

Food traceability

Harnessing the power of blockchain to empower consumers

Imagine a future in which a shopper can walk into a store, use their smartphone to flash a code on a product, and see its complete history at a glance: where it comes from, how it's been made, and how its safety and quality have been ensured.

Consumers already demand perfect food transparency, available at the swipe of a finger. But costs and logistics have traditionally made it an impossible goal.

Expected to do for transactions what the internet did for information, blockchain cuts the time and cost of verifying information along a supply chain. In doing so it increases the potential for absolute traceability, at a cost acceptable to all players involved.

The purpose of this paper is to explain how food traceability is revolutionized by blockchain. We outline the traditional obstacles in food traceability, before going on to explore how a blockchain-based solution could overcome them. Finally we delve deeper into the key issues of governance and trust and the likely future role for third parties such as Bureau Veritas in maximizing the integrity of information.

That is now changing with the advent of a disruptive technology:

blockchain



Context

Traceability issues in the food supply chain

Many brands have made strides in responding to consumer demands for transparency, but complete traceability remains an elusive goal. Why?

There is a huge variety of data

A typical food supply chain involves 6-8 stages: it can begin at the livestock feed stage, moving through farm, processing, manufacturing and distribution before finally reaching the retailer. A long supply chain results in vast amounts of information. Each stage includes numerous data of interest to the consumer, from chemicals used in feed and drugs used during the animal's life, to the location of the farm, processing or manufacturing plant, ingredients used in processing and manufacturing, any certifications of producers or facilities.... Sheer quantity makes this data hard to capture, track and verify.

No single actor controls the supply chain

Although some members of the supply chain wield more power than others, no single actor controls the entire chain. Data is held in silos for fair commercial reasons, and no third party is fully legitimate to hold all the data. In addition, no party can dictate how data should be collected— while bar codes are used by large retailer and manufacturing plants, for example, smaller players upstream are more likely to rely on paper records.

There is no fail-safe mechanism for detecting issues

Inspections and testing are the standard method used to confirm food provenance, quantity and safety. But the volumes involved in the global food industry mean that sampling can only ever verify the conformity of a small fraction of food sold. The seafood market in the US gives an idea of the problem: only 2% of seafood entering the market is inspected.*

Complete verification is extremely costly

Sampling, then, can never provide complete traceability. Yet the alternative – third party inspections of all batches and processes at every stage – is prohibitively expensive. And even though consumers want traceability, few are willing to pay a large premium for it.



