

1. Context of the problem :

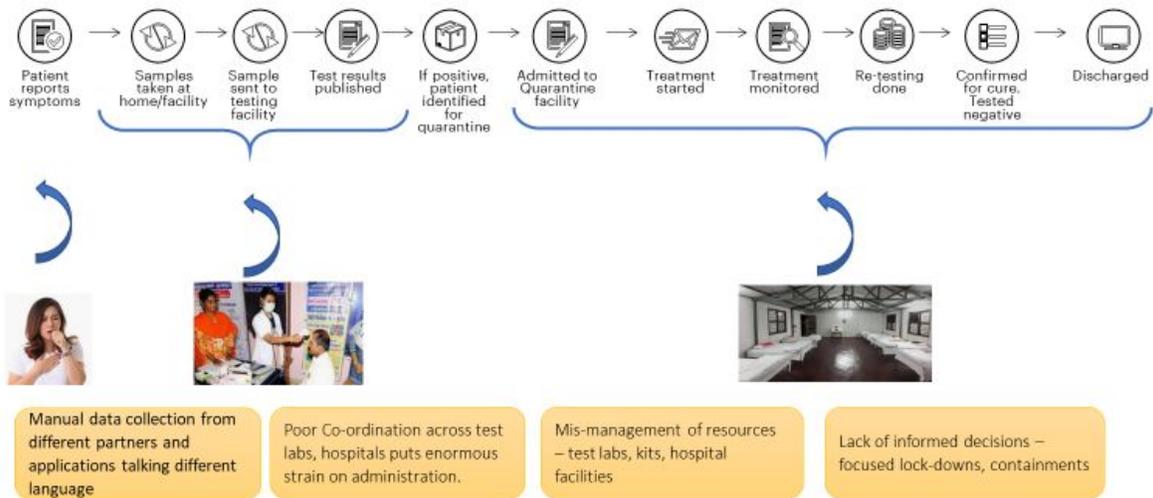
As shown below, the current process of curing Covid-19 affected patients involves handover across multiple parties (Patient, Testing lab, Hospital, Government) that follow different data-sharing arrangements. As the situation deteriorates with a greater number of patients going through quarantine, stress on the data sharing across private and government authorities is increasing.

At present, information gaps between different parties are handled via human glue, which seems useless in the hour of need when the focus should be on providing the best medical care rather than generating a single source of the truth by spending more and more effort in coordinating across different stakeholders.

Different stakeholders are going to use different systems, so they will need an architecture to which they can 'hook' right information which can generate 'truth' real-time instead of time-lagged fashion. As consequences of 'delayed' truth are fatal and damaging for everyone.

Such architecture should also be non-corruptible, fault-tolerant and scalable as data volume increases. At the same time, it should also respect data privacy considerations of stakeholders (Patient's medical records, as well as the Hospital's standard of care).

Current Process for COVID-19 Patient Tracking



2. Description of your solution :

We propose Blockchain-based architecture to solve the above problem. Blockchain is the ideal solution to establish a single source of the truth for transactions happening across multiple parties. Being a decentralized ledger, Blockchain is fault-tolerant and can scale as volume increases. Blockchain also follows the latest cryptographic standard and enforces private/public key infrastructure to identify stakeholders.

The proposed architecture will store only key data related to the patient, while storing private data (medical records, the standard of care) either offline , in encrypted form or not stored at all if not needed.

The affected patient will be tracked as a 'Digital' asset as it is handed over across multiple parties, on the single Blockchain ledger.

All data on the Blockchain layer is 'hashed, thus offers data protection. The proposed architecture will also provide simple APIs to –

- Patients via dApps (Decentralized Apps) or existing mobile apps (COWIN-20 / COVA)
- Testing Labs for reporting status on the IPFS (Interplanetary File systems) for offline Test result storage. Please note that IPFS is also a Blockchain-based file sharing protocol used for offline record storage. It offers the same level of data protection/ scalability.
- Hospitals for reporting patient status via simple APIs posting transactions as they happen.
- Government authorities to listen to the other 'nodes' and generate data-driven insights real-time
- APIs for 3rd Party developers / Companies .

All transactions posted on the Blockchain layer are immutable. They are also available in a transparent manner for auditing as it is an 'Append-only' ledger.

