Blockchain for Supply Chain Management

Arjeh van Oijen, co-founder and CEO of Unchain.io

10-13 June 2018
Century City Conference Centre
Cape Town, South Africa

The Leading Event in Africa for Supply Chain Professionals
The origin of blockchain

- Trustless network
- Mining
- 21 million coins
- Litecoin, Ripple, Ether
- Bubble?

“Satoshi Nakamoto”
2008

- Blockchain
- “Distributed shared ledger”
- Cryptography (SHA-256, PKI)
- Consensus model
- Smart contract
Traditional point-to-point collaboration & data exchange across business networks

Complex – Inefficient – Expensive – Error sensitive – Vulnerable - Slow
Blockchain based collaboration & information exchange in business networks

4 key elements of blockchain technology

- Shared distributed ledger
- Cryptography
- Consensus
- Smart contracts
Not just one blockchain technology

<table>
<thead>
<tr>
<th>‘Mother’ of all blockchain technologies</th>
<th>Differences between technologies</th>
</tr>
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<tbody>
<tr>
<td>bitcoin</td>
<td>• Open source or proprietary</td>
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</table>

<table>
<thead>
<tr>
<th>Most applied blockchain technologies</th>
<th>• Types of nodes</th>
</tr>
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<tbody>
<tr>
<td>ethereum, Hyperledger, Corda, Quorum</td>
<td>• Consensus model</td>
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<tr>
<th>Other blockchain technologies</th>
<th>• Storage technology</th>
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<tbody>
<tr>
<td>Tendermint, Credits, Chain, Bigchain</td>
<td>• Smart contract language</td>
</tr>
<tr>
<td>Factom, Guardtime, MultiChain</td>
<td>• Access control and confidentiality</td>
</tr>
<tr>
<td>SETL, Paxos, Monax, Digital Asset</td>
<td>• Extensibility</td>
</tr>
<tr>
<td></td>
<td>• Interfaces (APIs)</td>
</tr>
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<td>• Performance</td>
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Value of blockchain for business networks

- Reduced complexity and costs
- Identity & trust
- Reduction of errors
- Resilience & continuity
- Speed
- Auditability
### Areas for which blockchain is suited and for which it isn’t

<table>
<thead>
<tr>
<th>Suited</th>
<th>Not suited</th>
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<tbody>
<tr>
<td>• Exchange of data between organisations (and individuals)</td>
<td>• Exchange of data within one organisation</td>
</tr>
<tr>
<td>• Provide single point of truth</td>
<td>• Situations where trust/security is not relevant</td>
</tr>
<tr>
<td>• Trust is essential (identity, authenticity, integrity, non-repudiation, confidentiality)</td>
<td>• Situations where high throughput and low latency is essential</td>
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<tr>
<td>• Provide auditability and transparency</td>
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<tr>
<td>• Orchestration and control of processes across multiple organisations is essential</td>
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</table>
Application areas of blockchain (not limitative)

Financial Services
- Payments
- Securities registration & processing
- Lending

Property
- Real estate
- Intellectual property
- Cars

Governmental services
- Voting
- Registrations (passports, driving license)
- Permits

Identification & Security
- Party/device authentication
- Self sovereign identity
- Digital signatures

Trade & Supply Chain
- Document exchange
- Provenance
- Trade agreements

Internet of Things (IoT)
- Autonomous devices, such as
  - Cars
  - Drones
  - Sensors
Application areas of blockchain for supply chains (not limitative)

- Supplier and product catalogue data management & distribution
- Logistics management, monitoring and control
- Custody and declarations
- Quality assurance
- Provenance and compliance
- Freight insurance
- Payments and trade finance
- Supply chain financing
Blueprint for applying blockchain in supply chains

Blockchain Network
Data exchange, contracts, process orchestration, traceability, matching, identity & security

Source & Procure → Order → Delivery & Shipment → Invoicing & Financing → Payment → Reconcile
Example medicine distribution

Blockchain application

Control Tower

Supply chain data & events

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>📗</td>
<td>File from ERP system with serialized packages</td>
</tr>
<tr>
<td>📦</td>
<td>Pallet with NFC chip code</td>
</tr>
<tr>
<td>📦</td>
<td>Box with NFC chip and/or QR code</td>
</tr>
<tr>
<td>📞</td>
<td>Mobile phone</td>
</tr>
<tr>
<td>📞</td>
<td>IoT device with NFC sensor</td>
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</table>
Advantage blockchain vs. ‘traditional’ technology

• Out-of-the-box and standardised technology

• Secure and validated by development community

• Everyone can continue working with own system(s) (ERP, logistics, QA, etc.)

