

**Bør sporbarhetssystemer i
matindustrien baseres på
blockchainteknologi?**

TechFood – Online

18. Februar 2021

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About Nofima

Nofima is a private, non-profit research institute owned by the Norwegian government with head office in Tromsø and around 400 employees in six different locations around Norway.

Nofima was founded in 2008 when four former public food research institutes merged:

- Norconserv – canned and preserved foods, Stavanger
- Matforsk – food from agriculture, Ås
- Akvaforsk – aquaculture related research, Sunndalsøra
- Fiskeriforskning – seafood and processing, Tromsø

Main areas of work:

- Aquaculture and fisheries – raw materials
- Food from agriculture and aquaculture – processes and products
- Consumer and market research, which includes:
 - Consumer research, buying behaviour, food and context
 - Innovation and product development
 - Traceability, sustainability, environmental accounting

Turnover in 2019 was around 65 Million Euros



How to define traceability?

Traceability (ISO 8402):

The ability to trace the history, application or location of an entity by means of recorded identifications

For products this includes:

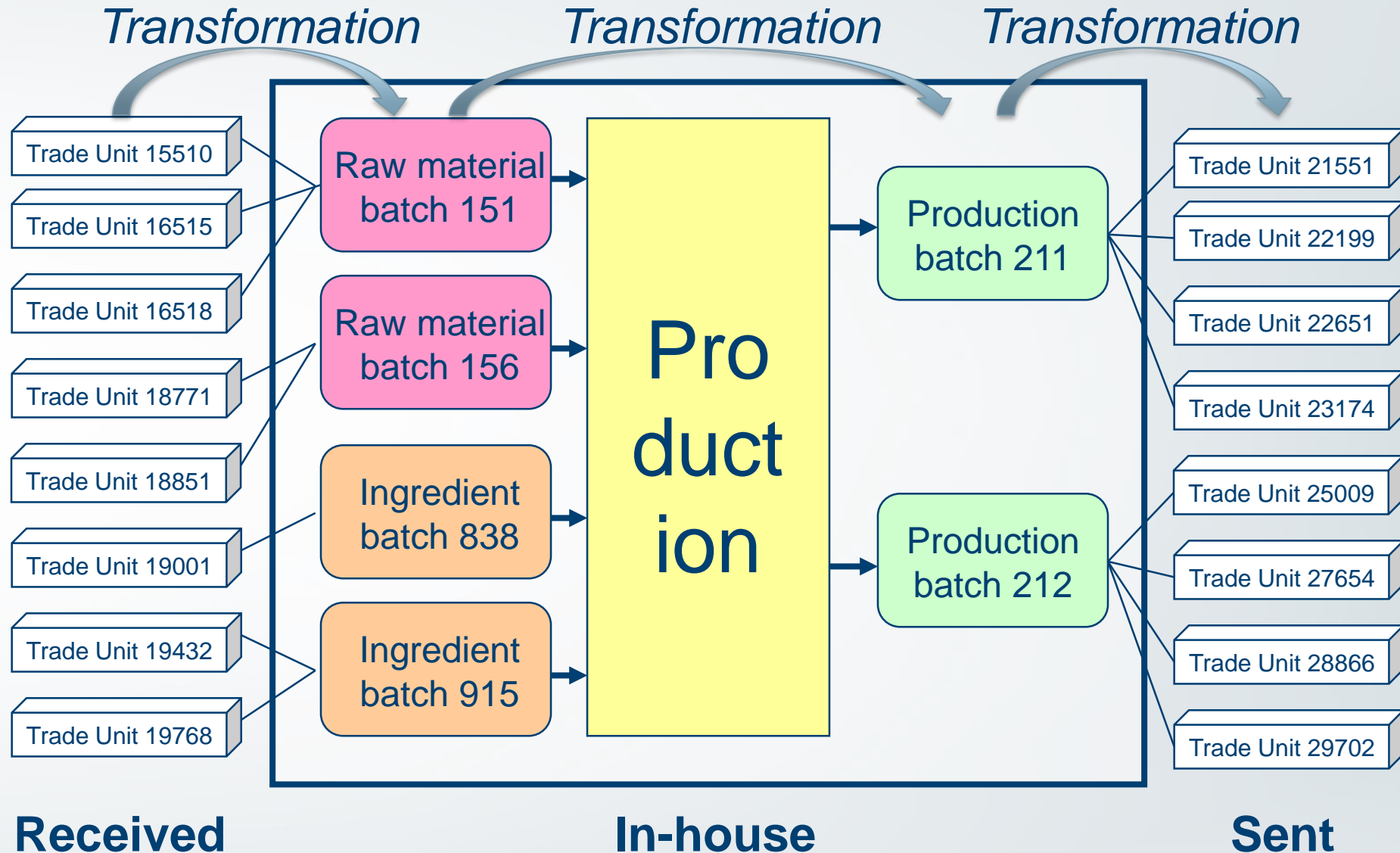
- origin of - and properties of all raw materials and ingredients*
- complete process history*
- location at any time*

