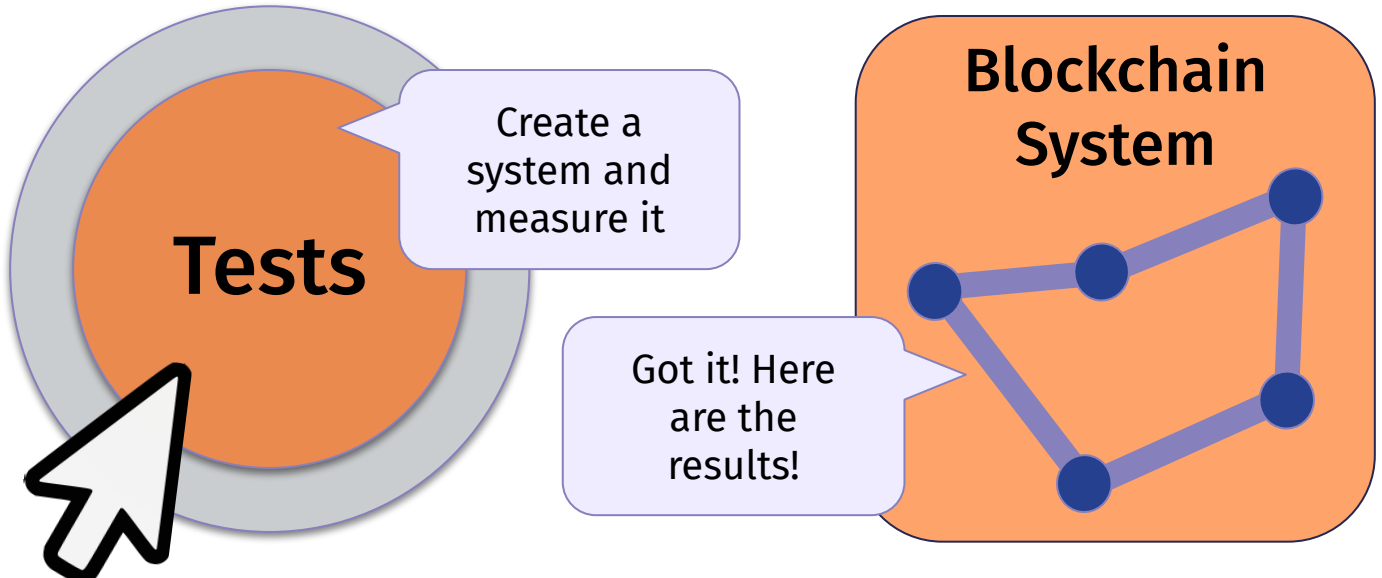
This step allowed us to see that the technical pieces could work together.

Insight 1: Feasibility

By simulating the gene therapy clinical supply chain in code, we learned that the **HLF platform can meet requirements** for security and verifiability in this context.

Automating

We developed the ability to dynamically and easily **generate different networks**.

