Team – UnPerish

Hyperledger Fabric based COVID-19 Vaccine Supply Chain solution

dApp I – BCDV1012

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GOVERNANCE DOCUMENT

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Organization

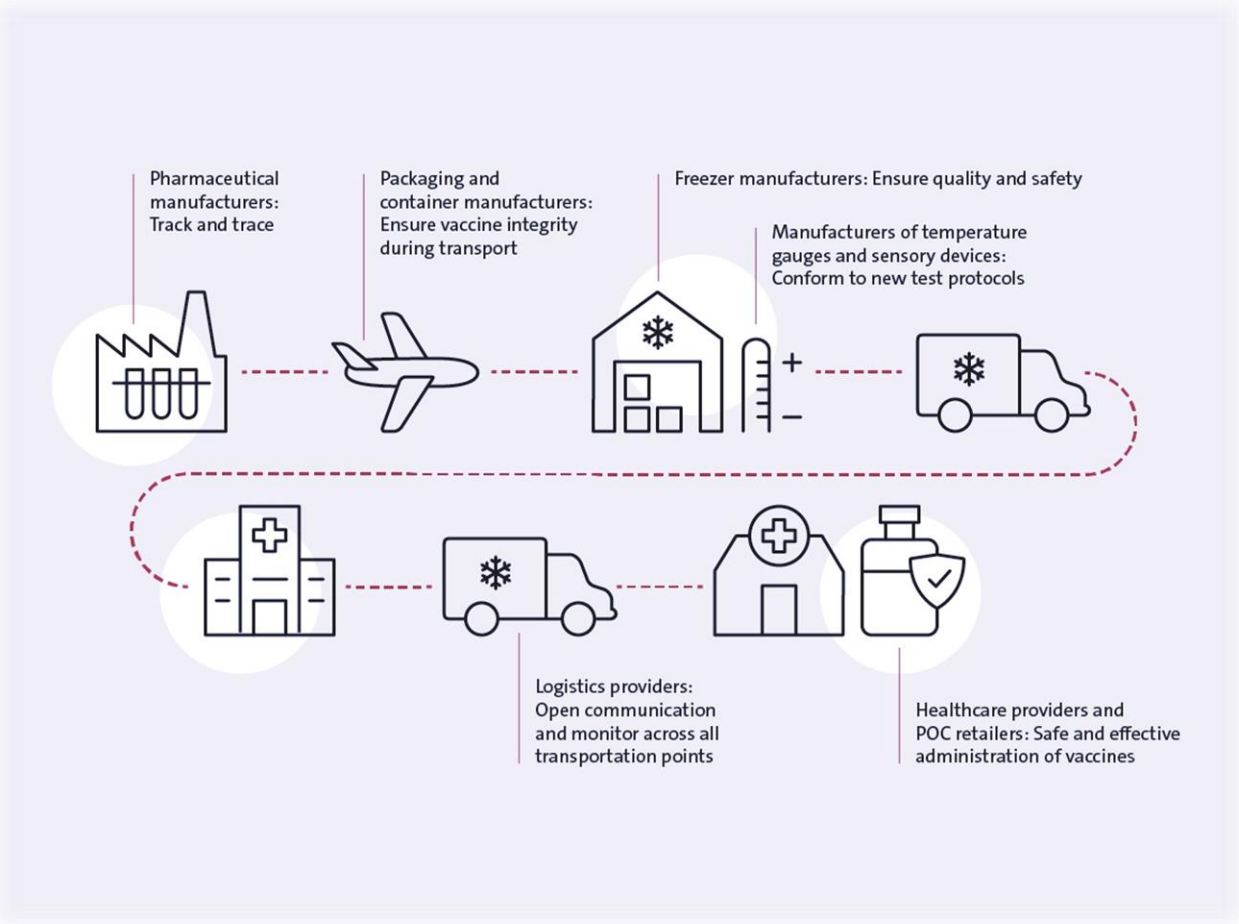
UnPerish, or an equally responsible and influential public health and welfare organization such as Health Canada that's coping with COVID19 like pandemic. From the diagnose of the first +ve case, to the rolling out of vaccination to front-line medics, para-medics and elderly, Health Canada not only keeps account of Canadians confirmed +ve, but also monitors the end-to-end vaccination of Canadians.

While restrictions and lockdowns can only control the spread of the COVID19 and its newly formed variants, a full-scale vaccination takes time as the organization keeps track of manufacturing/importing of covid vaccine, and monitors the preservation conditions of each individual batch. Only those batches of vaccine are passed to the HCPs that have not been contaminated for lack of prevalence of optimum storage and transportation conditions.

This document defines the purpose, core principles, and core policies which governs the entire blockchain system. It is basically overseen by UnPerish Board. All systems evolve or they die, and blockchains are not exempt from this universal law. Team Unperish has developed this generic COVID-19 vaccine supply chain system with Hyperledger to address its traceability part in order to use that data for future usage.