A traceability system is a record-keeping system

The records or claims in a traceability system might be false or misleading; the responsibility of the traceability system is to keep track of these claims

Traceability does not (only) entail knowing «where did the product come from»; it entails keeping track of all recordings made in the supply chain, including where the product came from, what processes it went through, and where it ended up

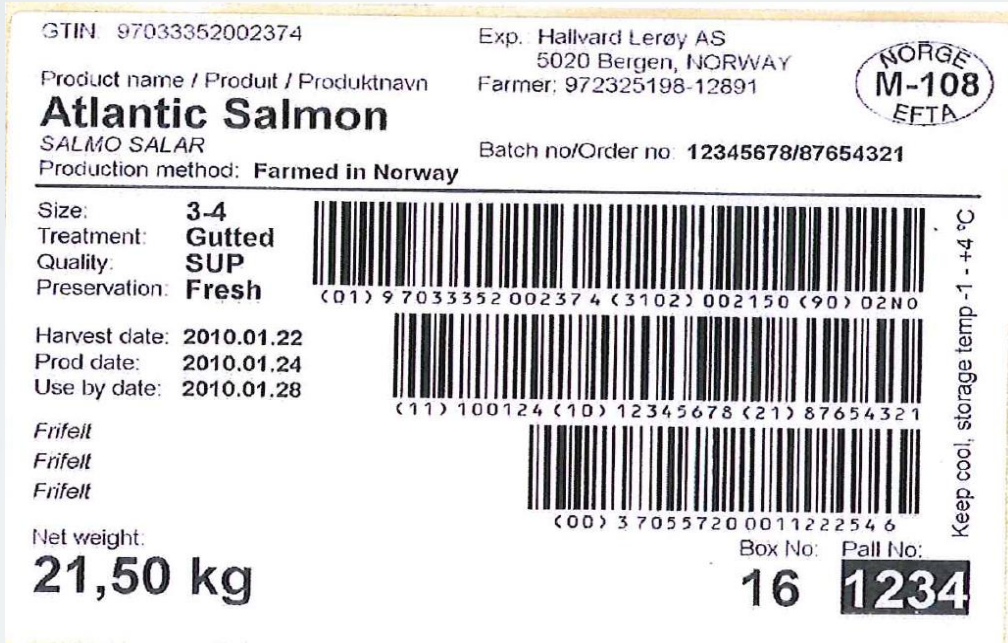
Batch/Lot, Trade Unit, Transformations



Components of a traceability system

**Identification
of TRUs**

Identifikasjon av enheter



Clear
text and
barcode
on TRU
label

QR-
code

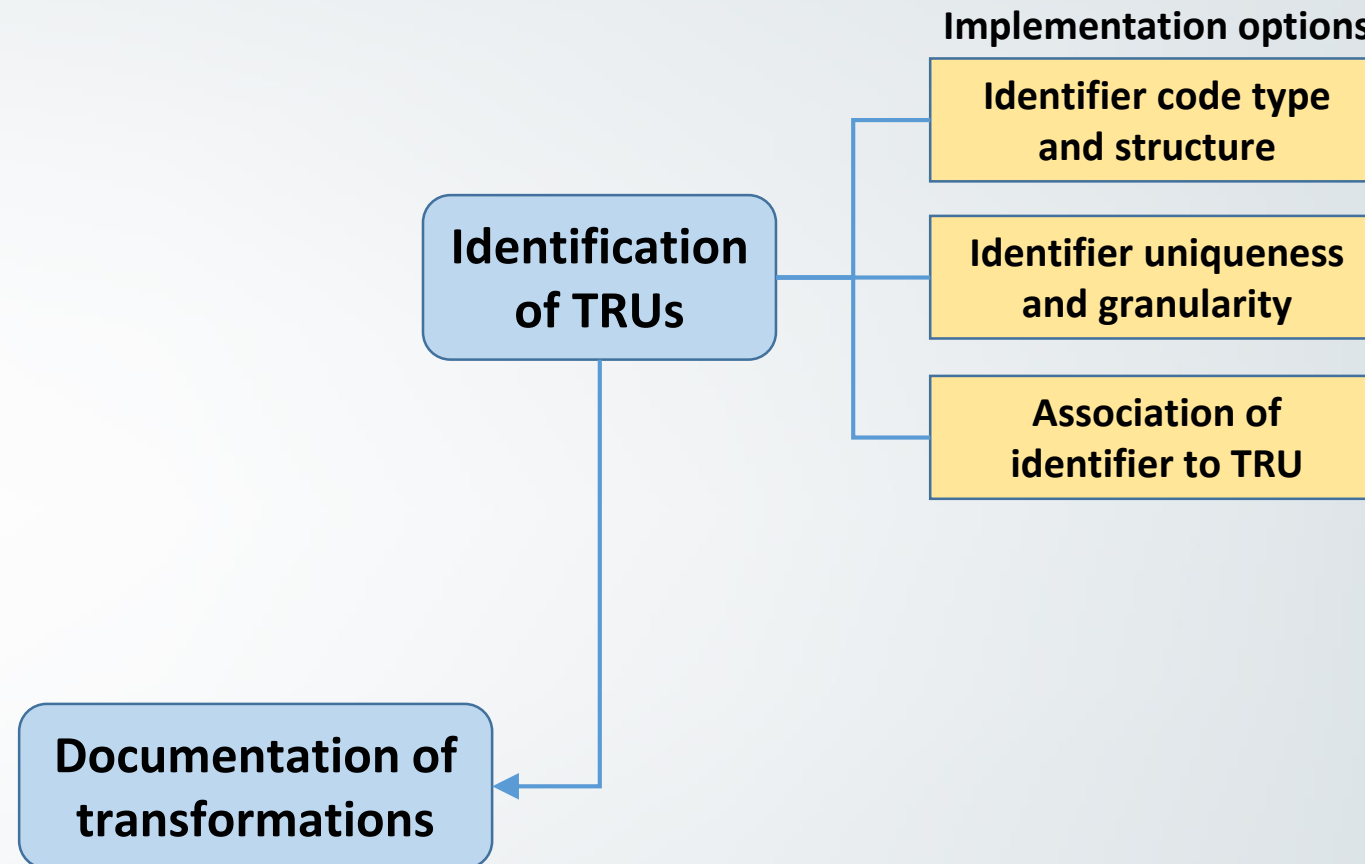


A structured code, unique in a given context, associated with one or more TRUs, and often represented in a way that facilitates quick reading