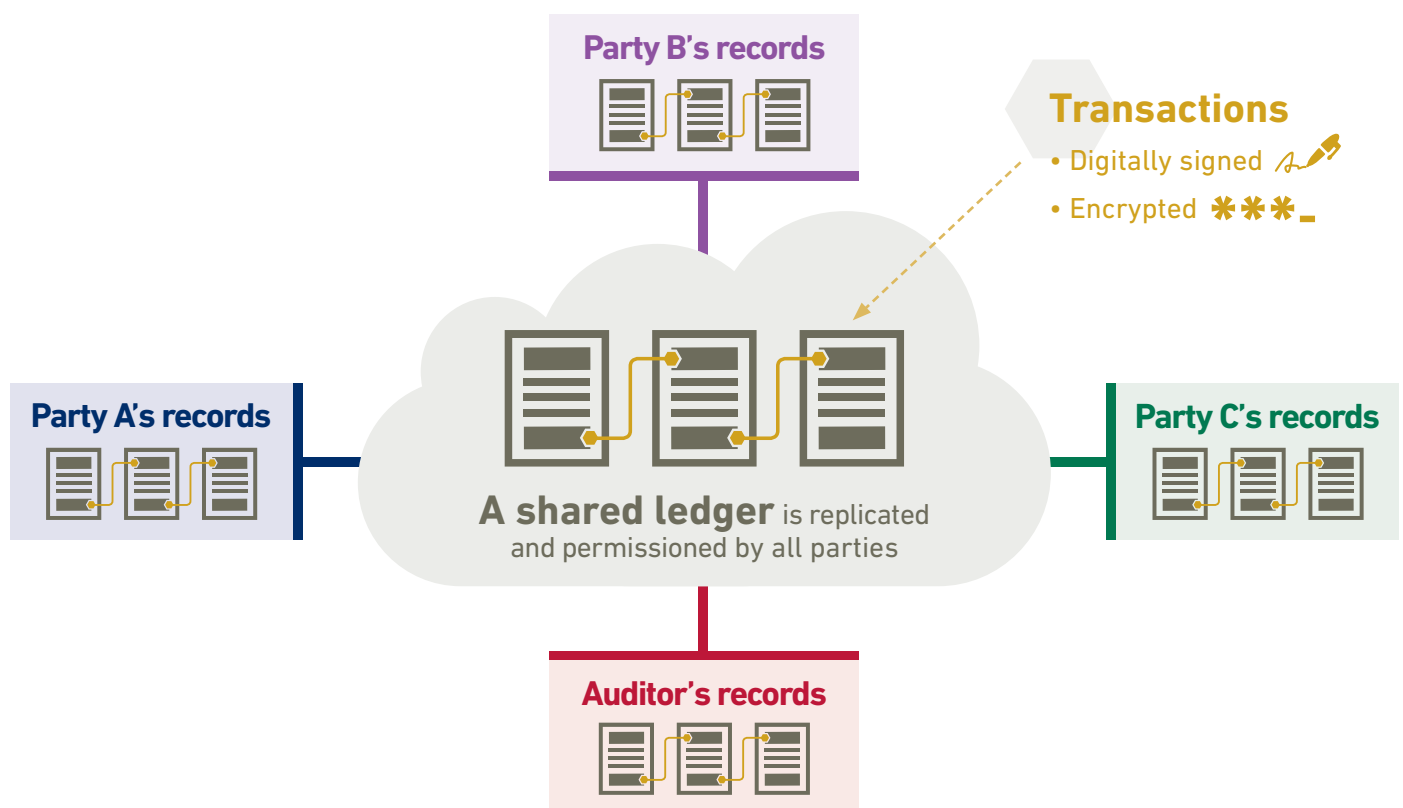
A disruptive solution

Introducing blockchain

Blockchain is a shared, distributed ledger that makes it possible to record transactions and track assets (for example products or money) without a central repository. Traditionally in business, all members of a network or supply chain keep their own records, which may be checked by a third party, for example an auditor. Blockchain enables all network members to share a ledger, which is updated through peer-to-peer replication

and validated by all parties every time a transaction occurs. In this way it improves efficiency by eliminating duplication of reconciliation efforts and reducing the need for intermediaries.

All of this makes blockchain ideal for end-to-end traceability, as it is designed to track asset creation, transformation and transactions.





How blockchain can address food traceability issues

What if any of the parties could verify the conformity of any product batch at any stage, at a cost that was low enough to be absorbed by the supply chain while adding value to the final product?

This scenario is possible with blockchain, which makes **every party in the supply chain an observer of every transaction**.

In a food supply chain, for example, the food processor or retailer would be able to see and call out any anomalies upstream, and vice versa. **For a transaction to be recorded in the blockchain, consensus is required:** all supply chain members must agree on its validity. For example, if the quantity of fish marked as coming from a sustainable fishing area sold by a fishing cooperative falls short of the quantity entered into the blockchain by the processor, this might suggest the processor had mixed some cheaper, unsustainably sourced fish into the batch. In this case, the next member of the supply chain could refuse to validate the transaction. **Once recorded, a transaction cannot be changed:** it becomes immutable. A failed test or inspection on a product at any stage of the supply chain will be automatically traced to the origin of the failure, thus exposing wrong-doers and undermining their credibility.

Three other features of blockchain technology make it highly suited to food supply chains:

1. It is open to any participant and any type of information can be entered.
2. It can use cryptography to protect commercially sensitive information. Each participant has a unique ID and key pair (public/private), and security policies govern who sees what. In some cases (for example contract prices) only the two members involved in the transaction will see the data.
3. It may use smart contracts – a set of automated rules governing a transaction designed to provide extra security. In the case of the fish supply chain, for example, these might specify that an auditor or a test be called every 100 transactions between producer and processor.

It is easy to see how the use of **blockchain can increase the reliability of information**, making complete traceability possible without any single all-powerful actor, or the presence of an independent third party at every transaction.

