Blockchain Technology for Food Safety

Session 20

Food Safety Summit Conference & Expo

May 9, 2019

Three Parts to Today's Discussion:

1. General industry/technology observations
2. What is Blockchain? What isn't it? Blockchain 101.
3. Proposed path(s) forward

Part 1: General Industry & Technology Observations

The Economist

The world's most valuable resource is no longer oil, but data

A NEW commodity spawns a lucrative, fast-growing industry, prompting antitrust regulators to step in to restrain those who control its flow. A century ago, the resource in question was oil. Now similar concerns are being raised by the giants that **deal in data, the oil of the digital era.**

The Economist Magazine, April 2017

Cargill

The race to enable digital supply chains

BUSINESS | LOGISTICS REPORT

Software Firm FoodLogiQ Raises $19.5 Million in Funding Round Including Tyson Ventures

The food-tracking technology company's tools for restaurants, grocers are in growing demand under tougher U.S food-safety regulations

Need for Transparency

Blockchain traceability pilot to create step change in transparency of food system

Industry leading animal well-being practices

Tyson

Nestle, Unilever, Tyson and others team with IBM on blockchain

Richa Naidu, Anna Irrera

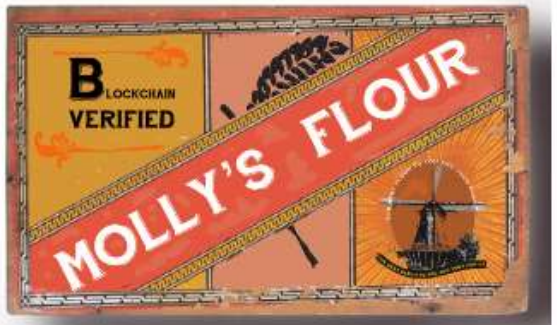
2 MIN READ

CHICAGO/NEW YORK, (Reuters) - Nestle SA (NESN.S), Unilever Plc (ULVR.L), Tyson Foods Inc (TSN.N) and other large food and retail companies have joined IBM's (IBM.N) project to explore how blockchain technology can help track food supply chains and improve safety, the companies said in a joint statement on Tuesday.

How Blockchain Is Replacing Branding As A Source Of Trust

Dr. Jemma Green, LON CONTRIBUTOR

FULL BIO



PEACE OF MIND

Blockchain will track how meat gets from Australian farms to Chinese tables

Digital Food Safety Solutions

As a food safety community, we believe:

Technology has and will continue to enable **better food safety outcomes** for our industry

Digital food safety solutions should **maximize supply chain transparency** without compromising the **competitive integrity** of our markets

We will focus digital food safety solutions investment on where it can have **the biggest impacts to food safety**

Digital food safety solutions should be built on **open technology and standards**

Part 2: Blockchain 101

Blockchain 101: 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, authors Blockchain Revolution (2016)

Satoshi Nakamoto – anonymous creator of blockchain (and bitcoin crytpocurrency), a noteworthy cypherpunk (activist advocating widespread use of strong cryptography and privacy-enhancing technologies as a route to social and political change); Julian Assange

Blockchain*

Blockchain was created because we don't trust:

- Each other to adhere to rules
- Third party institutions to help enforce compliance

The blockchain approach is a data- or application-centric approach:

- Transparency **everybody sees all transactions**
- Cryptography **extremely intensive data crunching**
- Decentralization **hackers would have to hack everybody in a distributed ledger**

* including Bitcoin, Etherium

What is Bitcoin?

bit·coin

/ˈbitˌkoin/

noun

a type of digital currency in which encryption techniques are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a central bank.
"bitcoin has become a hot commodity among speculators"

