DAC

Blockchain in Transport, Shipping and Logistics

Blockchain Technology Development

ORIGIN **TRANSACTIONS** **CONTRACTS** **APPLICATIONS**

1991-2008

Stuart Haber and Scott Stornetta work on distributed computing and the first blockchain.

2008

Satoshi Nakamoto publishes Bitcoin Whitepaper.

2010

First bitcoin transaction is carried out – the famous 10.000BTC pizza purchase.

2012

Development of blockchain in digital payments and currency transfers begins.

2013

Blockchain penetrates financial markets.

2014

Financial companies start using blockchain beyond cash transactions.

Vitalik Buterin and team commence work on Ethereum smart contract software.

2015

Permissioned blockchain networks are under development.

Linux Foundation announces the creation of Hyperledger Project.

2016

Blockchain technology penetrates markets across industries.

2017

Blockchain In Transport Alliance (BiTA) is founded to drive the adoption of blockchain technology in the transport industry.

2017

IBM, Walmart, China's Tsinghua University, and the Chinese e-commerce giant JD.com launch The Blockchain Food Safety Alliance to standardize the method of tracking food.

Introduction

Transport, shipping and logistics (TSL) industry problems to be solved with blockchain:

Transportation payment and dispute resolution

Average Days Sales Outstanding in trucking reaches 36.9 days[1]. Payment automation resulting from smart contract reduces payment delays and disputes.

Administrative costs

The cost of document processing and administration reaches 20%[2] of the costs of transportation according to Maersk and IBM. Blockchain-based platforms help to reduce it significantly.

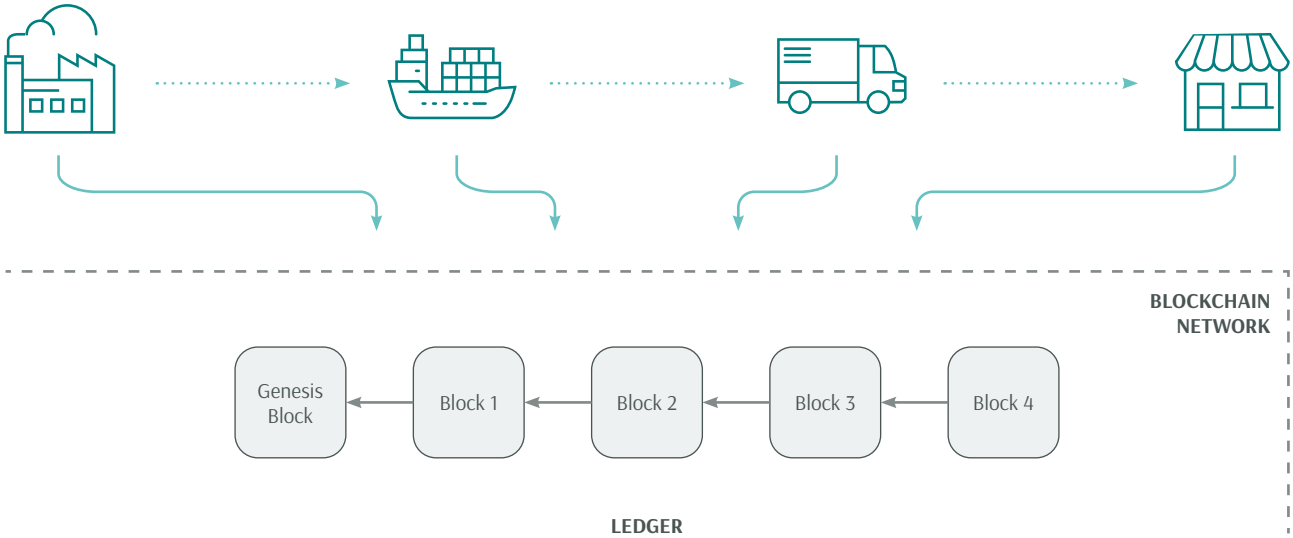
Freight monitoring and quality control

Cold chain monitoring is a serious challenge for the pharmaceutical industry where 8.5%[3] of global shipments are sensitive to temperature deviations. In some countries, this number reaches 20%.

