Distributed Ledger Technology for RUC

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Agenda

Introduction – *What is a Distributed Ledger Technology (DLT) and how is it related to blockchain?*

Applications for transportation – *How DLT can be applied to transportation (RUC and tolling)*

Case study – *Specific example of how DLT is used today in supply chain management (SCM)*

Industry updates – *Timeframe for DLT to be incorporated, OEMs' position*

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Introduction – *What is a Distributed Ledger Technology (DLT) and how is it related to blockchain?*

A **ledger** is a record of transactions

A **distributed ledger** is a ledger that is maintained by different owners, each with their own copy

Secure Hash of Block Data

Any kind of data can be contained in a "**block**". The whole block is then hashed

Block - Chain

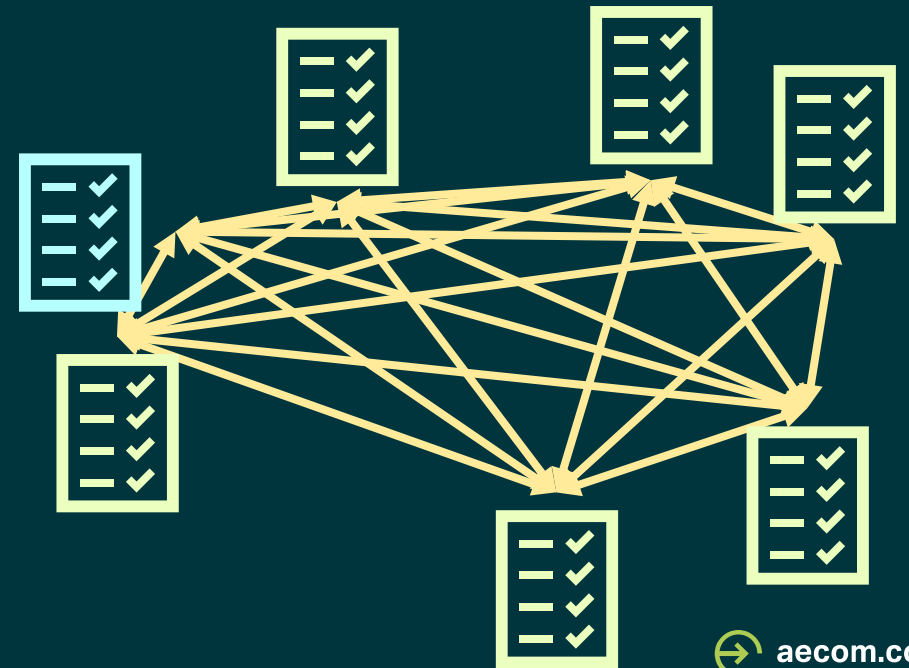Secure Hash of Previous Block's Data

Each new block contains the hash of the previous block

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The term "blockchain" typically refers to a **blockchain system**

✓ Official ledger (blockchain containing transactions)
✓ Rules and communication protocols
  ✓ Node communication
  ✓ New transaction verification
  ✓ May contain a token to represent value