Corporate structure

UnPerish/Health Canada is an independent non-profit organization that works with various partners. In the end-to-end procurement and application of vaccines, parties involved are Manufacturers/Importers, Logistics, Distributors, HCPs, and Individuals/Citizens. Here's the description of each of these is brief.



Roles

When people do not have the means to organize or express their voices, or when they think their voices are powerless, they exit. Our system has several ways for users to express their wishes for change. Our supply chain has number of sub-participants who are participating in the system, however, for brief understanding we have set main roles as below:

Manufacturer

Manufacturer is the prime member who participates in the system. They are basically originator of the supply chain from where vaccine originates. They are crucial authority and have significant impact in the system. Since they manufacture vaccine, and creates the data for vaccine batches which makes the system to have some purpose. Any new change from this role would be discussed with other roles in depth.

Logistics

Logistics partner are backbone of our system. Since vaccine to be transported to cross-borders it has many ways transport including air, railway, road and sea. From originator to distributor or hospitals it may pass through various hands. Logistics partners generates the data for storage, hand offs, dates and time for “to and from” delivery points. Their contribution makes the whole system purposeful. Participation and changes from their side becomes vital to make system more powerful.

Distributor

Distributor are the second last stop before they reach to either Hospitals or Pharmacy. Each distributor would have their own batches of vaccine and would be distributed to end users. They keep the track of all batches to which all hospitals they have sent vaccines. They do have freedom to participate and raise any concerns. However, logistics related data won't matter to them and authorization may or may not be given to check those data.

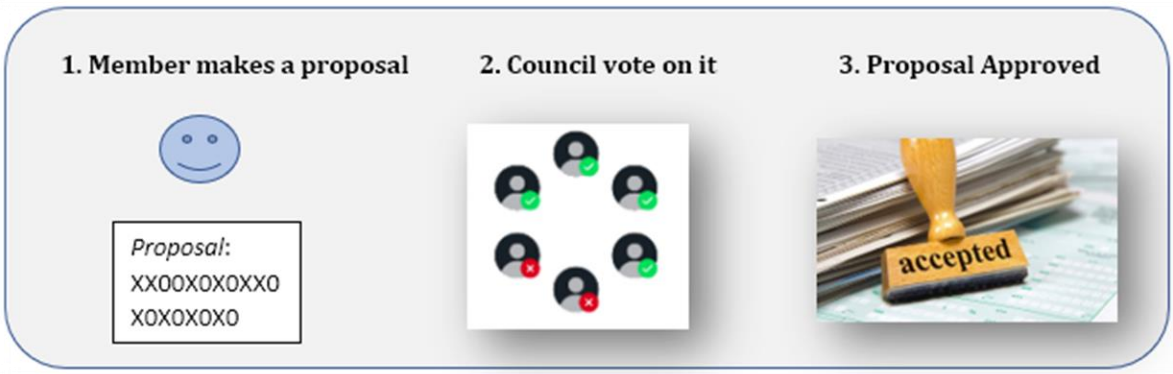
Hospitals

Final destination of our Supply chain is either hospitals or Pharmacy. This role is again very important owing to the fact that it gives vaccines shots to patients. What all batches has been used before expiry date and how many have been used and respective patient data may be collected by them. Again, this role may not need to access logistics data to some extent, however, may like to request data access of manufacturer. Any significant request or change would be discussed thoroughly by other roles.

Policies

Our system limited number of participants which forms the total decentralized group. All policies would be decided by equal participation and approval from each member. Board member would be the Manufacturer, Logistics partner, Hospital and distributor. Committee members would be elected from each board members' institution. Node of each participant would have to maintain their Hyperledger Fabric system. Additionally, maintenance of the network would be responsibility of each individual members.

Policy procedure would be in a flow of draft proposal submission of new changes in detail which must include purpose, scope, dependencies and rational outcome. Once approval will be given after discussion with all members, it can be in effect with implementation. Consensus would be taken based on the severity and priority of the software framework changes. Consensus rules are defined in rules section. Generic flow for changes in policy is explained as below:



Policy framework also focuses on privacy risk with various aspects. Each member has to manage privacy risk as per the legal framework of their countries' guidelines. There are certain standard ways to build and deploy the future changes with respect to software. The Technical Committee would be set up in order to approve respective proposals with long tern benefit horizon. This committee would not make proposals themselves, but rather can fast track existing proposals to happen in a shorter time frame than normal. They can only make governance for critical bug fixes process faster, but cannot control the network.

Rules

Since this framework is in initial phase and will gradually move to matured phase, we have laid down some of the rules which are applicable to all participating nodes as below:

- Minimum 66% consensus would be required to make new policies or make changes to the existing ones.
- Each of the partnering organization will only be allowed to have one ordering node.
- A copy of the ledger will be accessible to every node.
- All the business negotiations will be held in private channels.
- Only the Blockchain owner will be allowed to add new partners on the Blockchain after doing the due diligence for membership criteria.
- Partners can only add peer nodes and client nodes for their own organization.
- Partners can vote with a majority to remove another partner or settle a dispute.