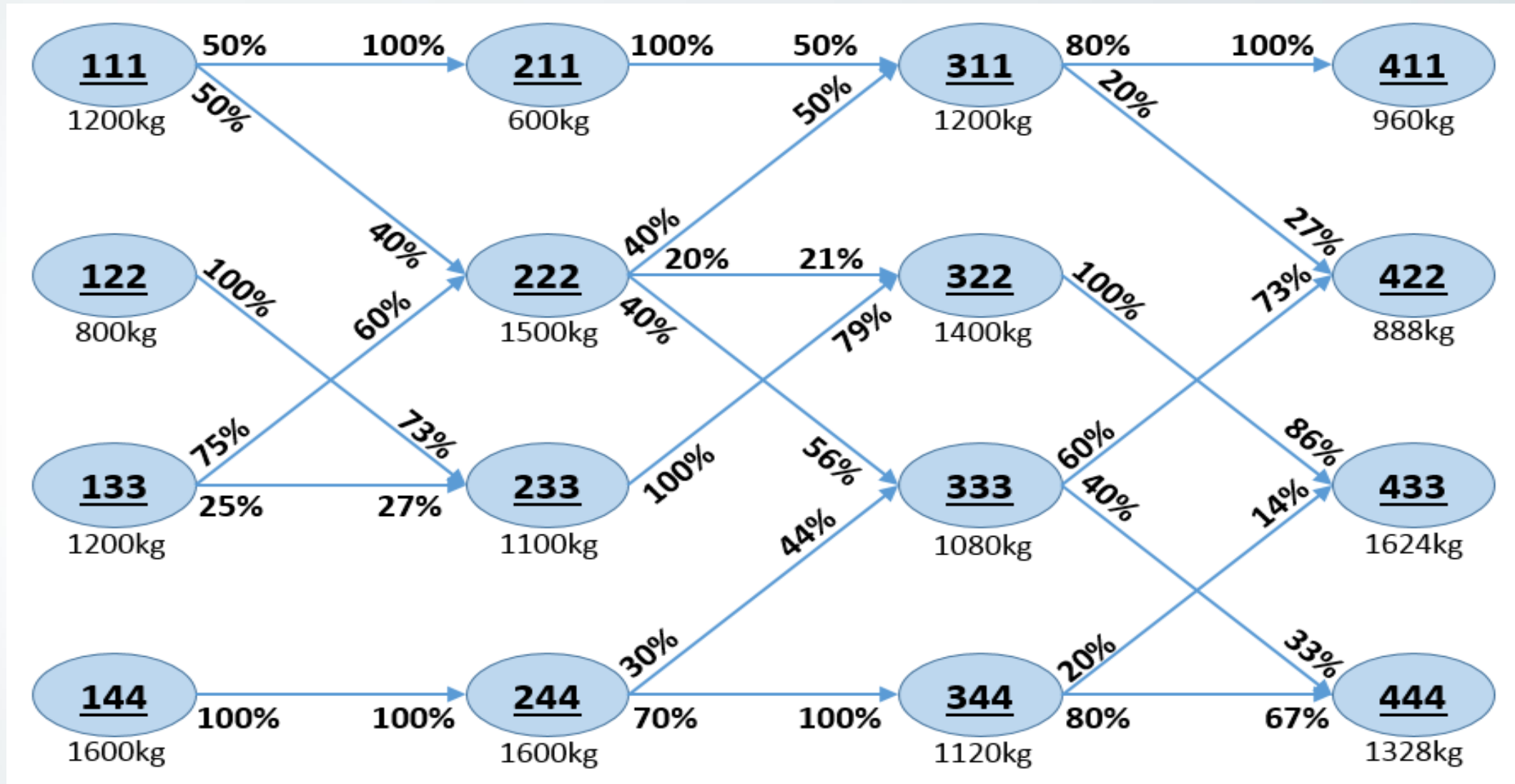
Code
embedded
in RF-ID
chip



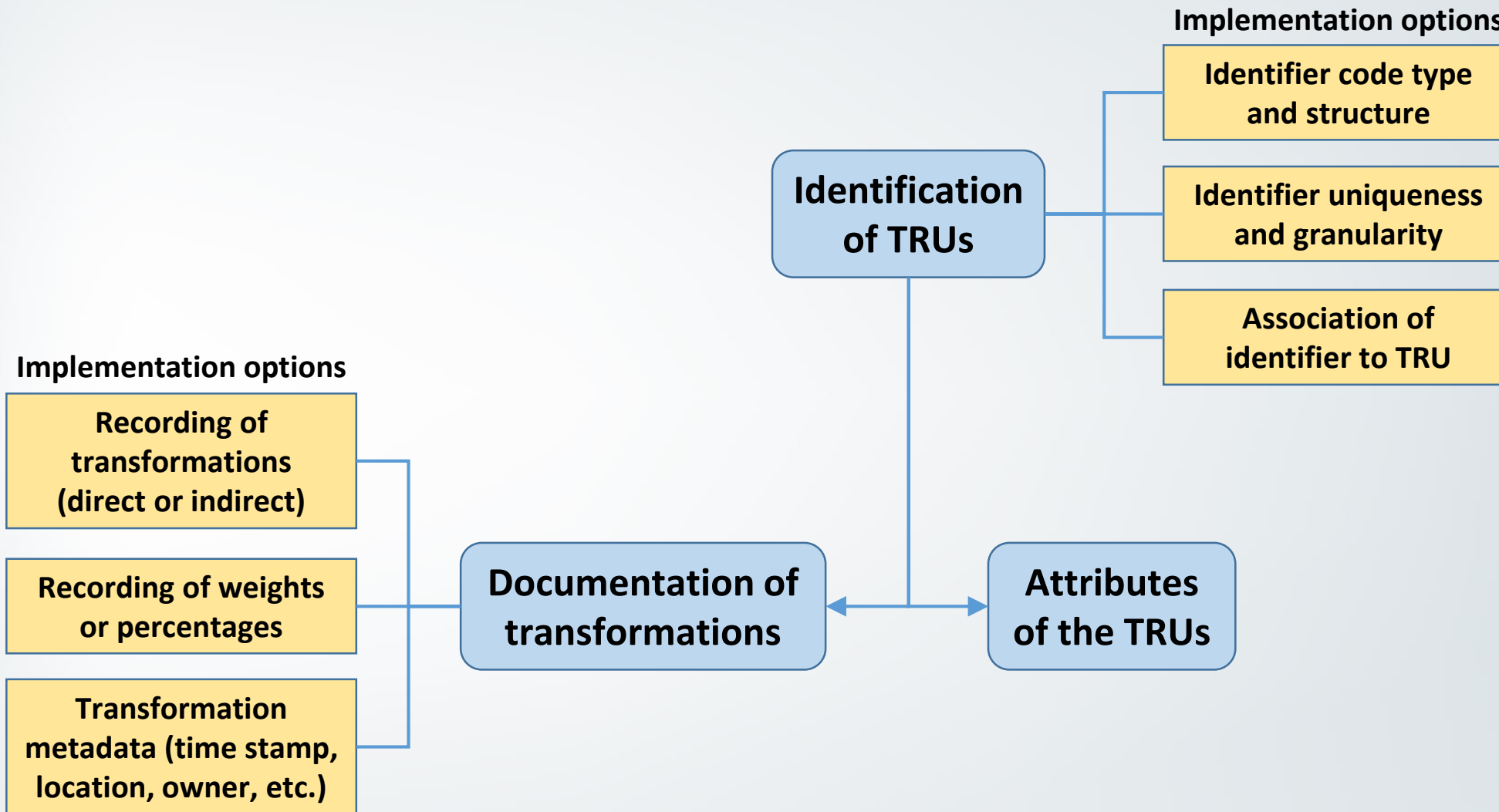
Components of a traceability system



Complicated supply chains with transformations



Components of a traceability system

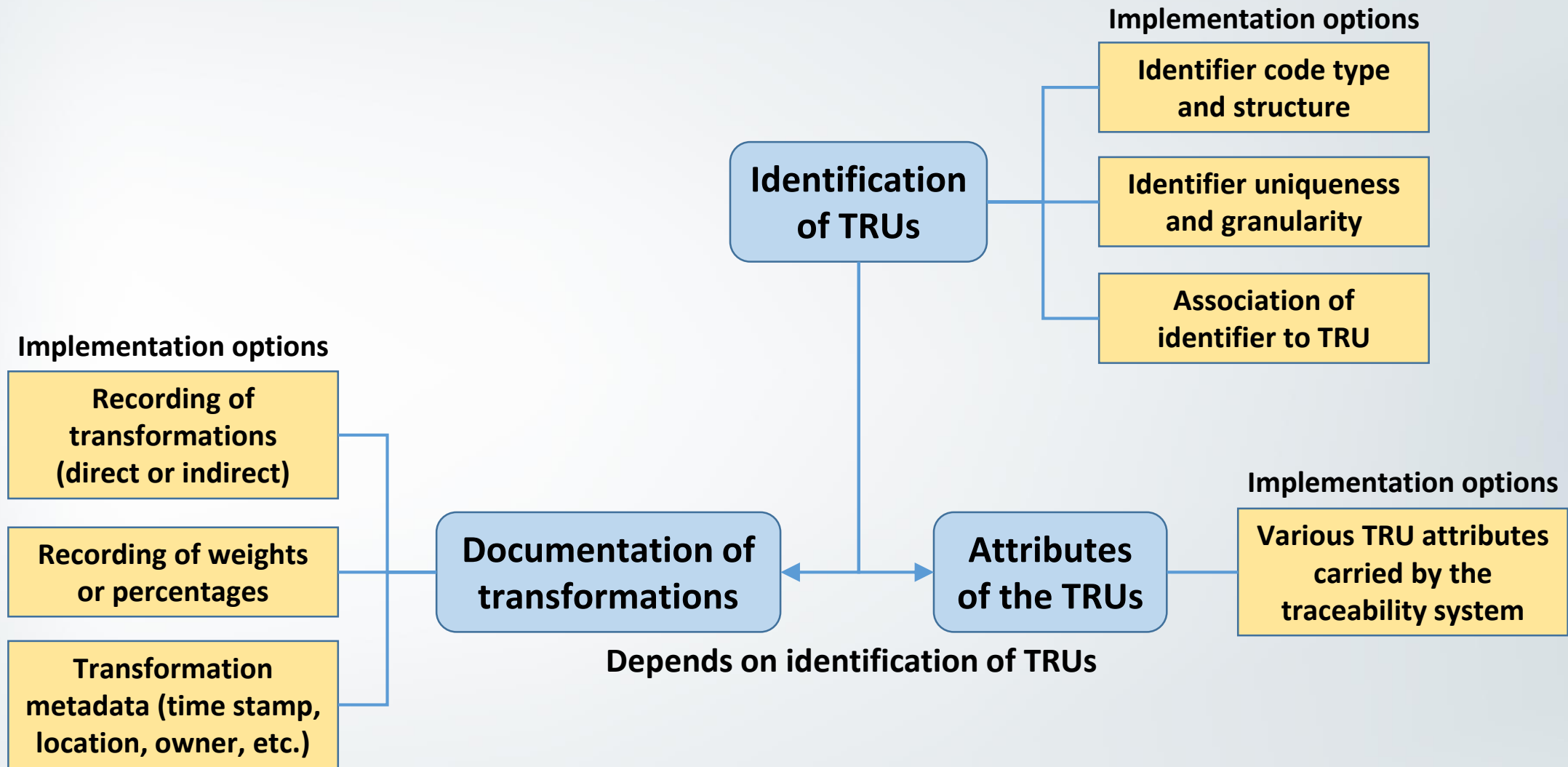


Example: Attributes in a captured fish supply chain

- Species Common Name
- Species Scientific Name
- Location/Catch Area Common Name
- Location/Catch Area FAO Map Number
- Location/Catch Area Latitude
- Location/Catch Area Longitude
- Landing location
- Landing location
- Receiving station name/ID
- Date of Catch/Date of Sailing
- Date of landing
- Vessel Type
- Vessel Name
- Vessel Unique ID/Call Sign
- Vessel Flag State
- Gear Type
- Fishing Method