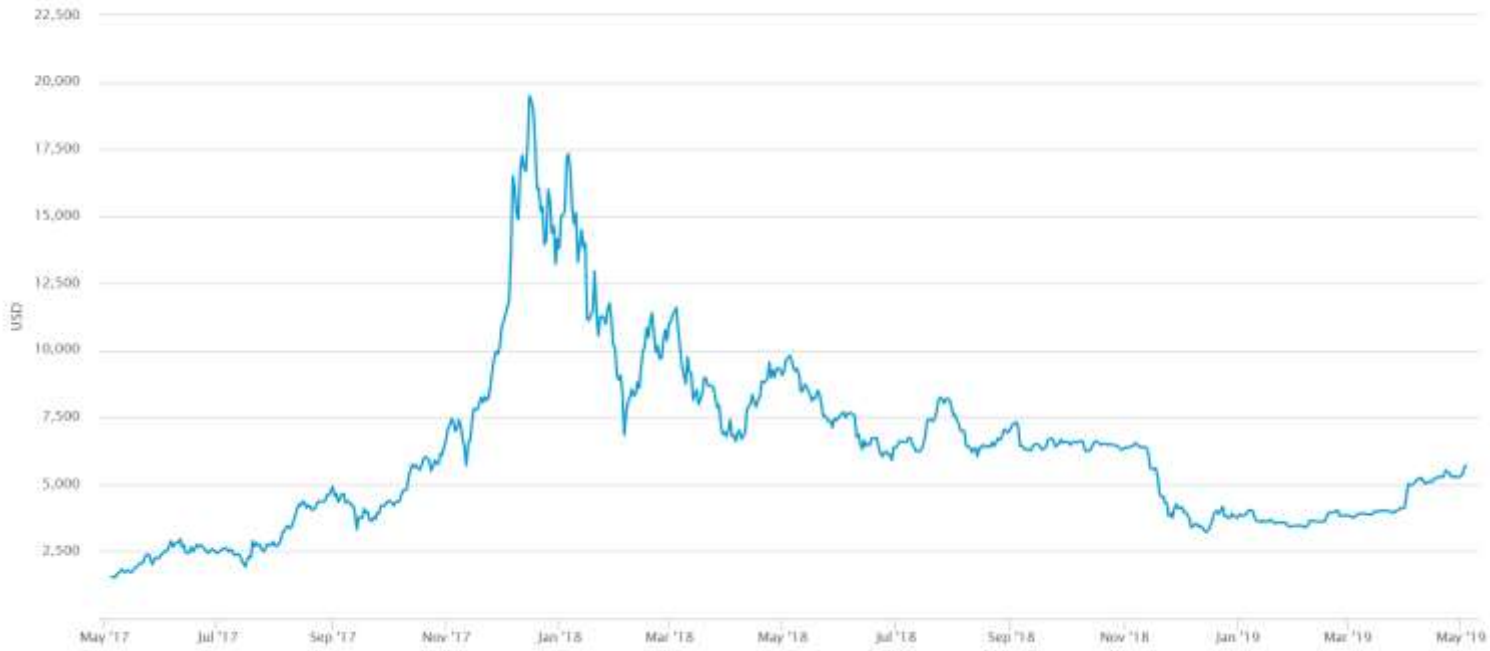
- a unit of bitcoin.
  "bitcoins can be used for online transactions between individuals"