Network 15   Network 14   Network 13   Network 12
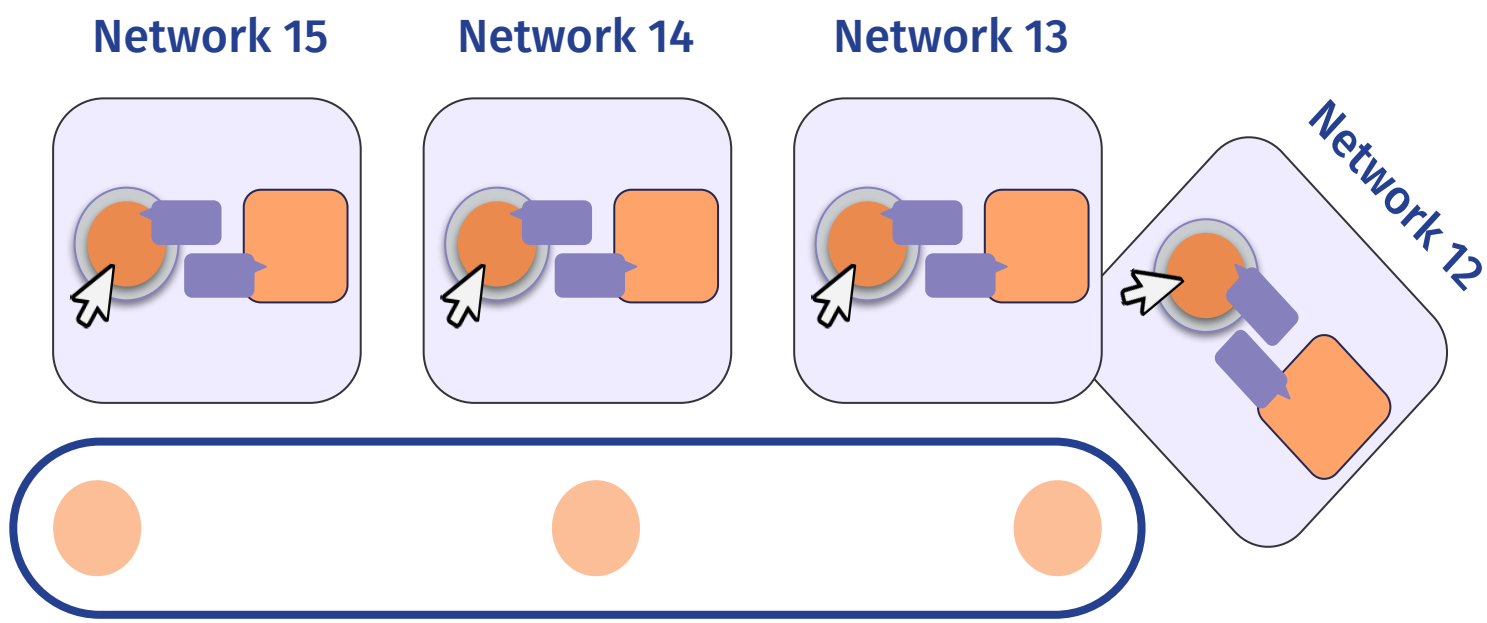
Next, we evaluated the effect different network topologies had on network performance and behavior.

Network 15   Network 14   Network 13   Network 12
3 seconds   4 seconds   3 seconds   10 seconds
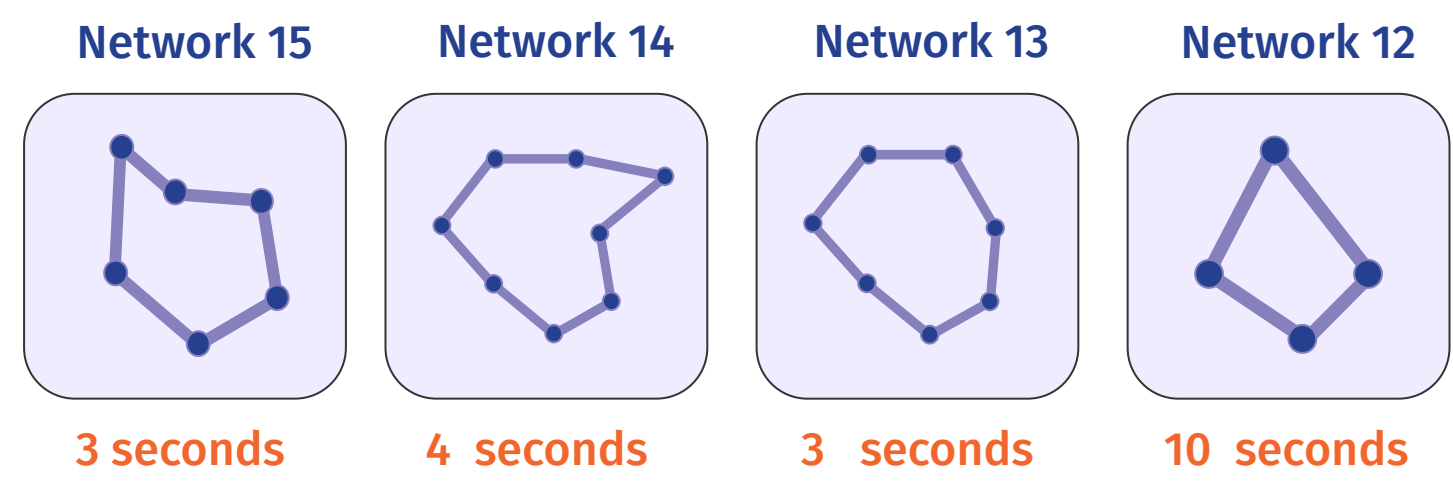
This unlocked the ability to analyze a myriad of networks.