Transparency and trust

Cargo thefts alone are estimated to $30 billion[4] annually worldwide. Blockchain implementation leads to a significant reduction of dishonest behavior and its identification along the supply chain.

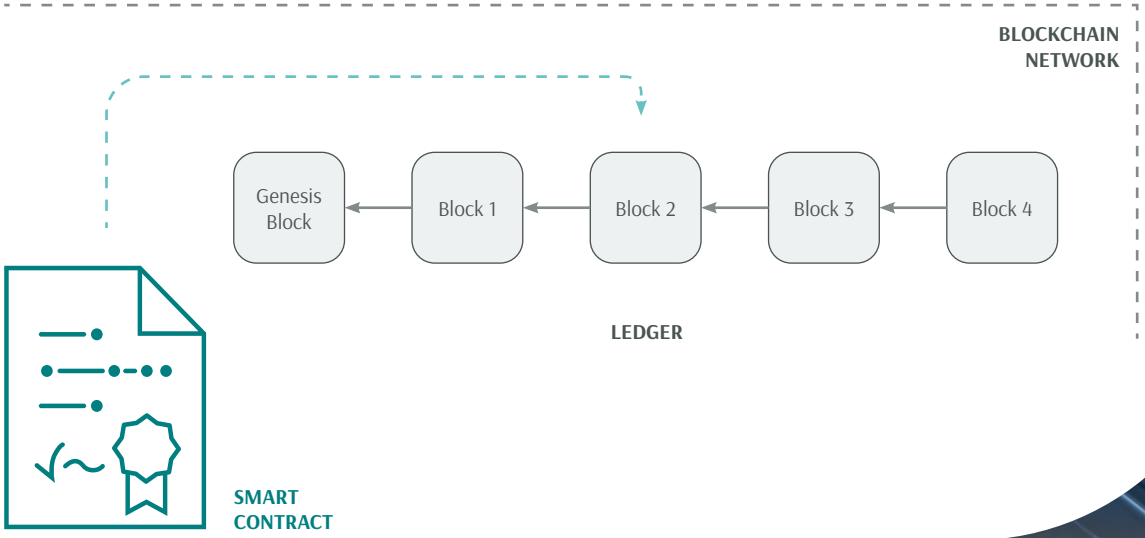
What is a Blockchain?