- Onboard storage method
- Producer Information
- Production location
- Business name/ID
- Date of Production
- Date of durability
- Date of shipment
- Type of product
- Preservation/processing method
- Storage
- Storage method
- Unit Weight
- Packaging
- Method of packaging
- Labelling scheme
- Eco-label scheme
- ...

FoodIntegrity project – Deliverable 6.1 Seafood Claims Ontology

Components of a traceability system



September 2008

October 2008



Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
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www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

1. Introduction

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust based model.

The identity of Satoshi Nakamoto is still unknown

Blockchain news articles ...

“It is estimated that 10% of adulterated and tampered products are isolated, processed and recalled.”

“Blockchain products are identified and product recalls.”

“In [a Walmart] seconds to blockchain, it took hours and 26

it took 2.2 farm. Without over six days, 18 original farm.”



What is blockchain?

The blockchain is an incorruptible digital ledger of (economic) transactions that can be programmed to record not just financial transactions, but virtually everything (of value)

Don & Alex Tapscott, Blockchain Revolution (2016)

Sample transaction: From account: 1234, To account: 5678, Amount: 1 BTC

Blockchain is a database of transactions



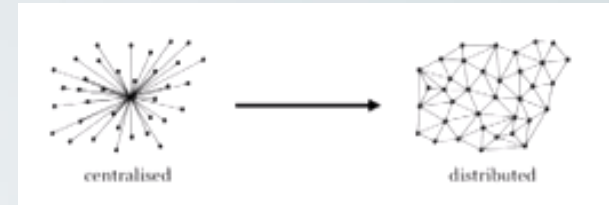
Online
(many users)