Blockchain in practice

Blockchains require some level of governance

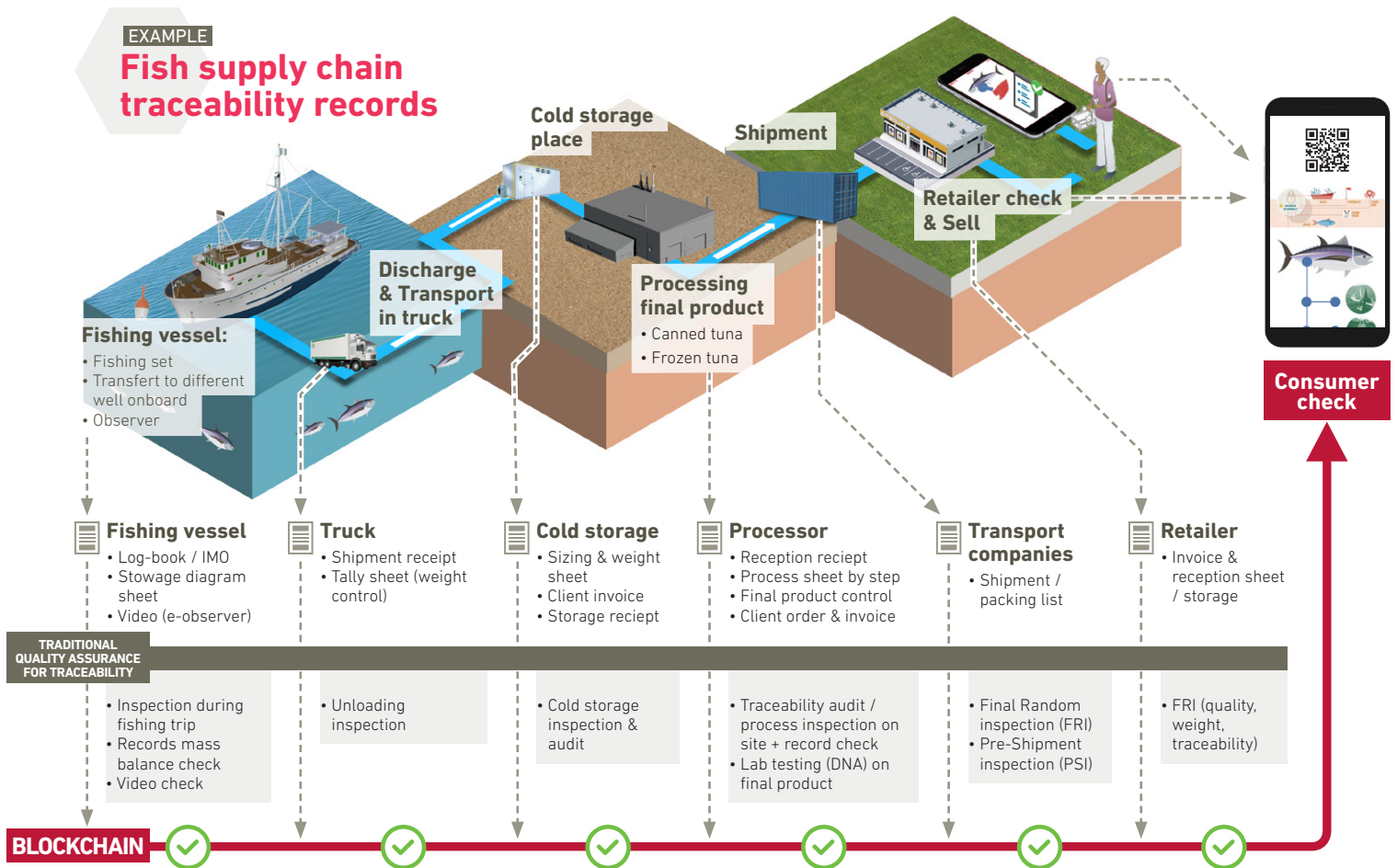
For a blockchain for traceability to work, participants' identity must be verified to guarantee their liability. This requires a third party or consortium to handle identity verification and management. Data entry process and interfaces need verification to ensure they capture real-life situations correctly and fully. The blockchain also needs to include appropriate checks, to ensure that members cannot collude outside the blockchain to validate fraudulent transactions.

Finally, the blockchain's incentivization model must be agreed. The low additional cost of implementing a blockchain could