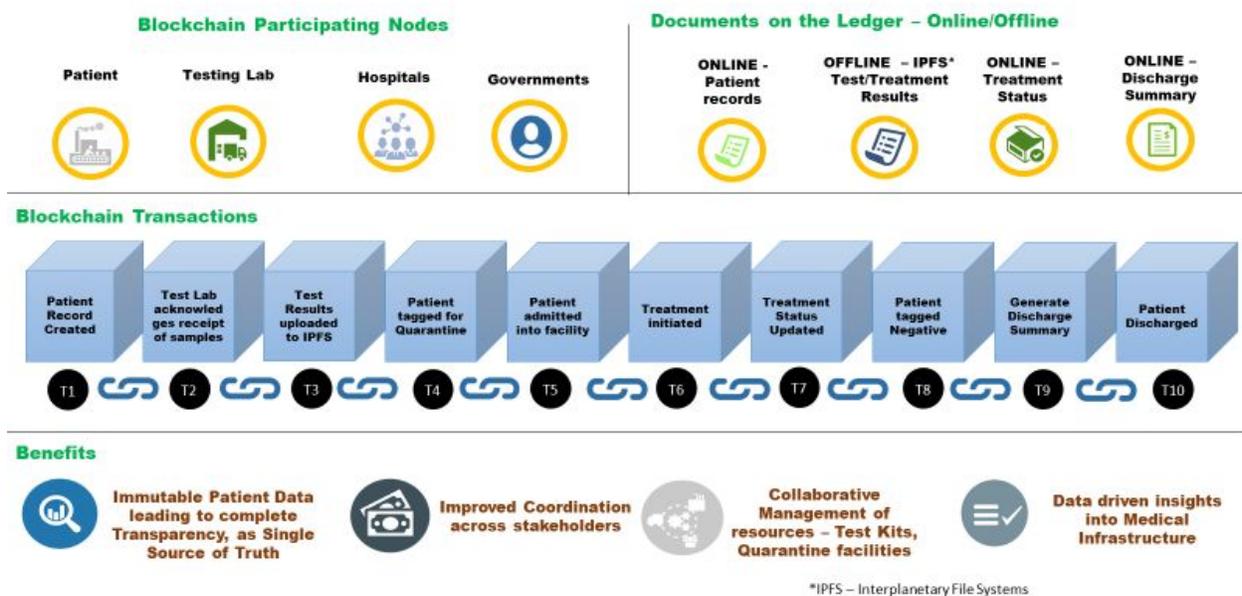
Platform :

We propose the QuillTrace platform based on the Ethereum as Blockchain protocol to use in the current solution. We expect that this architecture will eventually become the BACKBONE for our COVID-19 response while many patient-facing applications emerge henceforth.

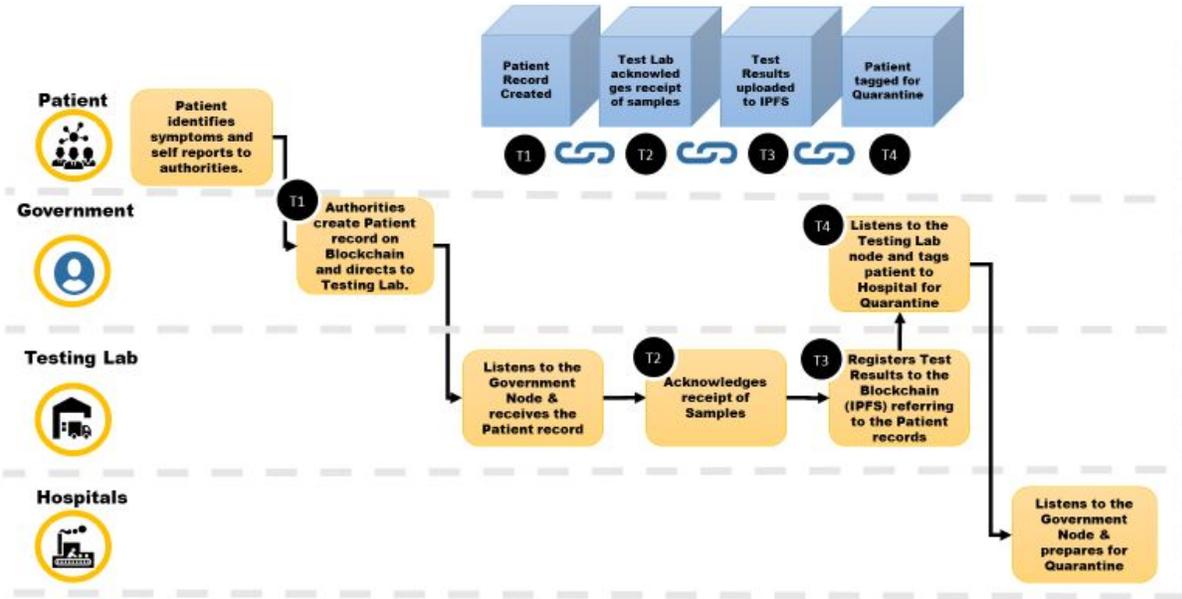
Please note that proposed architecture is in NO WAY interferes/reengineers with way of working (read - existing systems) at Testing Labs, Hospitals. We understand that it's their domain and they are rightfully equipped/skilled to run their processes as they see fit. It rather AUGMENTs their capability to talk to each other and generate a single source of truth real-time.