Synchronised
(every 10. minutes)



Database

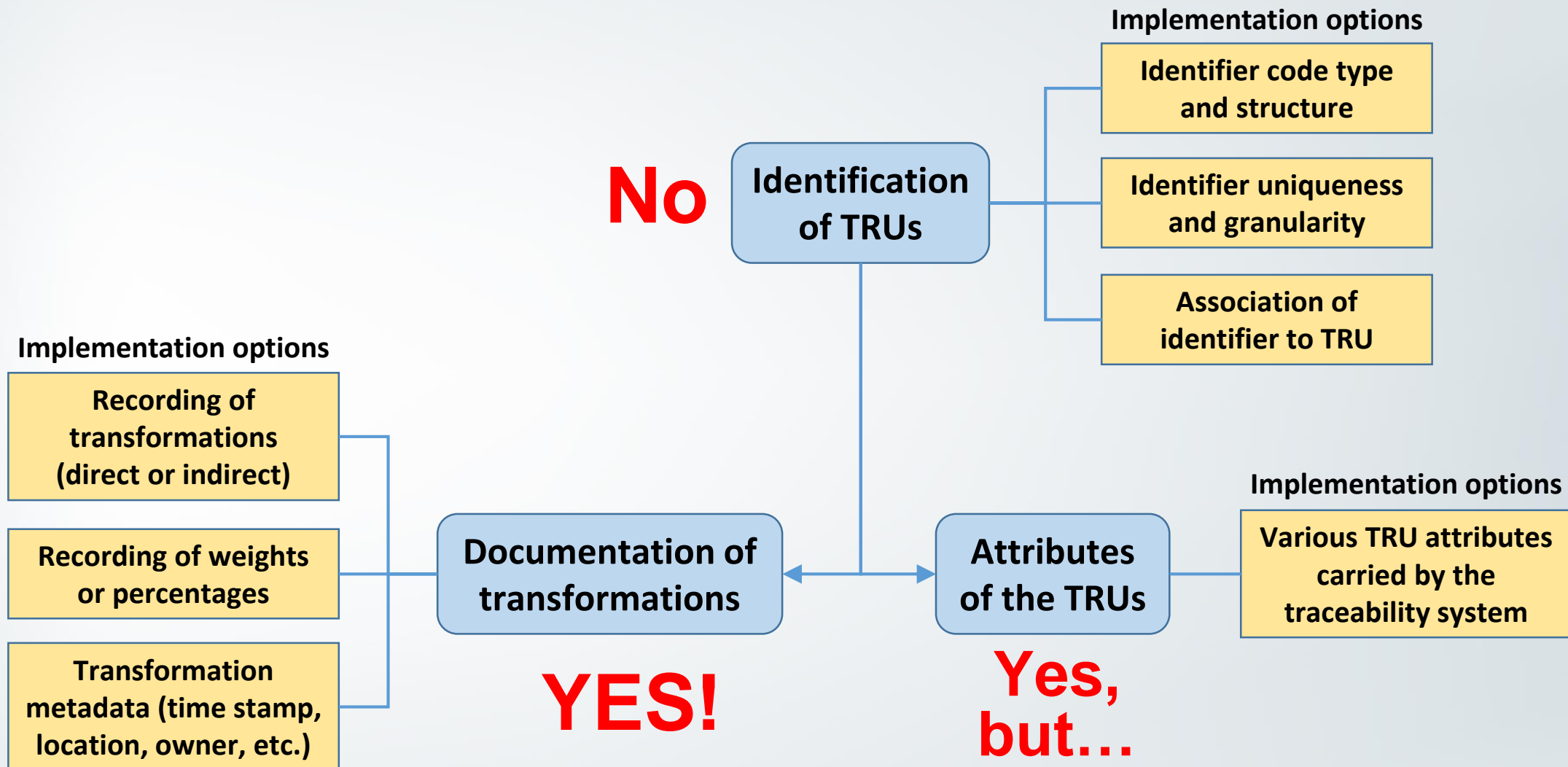


Distributed
(many copies)