In other words…

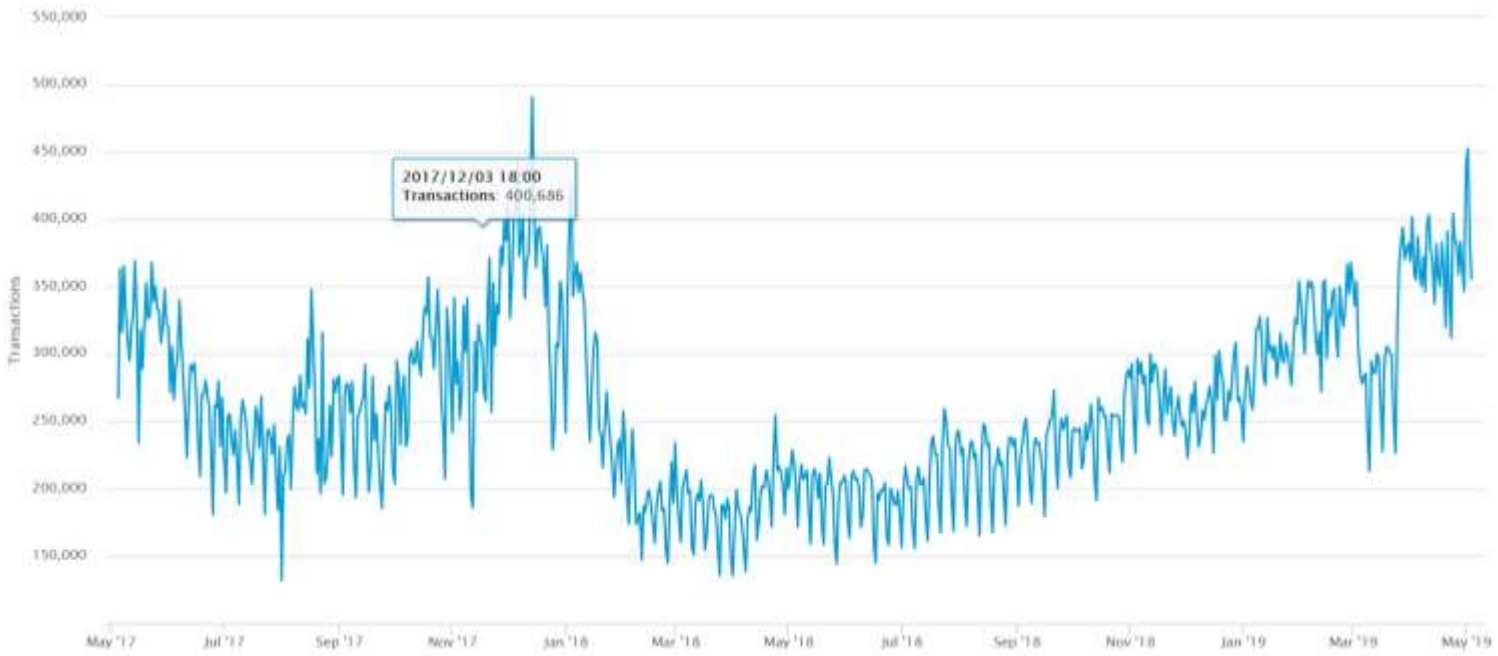
A bitcoin is one unit of an anonymous digital currency – a theoretically untraceable and unhackable version of PayPal.

PayPal