Over time, this application can be extended as part of the standard Disaster management response for governments worldwide. Once proven, any digital assets (e.g. goods/services for a variety of the businesses) can also be tracked on similar solution architecture, once COVID-19 is fully addressed. For example, medical testing labs can use it to track samples/testing kits during regular operations once this settles down.

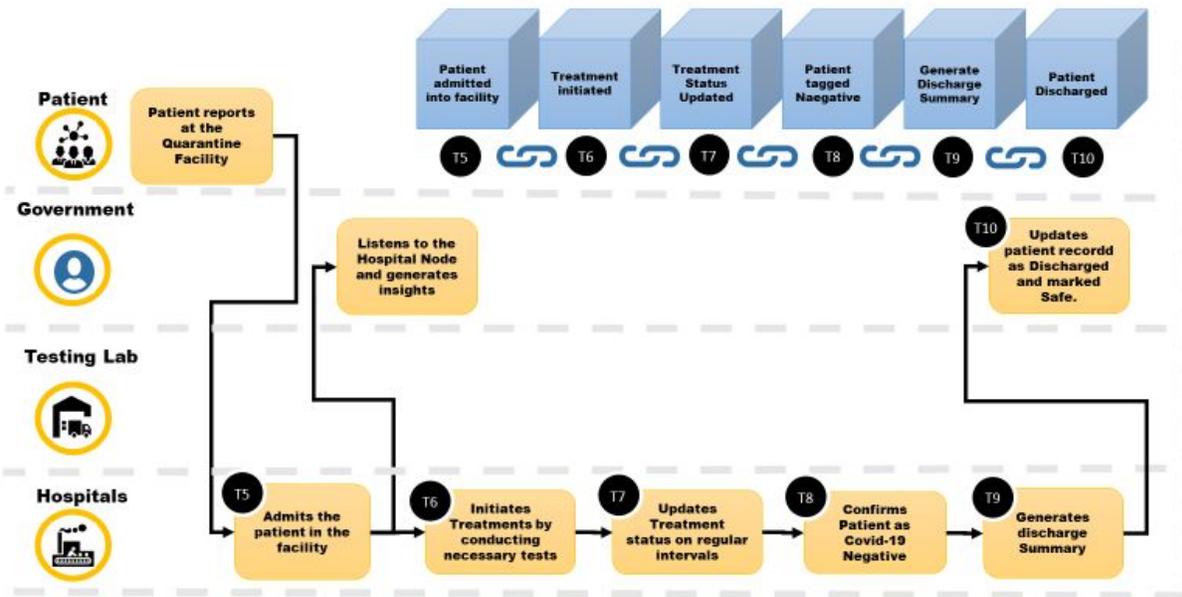
Blockchain-enabled Process Flow



Blockchain-enabled Process Flow



Blockchain-enabled Process Flow



- Segment of the population it will serve

This solution is scalable and expected to service all important stakeholders such as Patients, Government, Testing Labs, Hospitals.

- **Potential impact (in 3 months, in 1 year)**

M1 - One data standard & single source of truth for hospitals, private labs and government .

M2 - Government would be able to monitor all patients , patients will be tracked as a 'Digital' asset as it is handed over across multiple parties, on the single Blockchain ledger .

M3- Pilot Rollout

M4 - Standard Disaster management response for governments & worldwide.

- **Evidence of initial traction**

- <https://t.me/traceCOVID19>
- https://github.com/Quillhash/covid19_quilltrace_tracker
- <https://www.linkedin.com/pulse/monitoring-spread-coronavirus-blockchain-sanket-kulkarni/>

- **2-3 testimonials/references**

<https://coincrunch.in/2020/03/25/volunteers-needed-monitoring-and-tracking-covid19-patients-on-blockchain/>

<https://medium.com/quillhash/coronavirus-tracking-with-blockchain-quilltrace-b9793c7e7668>