**Encrypted,
Immutable**

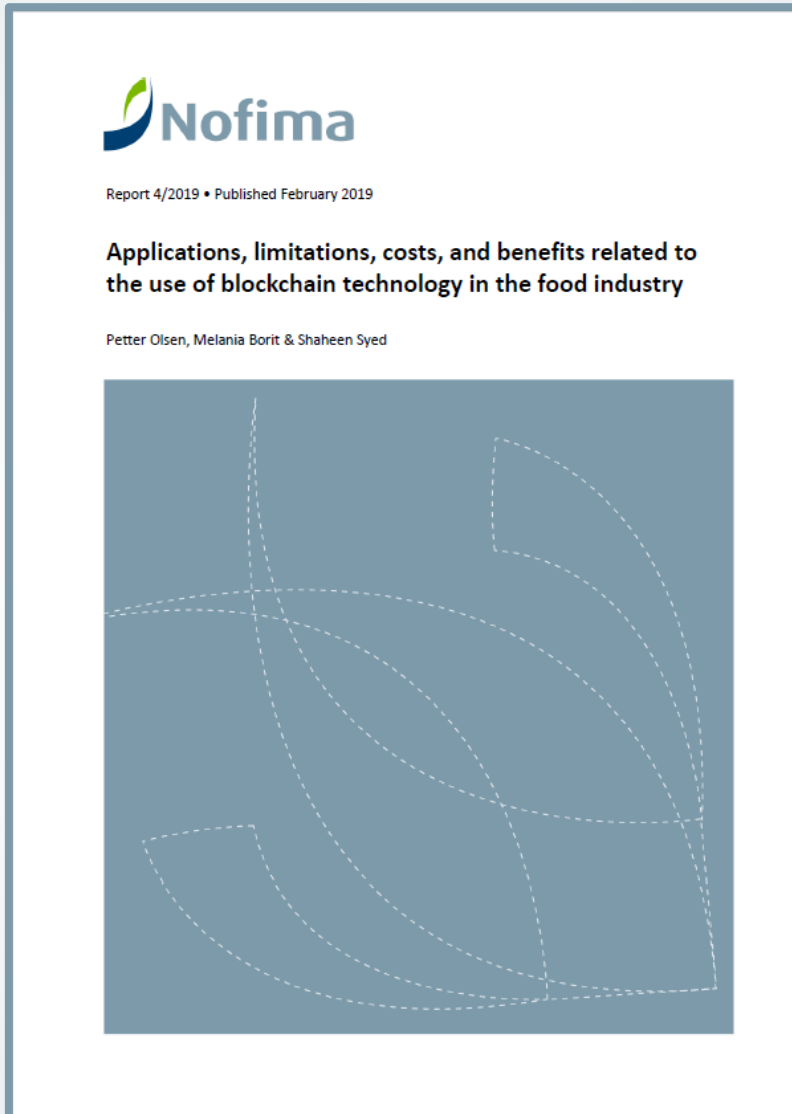
Can blockchain improve the traceability system?



Summary

- Blockchain is an exciting technology that has the potential to underlie a major technological paradigm shift
- Solution providers are currently overselling the benefits of systems based on blockchain technology
- Confidentiality and speed can be a challenge for traceability systems based on blockchain technology, but otherwise the technology is well suited for the purpose, and interoperability will be simpler
- For traceability in the supply chain, blockchain can remedy some potential problems because while claims that are recorded in the blockchain might still be wrong, it will be quite clear who made these claims, and we will know that these claims have not been tampered with

For more details...



Nofima Report 4/2019

Applications, limitations, costs, and benefits related to the use of blockchain technology in the food industry

Thanks for your attention

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Application of blockchain technology

- Immediate application in fields where the information itself is the value, and there is no physical component
- Examples include Money transfer (Bitcoin), Online banking, Contracts, Crowdfunding, Voting, etc.
- The blockchain has no inherent link to the physical world (e.g. the supply chain). The blockchain cannot remedy the problems and errors that occur in the physical world; all it can do is to record the claims that someone makes about the physical world.

What does this mean?

- A block is a set of transactions; normally all transactions reported the last 10 minutes
- The blockchain is a database of blocks
- The users add new blocks to the database every 10 minutes; the database is always growing
- There are thousands of (normally identical) copies of the database, all over the world
- Designed to prevent double spending of digital currency