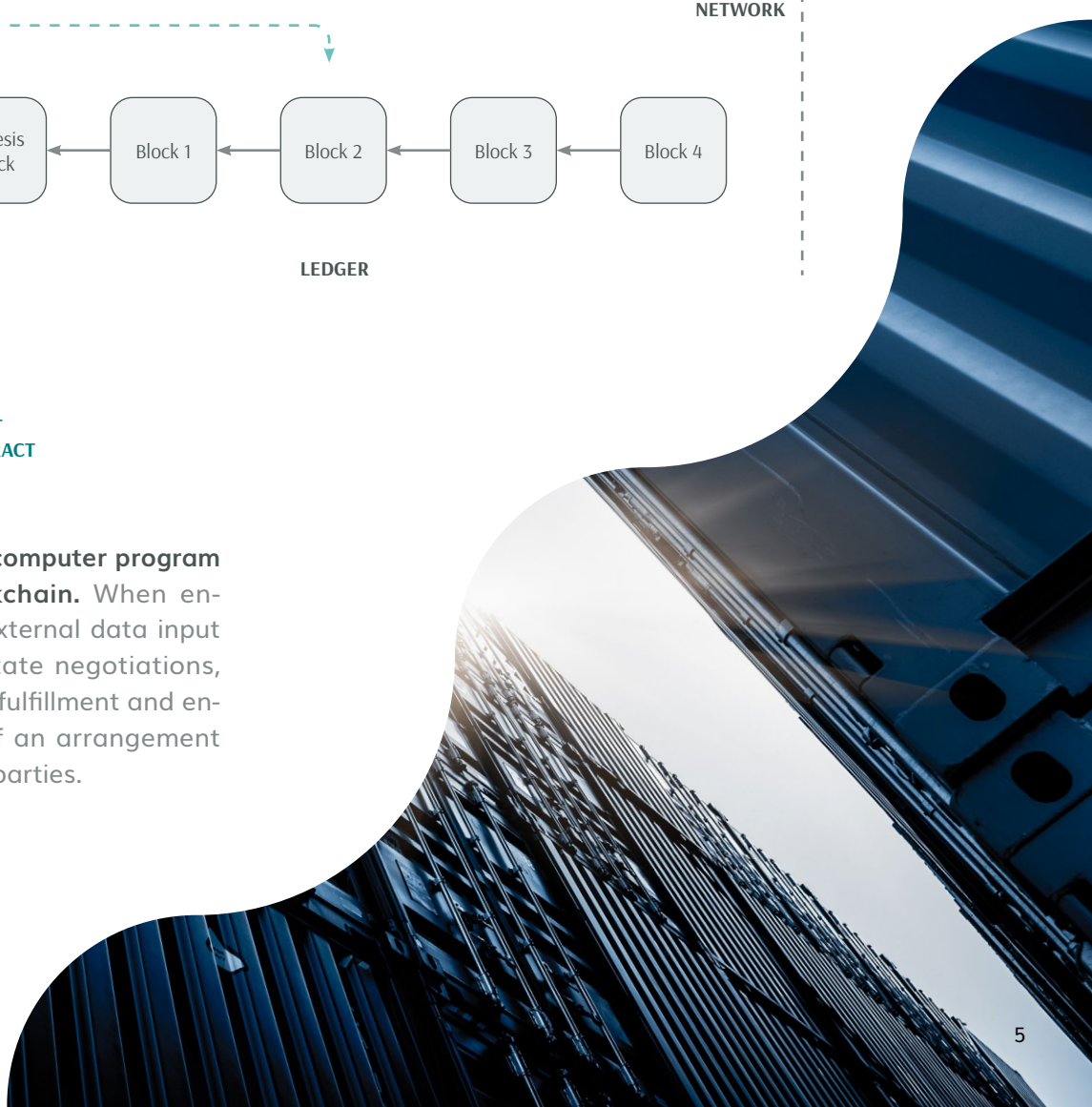
Blockchain – also known as distributed ledger – is a modern version of a centuries-old ledger. It enables multiple parties – who often don't know or trust one another – to record information in a **permanent, immutable, tamper-proof and transparent** manner on a decentralized digital ledger and on a distributed system without the aid of a central authority.

The integrity of the blockchain is secured by trustless consensus algorithms and guarded by cryptography making it impossible to illegally append or modify historical data.

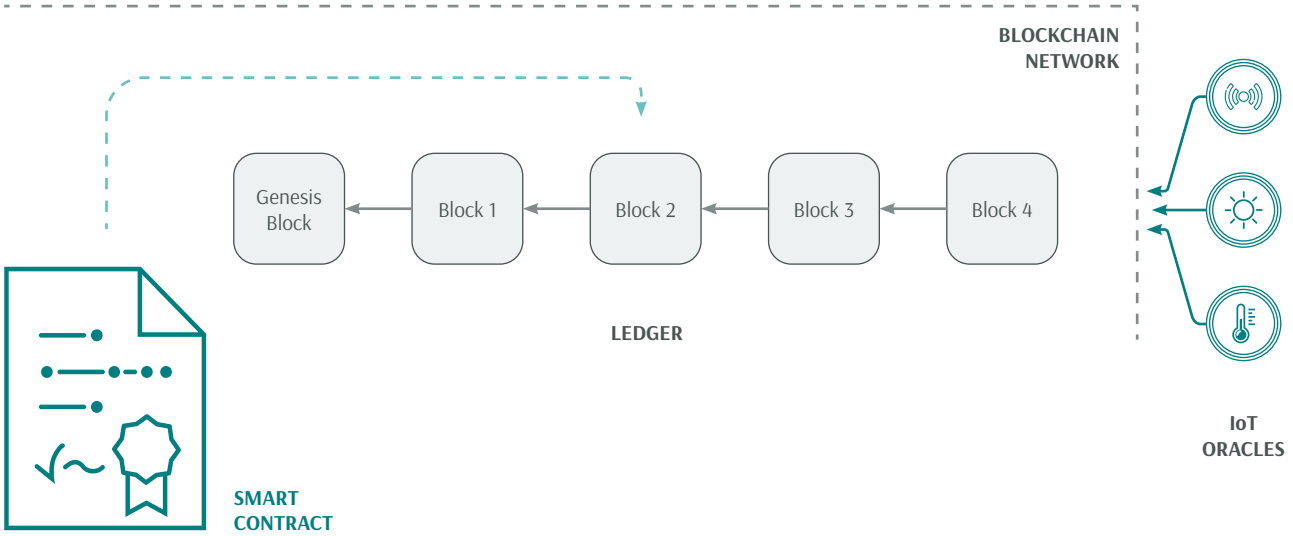
What is a Smart Contract?