Analyzing

Finally, we proceeded to evaluate the performance of the network, measured in **transactions per second (tps)**.

Transactions per second
Size of network
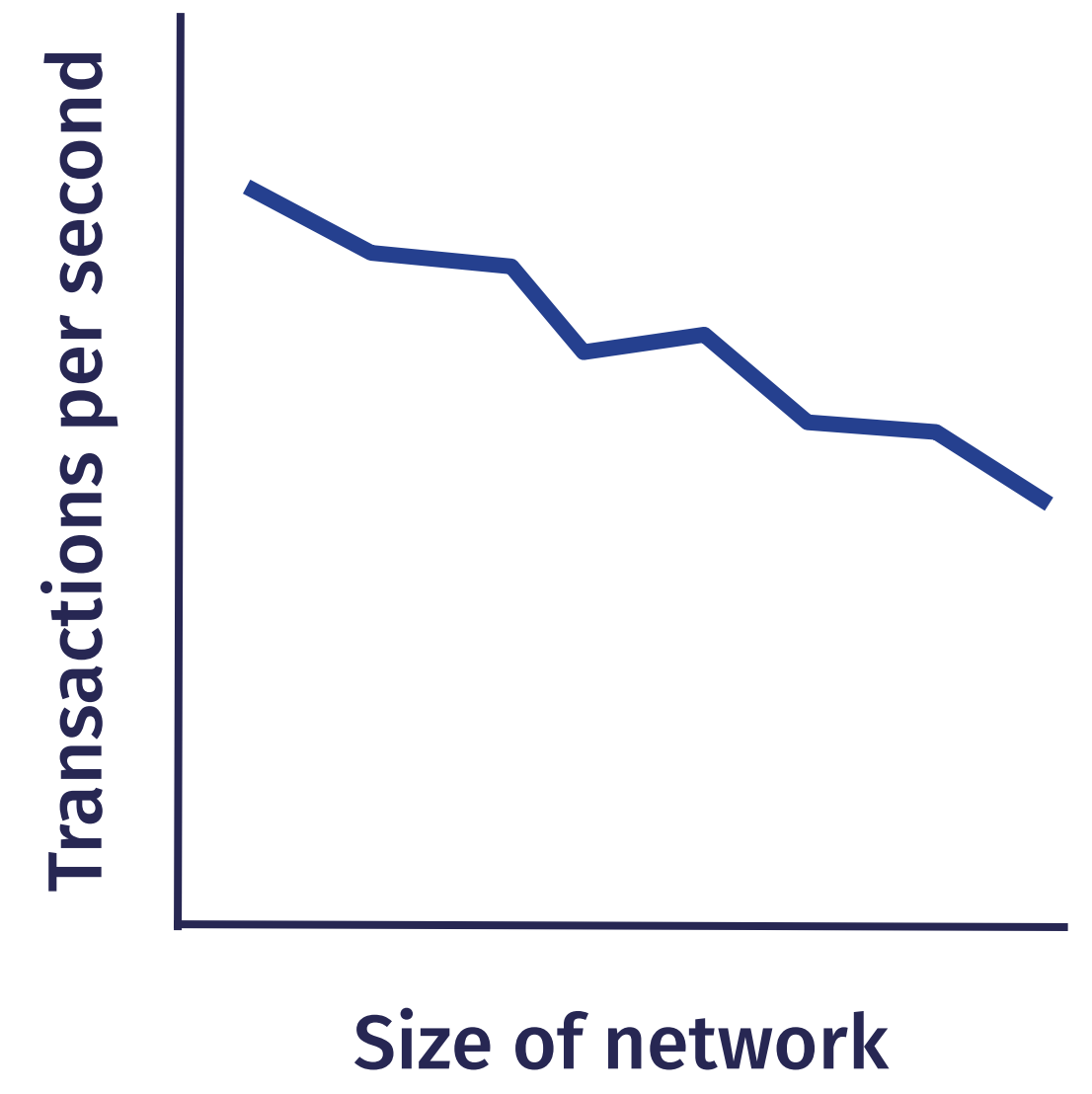
Insight 2: Scalability

An HLF-based network **could scale** to the size needed to support a clinical supply chain. Enterprise-scale testing is still required.

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Pfizer