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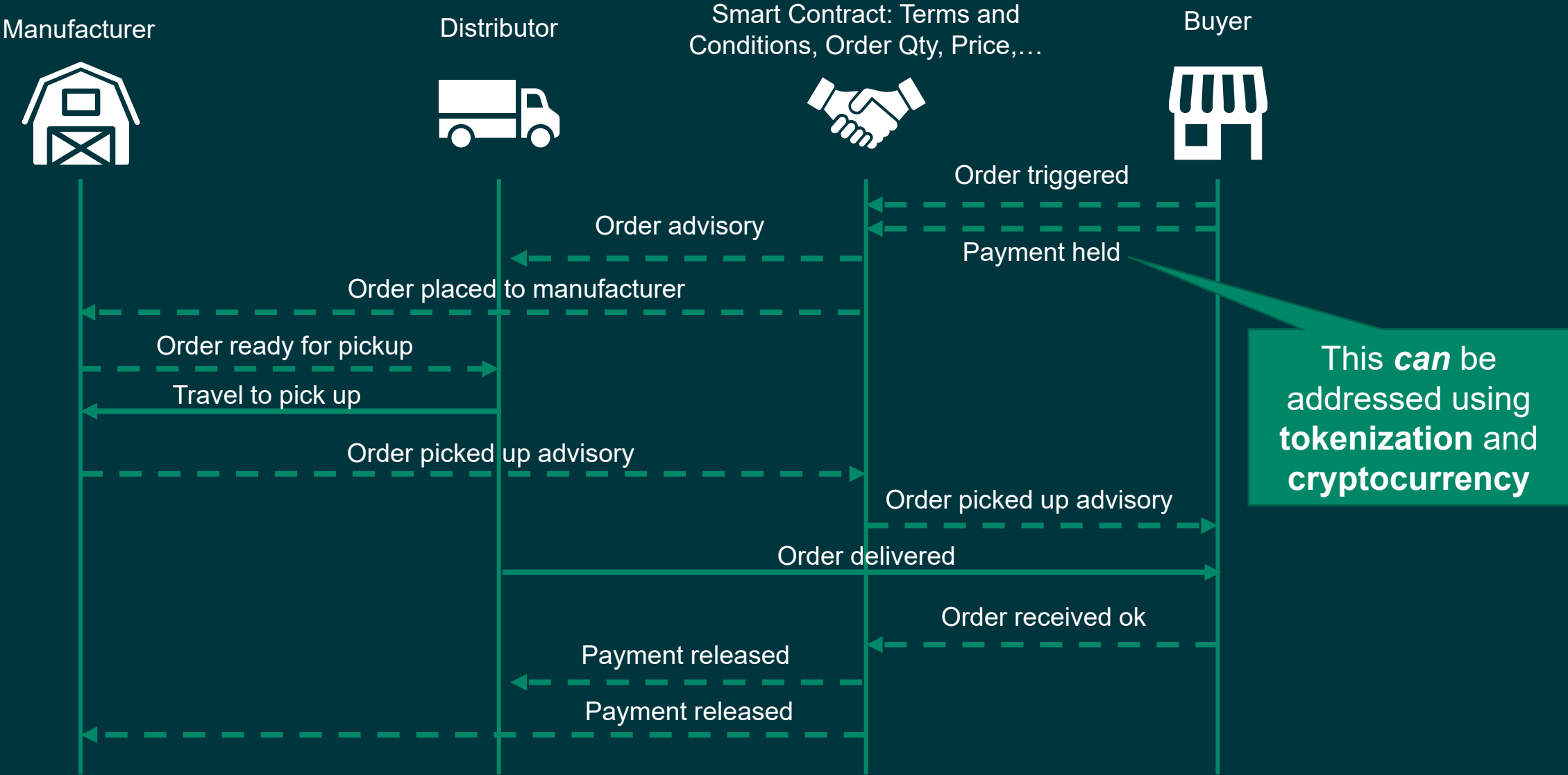# Security in Blockchains and Distributed Ledgers

A **blockchain** that has been modified will be detected by the collective, and that node will be ignored until it replaces its blockchain (ledger) with the correct one.

Modifying any data in a block will cause the hash to be different for that block, which is easily verified. The blockchain is compromised from that block onward.

Smart Contracts: Executed Automatically

Manufacturer

Distributor

Smart Contract: Terms and Conditions, Order Qty, Price,...