A smart contract is a **computer program running on the blockchain.** When enhanced with trusted external data input (oracles), it can facilitate negotiations, verify terms of service fulfillment and enforce the execution of an arrangement between two or more parties.



What is an Oracle?



Oracles are **trusted providers of external data**. By design, a smart contract is not aware of any outside data or events. It resides inside a blockchain and knows only about the data stored on that blockchain.

Oracles facilitate an interface between the distributed ledger and the outside world. They can range from IoT sensors, weather stations or trusted information providers supplying relevant data.

Why Should You Consider Blockchain?

More and more companies across a number of industries are already researching and implementing distributed ledger technology to solve their problems. Prominent examples include:

— banking,
— real estate,
— insurance,
— healthcare,
— government.

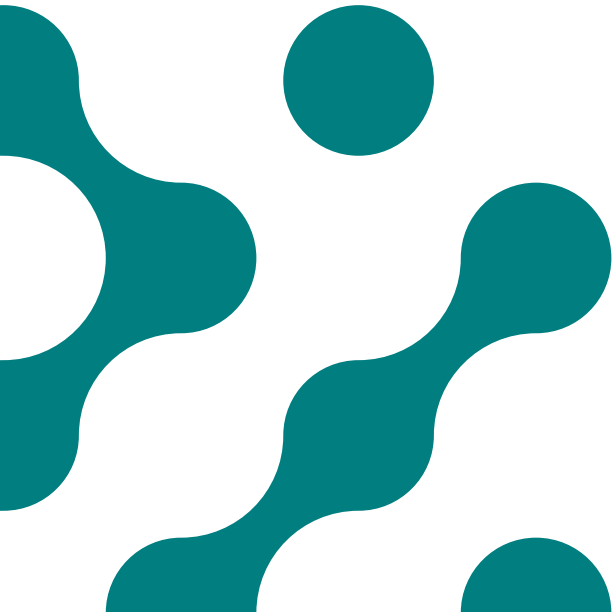
The shipping industry is another great candidate. By nature, it connects multiple participants with opposing interests. For example, contractual fines caused by late delivery of merchandise or damaged goods will be a benefit for one party and a disadvantage for the other.

Trust and fraud detection

With a single shipment oftentimes involving over 20 parties with roughly 200 interactions between them, there are numerous opportunities for dishonest behavior. These include:

— paperwork manipulation,
— shipment counterfeiting,
— fabricating data about cargo condition,
— goods theft,
— requesting fines under a false pretext.

With blockchain, companies can detect and combat fraud by tracking and validating every step of the supply chain process, benefiting both the buyer and manufacturer.



Provenance tracking

Trustworthy and detailed product lineage process can quickly help with:

— identifying parties impacted by recalls,
— locating faulty batches,
— providing proof that a product was sustainably grown or manufactured.