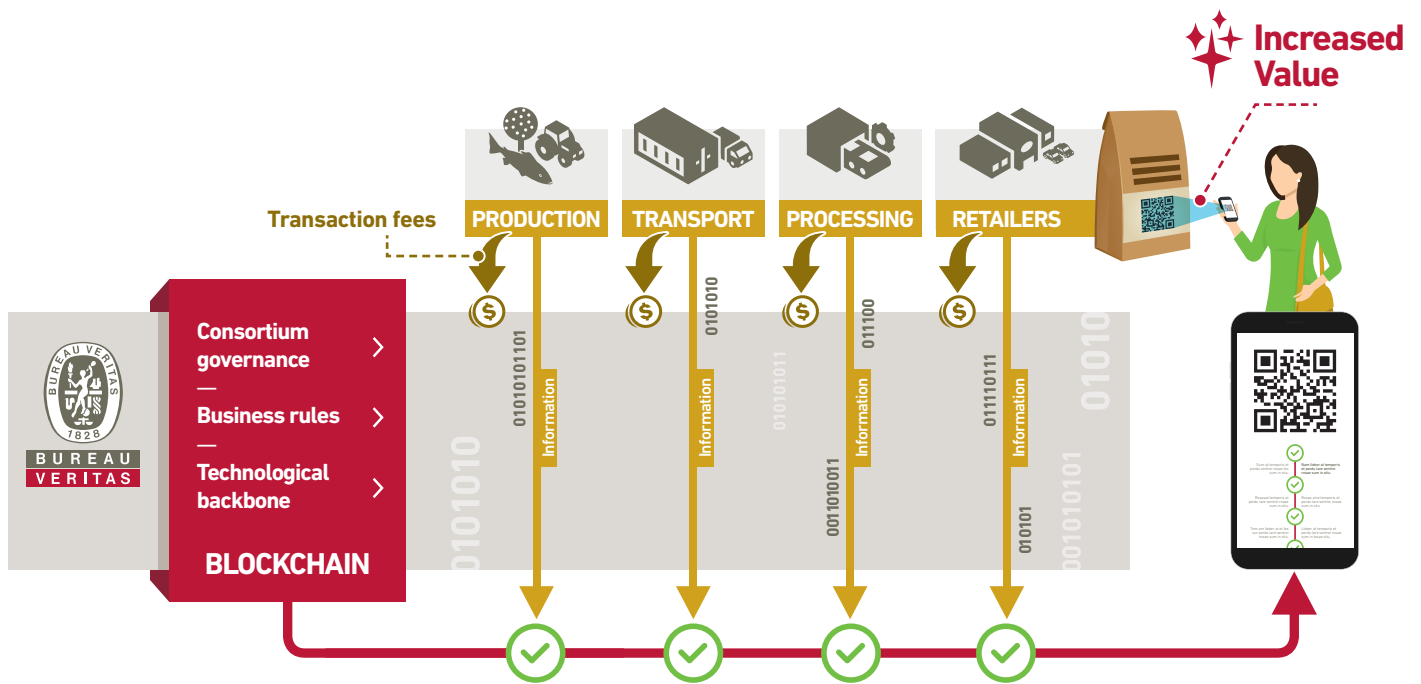
be included in the consumer price with a small premium. This would be shared by members upstream the supply chain, thereby acting as an incentive. This incentivization mechanism needs to be defined at the outset.

Bureau Veritas, as a recognized independent third party with expertise throughout the food supply chain is a natural choice to help put in place food traceability blockchain systems and devise appropriate systems of governance.

Third-party inspection bodies are also well placed to intervene at appropriate points and moments along the chain. This might include random product quantity or quality inspections, certification of management systems or inspections of facilities, for example.



Business model



Blockchain technology offers an unparalleled solution to food traceability

It gives consumers the product transparency they crave, via an efficient system that provides reliable information at a minimal cost.

Blockchain's very advantages – the need for consensus, the immutability of data, the ability to use smart contracts and permissions – raise the stakes on getting the system right at the outset.

Bureau Veritas is proud to be involved in some of the very first food traceability blockchains and looks forward to helping the industry move forward thanks to this exciting technology.



“ We believe that Blockchain is a technology that is disrupting our traditional business and we need to leverage it to bring traceability to a new era. We cannot continue inspecting just a small percentage of produce as it moves along the supply chain. ”

— Vincent Bourdil, VP Food with Bureau Veritas
Global Food Safety Conference, 2017

For more information, please contact

Food Service Line

✉ foodservices@bureauveritas.com

🌐 www.bureauveritas.com

ABOUT BUREAU VERITAS

Bureau Veritas is a world leader in testing, inspection and certification. We help clients across all industries address challenges in quality, health & safety, environmental protection, enterprise risk and social responsibility. We support them in increasing performance throughout the life of their assets and products and via continuous improvement in their processes and management systems. Our teams worldwide are driven by a strong purpose: to preserve people, assets and the environment by identifying, preventing, managing and reducing risks.



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Le Triangle de l'Arche, 8 cours du Triangle, CS 90096, 92937 Paris La Défense Cedex, FRANCE
Tel.: +33 (0)1 55 24 70 00 - Fax : +33 (0)1 55 24 70 01 - www.bureauveritas.com