USD $ per bitcoin – (May'17-May'19)



Daily transactions – (May'17-May'19)



Blockchain 101

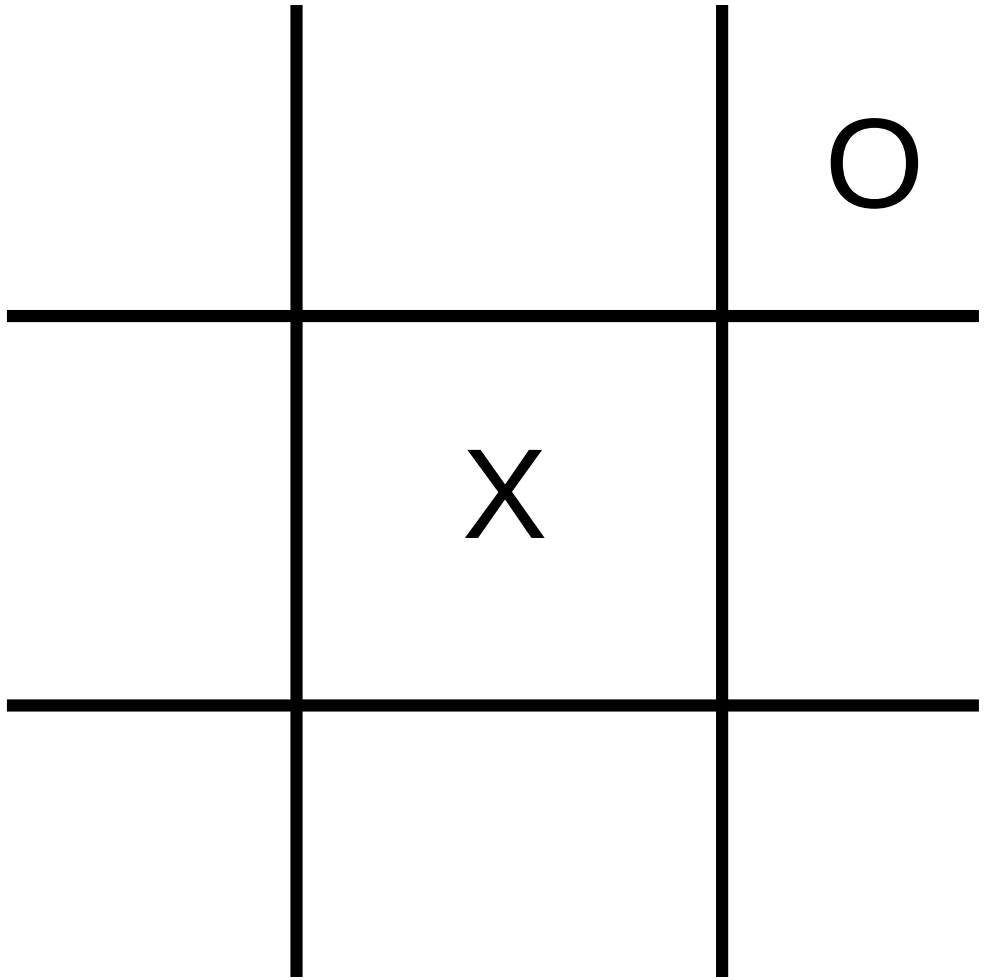
Blockchain is not the right solution for every problem.