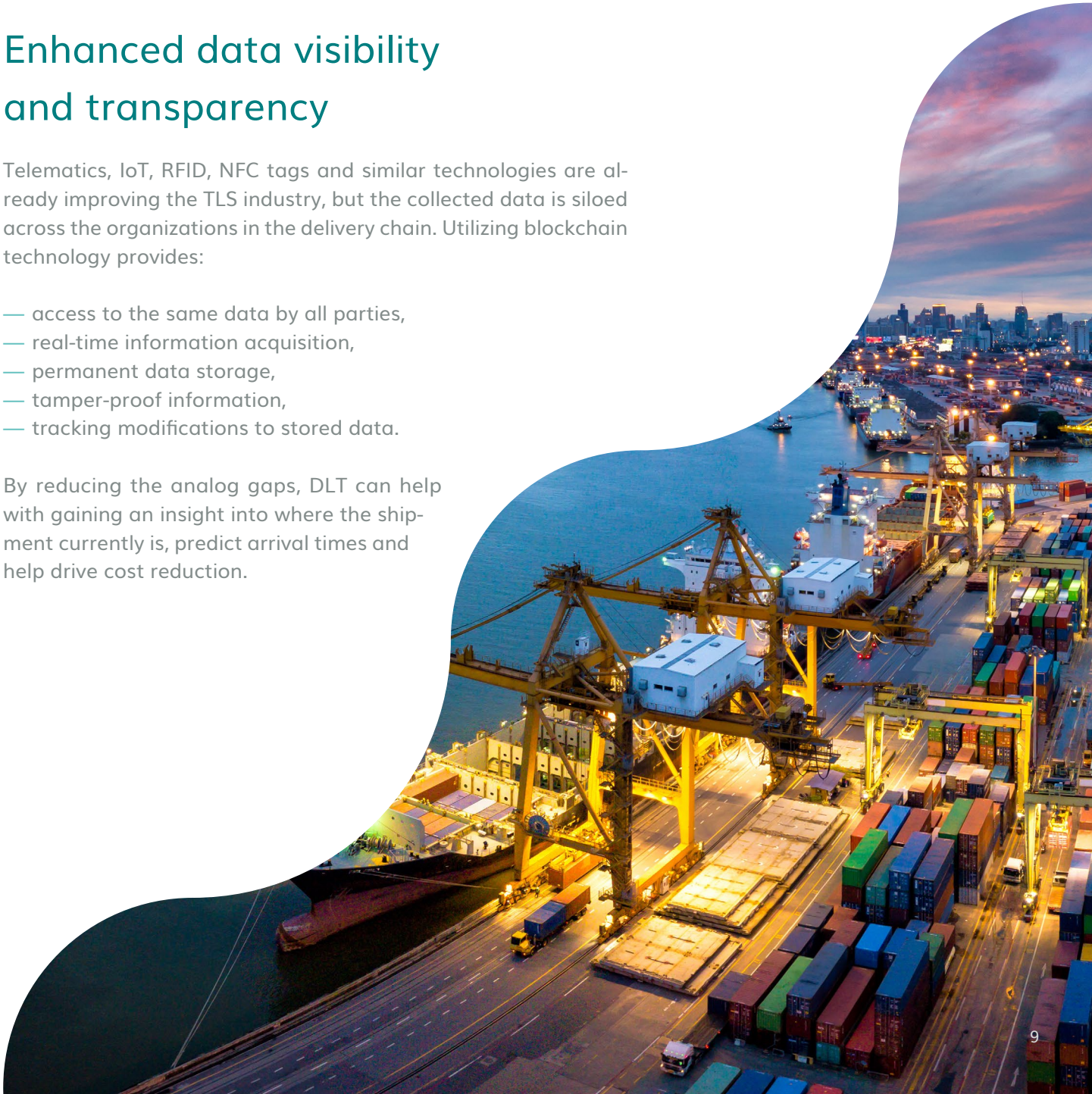
Great examples include both Walmart and the Australian meat industry[5] using blockchain to record and track information about beef or IBM helping with tracking of ethically sourced coffee[6].