These rules would be changed as we grow the nodes into the system. All participants are welcomed to initiate new proposal to augment any rule which may help to improve the efficiency, effectiveness, security and trust in the network.

Agreements

Agreements are defined in the code to be triggered at a particular time when all the conditions as defined in the Smart Contract meet.

Membership

Generally, the onboarding function for a member will have several necessary workstreams:

- Assessment of participant eligibility to meet membership criteria, including KYC/ AML review.
- Document exchange, review and signing, which includes all legal, regulatory, and business agreements that must be approved and maintained.
- Business process training for participant's operations team.
- Technical training and information for participant's IT/tech team.
- Building participants Fabric network connectivity which will differ based on:
  - If the participant is taking a node on the network (and hosting arrangements).
  - If the participant is outsourcing network node management.
  - If the participant is using a service provider to provide node interface.
  - Note: each of the above scenarios requires different connectivity, software, and testing models.
- Establishing the participant's identification, users, entitlements, and encryption key exchanges.

If a participant is taking a node on the network, they will have additional steps associated with:

■ Participant network node setup: node host registration, Fabric software download and installation, software checkout, node configuration and testing and node enablement.

■ Participant account setup: account registration, encryption key exchange, privacy enablement.

■ Ledger sync: client reference data refresh, ledger history synchronization.

■ Participant network and node operations and monitoring.

Once a firm has been on-boarded and established as a network member, there will be various ongoing maintenance functions, including ongoing network management, functional, technical and vendor updates which involve change notifications and implementations, resiliency testing and other typical system maintenance functions. Additionally, there will be ongoing communications concerning network status, changes, upcoming test cycles, and so on.

The final step of any participant lifecycle is off-boarding and removing all access and network connectivity. This may entail addressing the duration where the participant has been off-boarded and is not active but is still registered in live transactions on the Fabric platform, or in transactions archived for data retention purposes.

There is a linkage in the Participant Lifecycle function to two other business process and related systems:

■ Client Relationship Management (CRM)—typically for managing all interactions with a client

■ Billing—depending on business relationship

While these are outside the scope of this project paper, they are noted for completeness, as they may be relevant depending on the industry and business use-case.

References

Demiro Massessi, Blockchain Governance in A Nutshell (2019). Retrieved 10th March 2020, from https://medium.com/coinmonks/blockchain-governance-in-a-nutshell-67903c0d2ea8

Saksham Aurora, Hyperledger Fabric — Seashell Supply chain System II (2020). Retrieved 15th March 2020, from https://medium.com/coinmonks/hyperledger-fabric-seashell-supplychain-system-ii-3622ccefd11d

Sovrin Governance Framework. Retrieved 20th March 2020, from https://sovrin.org/library/sovrin-governance-framework/

Bedrock Business Utility Governance Framework, Retrieved 22nd March 2020, from https://bedrock-consortium.github.io/bbu-gf/

Joe Petrowski, Polkadot Governance (2020). Retrieved 22nd March 2020, from https://polkadot.network/polkadot-governance/

TRACING THE SUPPLY CHAIN, how blockchain can enable traceability in the food industry. Retrieved 12nd February 2020, from **https://www.accenture.com/_acnmedia/PDF-93/Accenture-Tracing-Supply-Chain-Blockchain-Study-PoV.pdf**

How blockchain can enable traceability in the food industry. Retrieved 10th February 2020, from **https://www.intel.com/content/dam/www/public/us/en/documents/pdf/connected-logistics-platform-study.pdf**

Martin Westerkamp, Friedhelm Victor, Axel Küpper (2019), Tracing manufacturing processes using blockchain-based token compositions. Retrieved 13th February 2020, from **https://www.sciencedirect.com/science/article/pii/S235286481830244X**

Daniel Bukszpan, The challenges Pfizer faces distributing its Covid-19 vaccine to the masses (2020). Retrieved 15th February 2020, from **https://www.cnbc.com/2020/11/25/challenges-pfizer-faces-distributing-covid-19-vaccine-to-the-masses-.html**

STEPHEN GANDEL, Pfizer's COVID-19 vaccine distribution will be a "logistical nightmare" (2020), Retrieved 16th February 2020, from **https://www.cbsnews.com/news/covid-vaccine-pfizer-distribution-logistical-nightmare/**

Sarah K. Rathke, Addressing COVID-19 Vaccine Supply Chain Challenges (2020). Retrieved 11th February 2020, from **https://www.natlawreview.com/article/addressing-covid-19-vaccine-supply-chain-challenges**

Adam Robinson, The Hurdles & Current Challenges of Using Blockchain in Supply Chain & Logistics (2020). Retrieved 15th February 2020, from **https://cerasis.com/using-blockchain-in-supply-chain-logistics/**

Over half of vaccines are wasted globally for these simple reasons. Retrieved 17th February 2020, from **https://www.weforum.org/agenda/2018/07/the-biggest-hurdle-to-universal-vaccination-might-just-be-a-fridge**