Cargill takes a business-centric approach to solve existing problems instead of looking for ways to implement new technologies for their own sake. Blockchain isn't a cure-all and it won't fit everywhere, but it does have potential to help Cargill under the right circumstances.

Indications 'The Problem' might not be a good fit for Blockchain

- Single node or single party
- We like the intermediary
- There is already a high level of trust between parties
- The transaction log should be changeable

Alternatives include API's, building on existing IT systems, joining a platform, etc

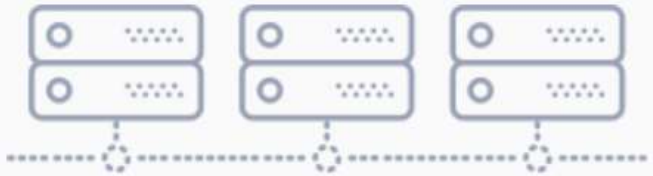


Rule #1: You don’t need Blockchain

Blockchain 101

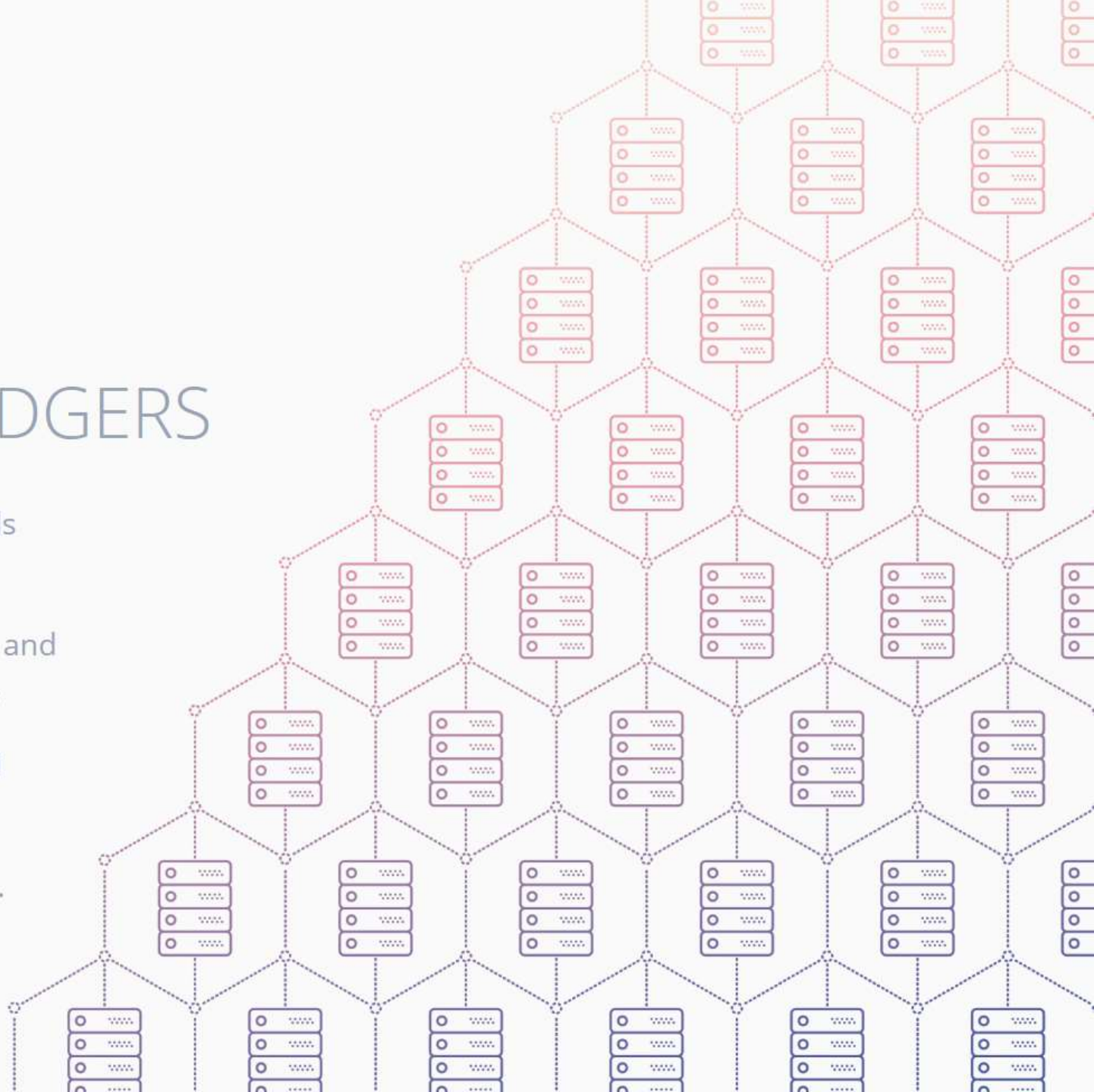
DISTRIBUTED LEDGER TECHNOLOGY

Distributed Databases	• Increasing security – it's not feasible for an attacker to take down every node
Peer-to-Peer Transmission	• Increasing speed & eliminating fees paid to an intermediary
Transparency with Pseudonymity	• Increasing transparency and trust
Irreversibility of Records	• Reducing fraud
Computational Logic	• Increasing automation of business logic
Encryption	• Increasing security & privacy



ABOUT DISTRIBUTED LEDGERS

A distributed ledger is a set of communication protocols that enable administratively decentralized, replicated databases. Distributed ledgers can provide an efficient and secure infrastructure for the issuance and exchange of digital assets. Their security, democratized control, and automation can have a transformational-impact on industries ranging from capital markets to global trade.