Enhanced data visibility and transparency

Telematics, IoT, RFID, NFC tags and similar technologies are already improving the TLS industry, but the collected data is siloed across the organizations in the delivery chain. Utilizing blockchain technology provides:

— access to the same data by all parties,
— real-time information acquisition,
— permanent data storage,
— tamper-proof information,
— tracking modifications to stored data.

By reducing the analog gaps, DLT can help with gaining an insight into where the shipment currently is, predict arrival times and help drive cost reduction.



Think Big – Start Small

With the right partner to guide you through the process, embracing blockchain can be a simple transformation with a smooth learning curve. Begin by identifying a use case for distributed ledger within your organization. Once you have it, start with a cloud-based solution with no need to invest in new hardware or expensive in-house research.

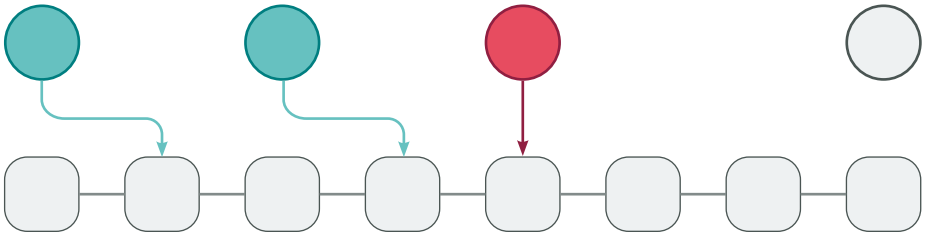
With only basic training, you'll be able to take your first steps in that ecosystem:

STEP 1
Begin by augmenting shipment visibility.

STEP 2
Enhance it with real-time IoT and oracles data.

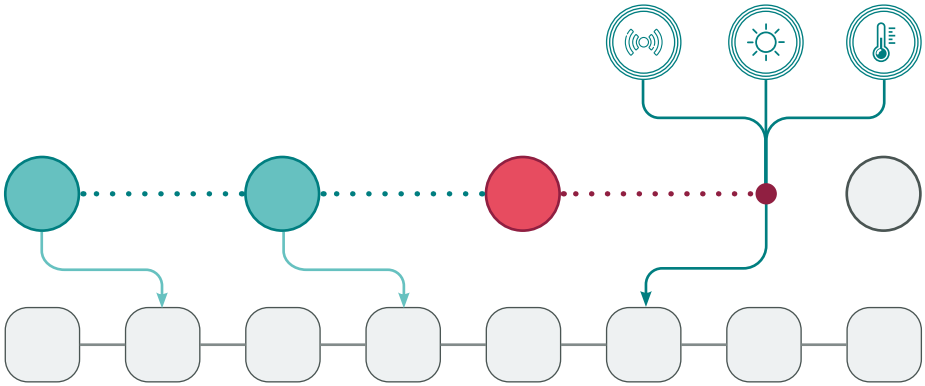
STEP 3
Replace the entire paperwork with DLT.

Step 1: Begin by augmenting shipment visibility.