• Vendor independent (open source) → acceptance by stakeholders in business network

• Deployable across multiple different data center providers (distribution of trust)

“Blockchain is an operating system for business networks”
IoT, Blockchain and AI … A Perfect Storm

**IoT**
- Automated collection of data
- Smart/autonomous devices

**Blockchain**
- Secure and trustful exchange of data
- Shared data repository for all
- Orchestration of supply chain

**Artificial Intelligence**
- Interpretation of data
- Automated decision
- Determining next actions
## Origination of blockchain networks

<table>
<thead>
<tr>
<th>Existing network organisations</th>
<th>New consortia</th>
<th>One initiating organisation</th>
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<tbody>
<tr>
<td>ACORD</td>
<td>tbs x3</td>
<td>MAERSK</td>
</tr>
<tr>
<td>Port of Rotterdam</td>
<td>BiTA</td>
<td>PSA</td>
</tr>
<tr>
<td>SWIFT</td>
<td>we.trade</td>
<td>MOL</td>
</tr>
<tr>
<td>Dubai Chamber</td>
<td></td>
<td>ripple</td>
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<tr>
<td>United Nations</td>
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<td>cellulant</td>
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<td>B3i</td>
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Reducing document processing costs in maritime logistics

“Blockchain could save **$300** per container in terms of labour and processing associated documents.”
Streamlining data exchange for ocean shipping

AB InBev, Accenture, APL and Kuehne + Nagel successfully test blockchain for Ocean Shipping

Benefits

- Reduces data entry by up to 80%
- Simplifies data amendments
- Streamlines the data exchange
- Single point of truth
- Reduces incompliancy risks (and penalties)
Better control on risks in marine insurance

Maersk, MS Amlin, XL Catlin to incorporate blockchain into marine insurance
More efficient and faster trade finance

Group of banks found We.Trade to create the first blockchain-based trade finance platform

- Deutsche Bank
- KBC
- Rabobank
- HSBC
- Natixis
- Nordea
- Unicredit
- Santander
- Society General
BITA – Blockchain in Transport Alliance

BLOCKCHAIN IN TRANSPORT ALLIANCE
A STANDARDS ORGANIZATION

700+ members and counting

- Fleets, 3PLs, and Shippers
- Technology Companies, OEMS, Suppliers, and Service Vendors
- Startups and Investors
- Consultants, Advisors, Universities, and Trade Associations

Topics covered (not limitative)

- Freight tendering and contracting
- Freight payment
- Asset ownership and transfer
- Gray trailer pools
- Freight custody
Faster Bill of Lading document exchange with reduced costs

Introducing CargoX Smart B/L

Blockchain-Based Bill of Lading (B/L) Documents for Global Trade

CargoX is reshaping the global logistics industry by introducing Smart B/L documents based on blockchain technology, replacing old-style paper Bill of Lading documents. With the Smart B/L users will be able to state and transfer cargo ownership rights without the hassle of handling paper.

"The shipping industry still uses paper for issuing proof of cargo ownership. **Blockchain and Smart Contracts are made for this industry.**"
Improve transparency and reduce waste in food chain

Nestlé, Unilever, Kroger and more sign up with IBM in major blockchain food safety deal

By James Bourne

James is editor of TechForge Media, with a passion for how technology influences business and several Mobile World Congress events.

Posted on August 22, 2017

- Transparency to consumer
- Fair trade & sustainability
- Reduce waste
- Optimisation of production & supply chains
End-to-end traceability and fair trade
Provenance and sustainability in food supply chains

Farmers Cooperative Uses Blockchain to Trace Meat Through Supply Chain

Posted on: August 8, 2017 Under: SupplyChain With: 0 Comments

Original Post Source

A group of Arkansas livestock farmers known as the Grass Roots Farmers’ Cooperative, supported by Helfer USA, is using blockchain technology to trace meat through the supply chain to provide consumers information about the source of their food.
Stopping the spread of conflict diamonds

How the blockchain is helping stop the spread of conflict diamonds

Leanne Kemp’s Everledger uses blockchain to track features such as diamond cut and quality, as well as monitoring diamonds from war zones.

By GIAN VOLPICELLI

Wednesday 26 February 2020
Busting counterfeit and reduce waste in medicine supply chain

DHL, Accenture Reveal Blockchain Prototype To Tackle Pharmaceutical ‘Tampering’

Logistics giant DHL announced it had partnered with Accenture and created a Blockchain-based supply chain prototype March 12.

Indian Government Turns to Blockchain to Crackdown on Fake Drugs
Boosting agriculture growth in Africa

Agrikore is a block-chain based platform that ensures that everyone in agriculture can do business with each other in a trusted environment

- Identity management
- Secure data exchange
- Supply chain management
- Payments
- Financing
Attention points for setup and implementation of blockchain networks

**Organisation**
- Consortium organisation and governance
- Scheme specification, processes, roles, responsibilities
- Legal structure and financing

**Technology**
- Blockchain and other technology related choices
- Blockchain network setup (consensus model, node deployment, scalability)
- Standardisation, APIs and interoperability

**Roll-out**
- Onboarding of participants (incl. identity & key management)
- Integration with business applications and devices of network participants
- Blockchain network interoperability and integration
Integration ‘existing world’ with blockchain networks

- Complex point-to-point integrations
- Hard to manage and operate
- Dependent of scarce blockchain experts
- No secure storage of keys
Unchain.io blockchain integration gateway

- Any application/device to any blockchain network
- Easy, fast and secure integration
- No dependency of blockchain experts
- Low cost
Summary

• Blockchain is here to stay

• Paradigm shift in thinking how to collaborate in business networks

• Blockchain technology simplifies creation of networks to enable business collaboration

• Organisation and governance aspects become more essential than technology

• Many different initiatives to set up blockchain networks

• Interoperability and consolidation needed to avoid too much fragmentation

• Ease of on-boarding and integration will be critical for success of blockchain networks