Reference: sawtooth.hyperledger.org

Blockchain… lots (and lots) of applications

Smart Contracts

Digital rights

Wagers

Escrow

Digital Currency

E-commerce

Global payments

P2P lending

Microfinance

Securities

Equity

Private markets

Debt

Crowdfunding

Derivatives

Record Keeping

Healthcare

Title records

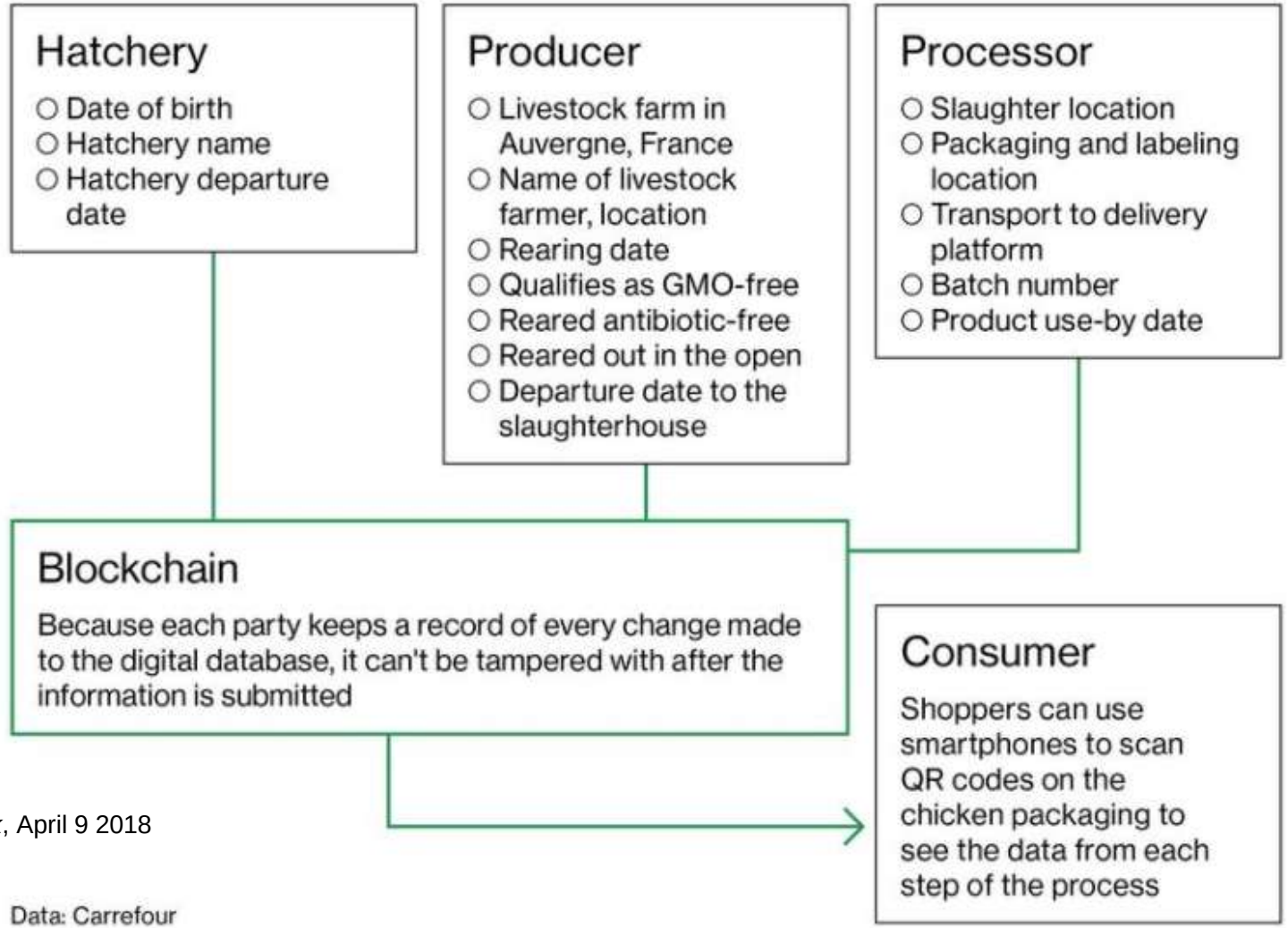
Ownership

Voting

Intellectual property

Tracing Food Via Blockchain

Agriculture companies are testing the use of blockchain software as a way to establish their products' bona fides. Each party is supposed to provide details related to its link in the supply chain. Here are the data points for a single Auvergne chicken sold by French supermarket chain Carrefour.



Source: *Bloomberg Businessweek*, April 9 2018

Part 3:
Path(s) Forward

What is the Opportunity?

- To partner with Food Industry Leaders on food safety solutions leveraging data and technology for better outcomes.
- Initially, we will focus our discussions on the following Opportunity:

  Improve food safety by providing transparency with our partners to track and trace products through the supply chain providing recall process efficiencies and reduced time to take action.