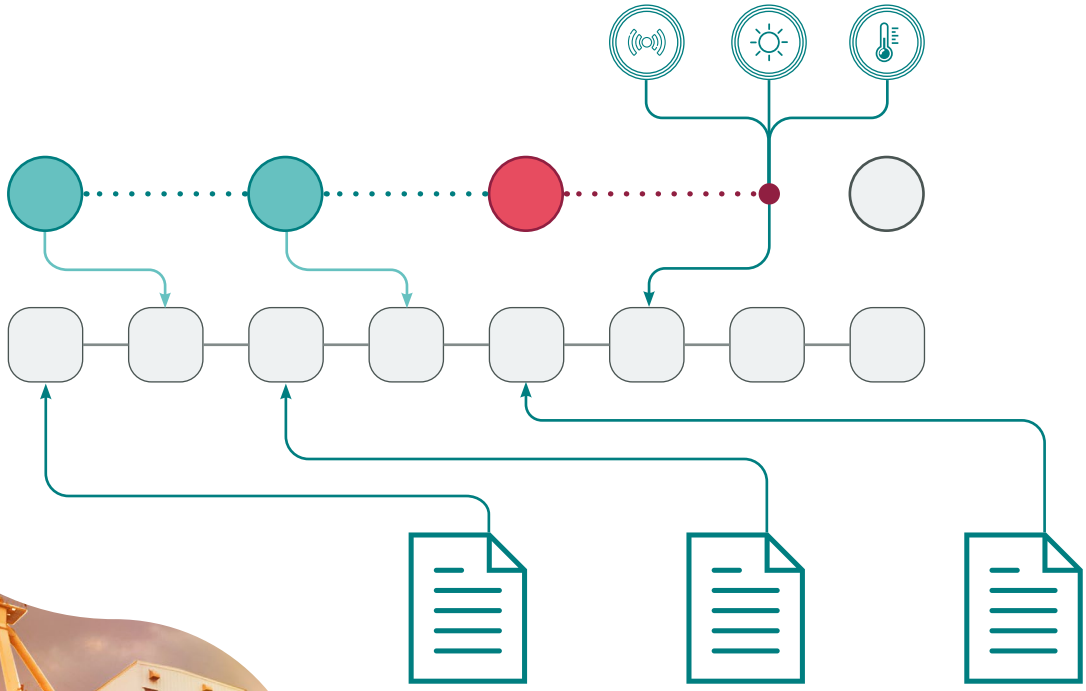
Initially, blockchain technology can be used to improve visibility throughout the delivery chain. Each handover can be recorded as an immutable transaction with a timestamp and shipment transfer location.

Step 2: Enhance it with real-time IoT and oracles data.



The subsequent step will require deploying blockchain compatible IoT hardware that can provide telemetry data in real time. Enhanced with input from oracles, it will enable tracking and smart contract validation not just at but between the way-points as well.

Step 3: Replace the entire paperwork with DLT.



This will be the most complex and lengthy process as it requires cooperation from all parties involved, including governmental agencies. When successfully deployed, it will help with removing most of the analog gaps existing within and across organizations. It will help with driving the costs down by limiting delays in information flow and errors caused by manual data processing.

Use Cases and Examples

TRANSPORTED GOODS	DAIRY PRODUCTS	ENGINE PARTS	MEDICAL PRODUCTS
ORIGIN	dairy manufacturer	engine manufacturing plant	pharmaceutical production plant
DESTINATION	retailer's local warehouse	car assembly plant	pharmaceutical distribution center
CONTRACT CONDITIONS	temp. < 7°C, just-in-time delivery	just-in-time delivery	temp. > 2°C
DELIVERY TIME	4:00pm	1:25pm	——
MONITORING	continuous temperature measurement by IoT sensors	continuous location and traffic conditions monitoring to predict arrival at ramp	continuous temperature monitoring

Data from sensors, GPS locations etc. is recorded on the blockchain and smart contracts are verified against it. If the delivery conditions are not met, penalty fines are automatically paid or the contract is voided. Blockchain smart contract allows the payment process to be automatically triggered.

About DAC

www.dac.digital

DAC is a software development and hardware integration company. We help industry leaders to boost the efficiency of their value network. Our software and hardware integration technologies influence how the network produces benefits and increases assets for our customers. We work on the intersection of technology, science, and business.

The solutions we deliver to our customers result from the unique blend of research and management methodologies embedded in software development and hardware integration processes.

We specialize in Custom Software Solutions, SaaS applications, Blockchain, IoT, Data Analytics, Enterprise Integration for Mobility, Agro, FMCG, Automotive, or Logistics.

Contact us to discuss blockchain implementation opportunities in your organization.

CONTACT

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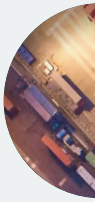

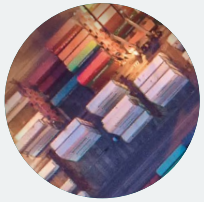

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