BLOCKCHAIN AND SUPPLY CHAIN IN TURBULENT CONTEXT

BLOCKCHAIN CAPABILITIES FOR DISASTER RISK REDUCTION MANAGEMENT - PART 2

Cédric Baudet
Maximiliano Jeanneret Medina
Jean-Fabrice Lebraty
ILLUSTRATIVE JANUARY 2021 EXAMPLES

Blockchain-based COVID-19 passports to begin trials in Q1
CoinTelegraph - Yesterday

British hospitals use blockchain to track COVID-19 vaccines
Reuters - 7 days ago

IBM harnessing blockchain to deliver verifiable Covid-19 vaccine and health passes
CTech - 3 days ago

Crypto tech vs. COVID-19: How hospitals are using blockchain in the vaccine rollout
MarketWatch - 6 days ago

Another Use for Blockchain: Tracking COVID-19 Vaccines | Robinson+Cole Data Privacy + Security Insider - JDSupra
JDSupra - 5 days ago

The impact of blockchain in the midst of the COVID-19 pandemic
TechTarget - Dec 29

CargoChain Partners with FileVision on VaxTracks—Visibility Tracker for the COVID-19 Vaccines
BLOCKCHAIN TECHNOLOGIES

A blockchain is a permanent Distributed Transactional Ledger that can include contract programming possibility. It’s also a cryptographic based data structure that is replicated and shared among the members of a network.

Main features:
- Distributed
- Immutability
- Transparency
- Automation

Public-private
Permissioned-less

- Smart contract
- Token, ICO
- …
**Blockchain & Supply Chain Opportunities**

### Scholars’ perspective

- **Is multi-party required?**
  - No
  - Is trusted authority required?
    - No
    - Is transparency required?
      - Yes
      - Can data be shared with encryption?
        - Yes
        - Is immutability required?
          - Yes
          - Can the mutable data off-chain?
            - No

- **Is operation centralised?**
  - No
  - Is transaction history required?
    - Yes
    - Can big data off-chain?
      - Yes

### Practitioner’s perspective

- **Supply Chain Pain Points**
  - **Traceability**
    - Capability to monitor events and meta data associated with a product
  - **Compliance**
    - Standards and controls to provide evidence that regulatory conditions are met
  - **Flexibility**
    - The ability to adapt rapidly to events or issues, run various scenarios, without significantly increasing operational costs

### Blockchain Capabilities

- **Auditability**
  - Blockchain provides a full audit trail of data, creating an everlasting means of record-keeping along a supply chain
- **Immutability**
  - All blockchain transactions are timestamped and tamper-proof, providing a single source of data integrity
- **Smart Contracts**
  - Continuous real-time tracking of data is facilitated through the use of smart contracts across the supply chain
- **Disintermediation**
  - Blockchain enables peer-to-peer interactions which can be trusted based on the digital signatures

**Suitability evaluation** (Lo, Xu, Chiam, & Lu, 2017)
## BLOCKCHAIN & SUPPLY CHAIN COVID-19 VACCINE SUPPLY CHAIN

<table>
<thead>
<tr>
<th>Weaknesses (internal to supply chain)</th>
<th>Opportunities (supported by blockchain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lack of visibility over members (e.g. pharma. company) and their services</td>
<td>• Digital profiles of members into a blockchain</td>
</tr>
<tr>
<td>• Demand planning</td>
<td>• Secured automation with smart contracts</td>
</tr>
<tr>
<td>• Lack of traceability of sensitive or valuable products</td>
<td>• A blockchain combined with IoT to track products in real time (eg. Ambrosus Smart Container)</td>
</tr>
<tr>
<td>• Respect transport conditions</td>
<td>• On-chain immutable certificates</td>
</tr>
<tr>
<td>• Product integrity proof</td>
<td></td>
</tr>
</tbody>
</table>
SMART CONTAINER
IOT INTEGRATED IN
TRANSPORT UNITS

Ambrosus, 2019
Problem: Ensuring a reliable link between the physical and digital world

(a) Intended Scenario: The supply truck is refrigerated.

(b) Attack Scenario: The trusted sensor is in a cooled compartment, while the rest of the truck is unrefrigerated.

(Wüst & Gervais, 2018)
Blockchain technologies can:

- reduce information asymmetry;
- reduce (but not eliminate) the principal's trust in his agent;
- degrade the agent's trust in the principal.
REFERENCES


Christidis, K., & Devetsikiotis, M. (2016). Blockchains and Smart Contracts for the Internet of Things. *IEEE Access*, 4, 2292–2303. [https://doi.org/10.1109/ACCESS.2016.2566339](https://doi.org/10.1109/ACCESS.2016.2566339)


Wüst, K., & Gervais, A. (2018). Do you need a Blockchain? *2018 Crypto Valley Conference on Blockchain Technology (CVCBT)*, 45–54. [https://doi.org/10.1109/CVCBT.2018.00011](https://doi.org/10.1109/CVCBT.2018.00011)