Buyer

Order triggered

Order advisory

Payment held

Order placed to manufacturer

Order ready for pickup

Travel to pick up

Order picked up advisory

Order picked up advisory

Order delivered

Order received ok

Payment released

Payment released

This *can* be addressed using **tokenization** and **cryptocurrency**
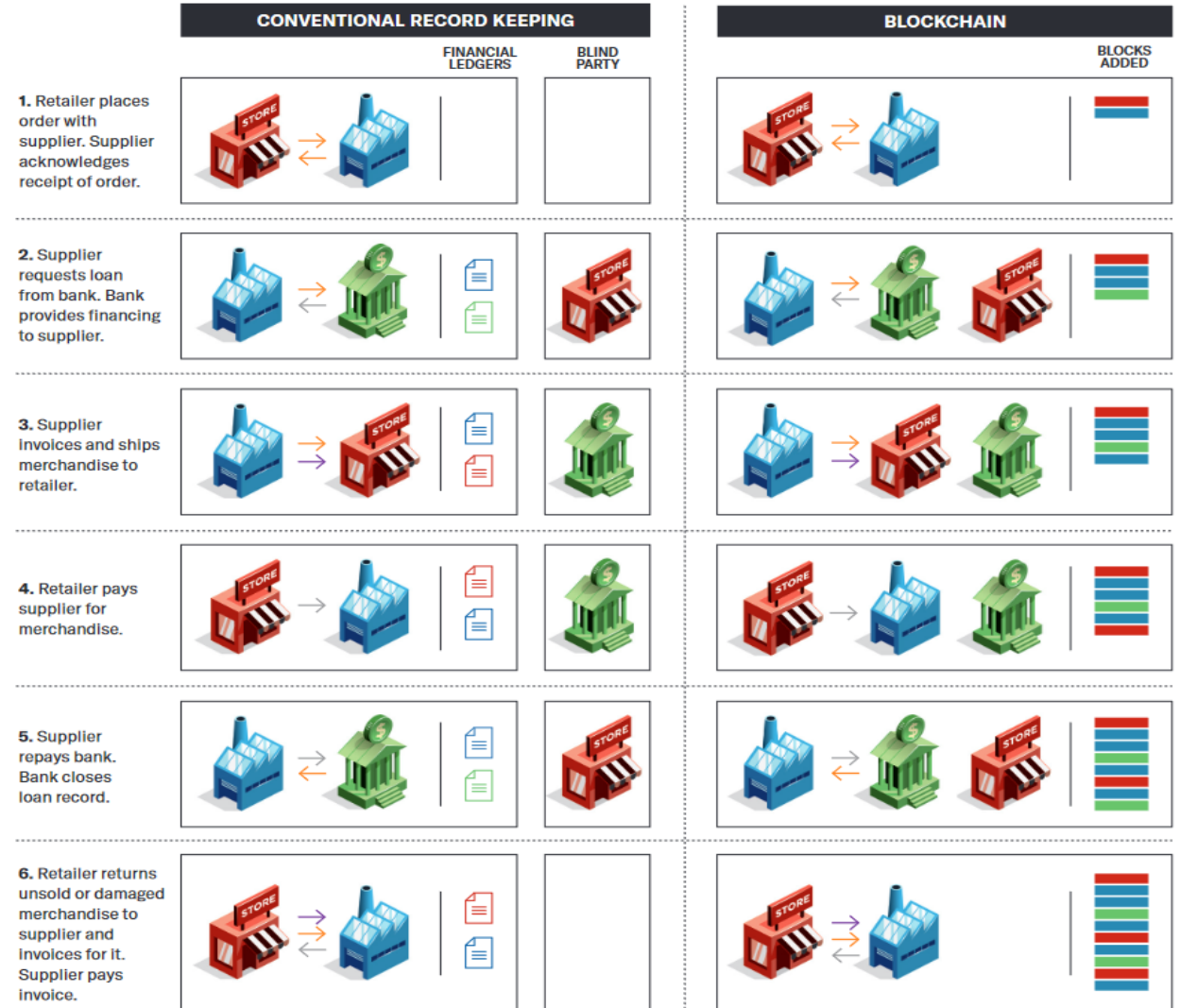
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Blockchain vs Traditional Records

➤ Information is compartmentalized

➤ Ledgers of transactions are incomplete and only as secure as the holder

➤ Significant overhead involved in managing the individual interactions

Capturing the Details of a Simple Transaction: Conventional vs. Blockchain Systems

The financial ledgers and enterprise resource planning systems now used don't reliably allow the three parties involved in a simple supply-chain transaction to see all the relevant flows of information, inventory, and money. A blockchain system eliminates the blind spots.