- With co-innovation based on the following Digital Solution Principles:

As a food safety community, we believe:

- Technology has and will continue to enable better food safety outcomes for our industry
- Digital food safety solutions should maximize supply chain transparency without compromising the competitive integrity of our markets
- We will focus digital food safety solutions investment on where it can have the biggest impacts to food safety
- Digital food safety solutions should be built on open technology and standards

Where should we start?

The excitement about Blockchain is really an excitement about sharing information across enterprises to deliver shared value.

Some tough questions need to be worked on before we start:

- How much can participants see?
- When does the “window” open/close?
- Is the consumer “in”?
- Is the grower/farmer/rancher “in”?
- Who governs? Who provides? Open Source is critical to success…
- Relevant and practical data sources
- Appropriate data standards
- Data governance

What data are we sharing? Data elements in supply chain applications *could* be shared in a cross-enterprise blockchain ledger

- Event data, transactional data, and even master data…
- This will create very large blockchains of data - but, more than likely you will see pointers to (and hashes of) event and transaction data in an enterprise blockchain ledger!
- These pointers can refer to off-chain data and include encrypted hashes of that off-chain data can prove that the off-chain data wasn't tampered with.

Potential(!) Traceability Data Elements

Primary Inputs	Breeder	Farms/Growers	Harvesting Plant	FP Plant	Cargill DC	Customer DC	Restaurants or Retail Stores	Consumers
			Chain of custody	**Chain of custody**	**Chain of custody**	**Chain of custody**	**Chain of custody**	
Anti-biotics	Animal Welfare Practices		Transp. Temp. log	Transp. Temp. log	Temperature	Temperature	Temperature	What's in my food
Feed	Certificates		Certificates	Certificates		Inventory mgmt	Inventory mgmt	How my food was made
Fertilizer	Weather		Lab Analysis	Lab Analysis		M2M settlement	M2M settlement	How animals were treated
	Transportation conditions			Enhanced Sust. Metrics		Product claims	Product claims	Sustainability
	Sustainability metrics					Orders in transit	Orders in transit	
	Breed(s)/Species					Ship To changes	Waste mgmt	
	Certificate of ownership					Waste mgmt		

Chain of Custody
E2E Trace & Track
Transportation Optimization
Sustainability Footprint, Waste Index, etc
Food with a Story (FWAS)

Cargill's vision of digital supply chains

Primary Inputs | Breeder | Farms/Growers | Harvesting Plant | FP Plant | Cargill DC | Customer DC | Restaurants or Retail Stores | Consumers

Cargill Digital Supply Chain Platform

Enabling Tech: BLOCKCHAIN IoT APIs

CONSUMER FACING:

Provenance (Farm-to-Fork) stories

What's in my food

How my food was made

How animals were treated

Underlying sourcing practices (Sustainability)

TRANSPORTATION:
Shipment notifications
Product Claims

FOOD SAFETY:
Temperature logs
Certificates
Chain of custody

QUALITY:
Lab results
Certificates

SUSTAINABILITY:
GHG/Carbon Footprint
Food Waste reduction
Water/Energy usage & practices

COMMERCIAL:

Contracting/Ordering digitalization

Clearing – payments & remittances

Settling – auto-triggered transactions

Record-keeping

CORPORATE SOCIAL RESPONSIBILITY:
Workplace Safety
Social Impact
Other NGO external stakeholders metrics

Cargill's vision of digital supply chains

Cargill is investing in the digitalization of food safety and believes technology will result in better outcomes for food safety

- *Blockchain may be **one** technology of a digital solution*
- *Defined problem and opportunities determine the technology*

Seeking working partnerships on a Digital Food Safety Solution POC

- *Cargill is moving forward with solutions and seeking industry partners for co-innovation*
- *Working with partners to align and drive the problem to solve and opportunity*
- *Within Cargill, alone, the technology has little value*
- *Food Safety is non-competitive*

“This is not about the technology, *it’s about trust*”

- David Furlonger, Research VP, Gartner


We Take
Bitcoin &
Cash Only.
Thank you for
your understanding!