KEY
Retailer — Information flow
Supplier — Inventory flow
Bank — Financial flow

CONVENTIONAL RECORD KEEPING | FINANCIAL LEDGERS | BLIND PARTY | **BLOCKCHAIN** | BLOCKS ADDED

1. Retailer places order with supplier. Supplier acknowledges receipt of order.

2. Supplier requests loan from bank. Bank provides financing to supplier.

3. Supplier invoices and ships merchandise to retailer.

4. Retailer pays supplier for merchandise.

5. Supplier repays bank. Bank closes loan record.

6. Retailer returns unsold or damaged merchandise to supplier and invoices for it. Supplier pays invoice.

Illustrations: Mauco Sosa

From: "Building a Transparent Supply Chain" by Vishal Gaur and Abhinav Gaiha, May–June 2020

HBR

Applications for transportation – *How DLT can be applied to transportation (RUC and tolling)*

A blockchain can be used to record transactions: Provides proof of payment for a vehicle in a specific RUC zone

RUC Authority

A vehicle with a smart contract approaches a RUC zone

Once the vehicle exits the RUC zone, the smart contract releases payment

If the terms of the smart contract are met, it executes automatically

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Case study – *Specific example of how DLT is used today in supply chain management (SCM)*

Blockchain Use Cases for Supply Chain Management

From track-and-trace to more efficient execution of contracts, the blockchain use cases for supply chain management are vast.

1/2   ‹ Prev   Next ›

Tracking Food From Source to Shelf

Blockchain in the food supply chain is helping retailers track goods from source to shelf more accurately than ever before. Suppliers, transporters and retailers are working together on digital ledgers with one immutable source of information. What's more, the combination of blockchain technology and IoT sensors is helping to preserve quality standards. If a refrigeration system breaks down while the food is in transit and goods perish, this information can automatically and securely stored on the blockchain and relayed back to the suppliers and stores before the shipment even reaches its destination.

Blockchain
IN SUPPLY CHAIN MANAGEMENT
DISRUPTOR DAILY

Logistics / Shipping Data: origintrail, SKYFchain, T-mining, EXIMCHAIN, BLOCKHEAD TECHNOLOGIES, Peer Ledger The Responsible Sourcing Company

Compliance & Fraud Prevention: tbs x3, modum, CHRONICLED

Provenance: DORÆ, ZĒGO, NextPakk, SHIPCHAIN PROVENANCE

Decentralized Supply Chain Operations: WAVE, skuchain, sweetbridge, BiTA BLOCKCHAIN IN TRANSPORT ALLIANCE, fr8 network, KONEXIAL, AION

Factoring & Supply Chain Finance: CARGO COIN, TangoTrade, ZERO1, TRADELINE, CargoX, Hijro

Q1-2019

Walmart implements IBM's blockchain for food traceability

The aim is to track food from farm to store in near real time using blockchain's distributed ledger system.

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How Ford Is Using Blockchain Technology To Improve Urban Air Quality

The way it works is that low-emission and zero-emission vehicles like the Ford Transit PHEV are tracked as they enter and leave the low-emissions "green zones" that are becoming commonplace across Europe in the wake of diesel engine bans. The Ford vans offer geofencing technology as standard, which allows fleet managers to keep drivers in their given work zones and puts the van into a "pure" EV mode as it enters and leaves the green zones. The municipal fleet in Cologne, Germany, took that geofencing a step further by using blockchain technology to record the vans' movements into a blockchain ledger, so that the number of "green miles" driven in that city's low-emission zone could be securely and transparently stored online, where it could be shared among relevant stakeholders without being manipulated by one party or another to advance their own agenda.

➤ Ford Europe using DLT

   ➤ Blockchain of transactions to track miles driven in a "green zone"

   ➤ Green zones are dynamic

   ➤ Ford realizes financial benefit for "green miles" driven

Industry updates – *Timeframe for DLT to be incorporated, OEMs' position*

Mobility Open Blockchain Initiative (MOBI) presentation

Launched on May 2, 2018

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Questions?

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