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


3. Proposed path(s) forward
Part 1: General Industry & Technology Observations
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*
The race to enable digital supply chains

How Blockchain Is Replacing Branding As A Source Of Trust

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

Nestle, Unilever, Tyson and others team with IBM on blockchain
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 cryptocurrency), 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?

In other words…

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

<table>
<thead>
<tr>
<th>Smart Contracts</th>
<th>Digital Currency</th>
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<tbody>
<tr>
<td>Digital rights</td>
<td>E-commerce</td>
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<td>Global payments</td>
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<td>P2P lending</td>
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<td>Microfinance</td>
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<th>Record Keeping</th>
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<td>Equity</td>
<td>Healthcare</td>
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<td>Private markets</td>
<td>Title records</td>
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<td>Debt</td>
<td>Ownership</td>
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<td>Crowdfunding</td>
<td>Voting</td>
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<td>Derivatives</td>
<td>Intellectual property</td>
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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.

- **Hatchery**
  - Date of birth
  - Hatchery name
  - Hatchery departure date

- **Producer**
  - Livestock farm in Auvergne, France
  - Name of livestock farmer, location
  - Rearing date
  - Qualifies as GMO-free
  - Reared antibiotic-free
  - Reared out in the open
  - Departure date to the slaughterhouse

- **Processor**
  - Slaughter location
  - Packaging and labeling location
  - Transport to delivery platform
  - Batch number
  - Product use-by date

**Blockchain**

Because each party keeps a record of every change made to the digital database, it can’t be tampered with after the information is submitted.

**Consumer**

Shoppers can use smartphones to scan QR codes on the chicken packaging to see the data from each step of the process.

Source: *Bloomberg Businessweek*, April 9 2018

Data: Carrefour
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

<table>
<thead>
<tr>
<th>Primary Inputs</th>
<th>Breeder</th>
<th>Farms/Growers</th>
<th>Harvesting Plant</th>
<th>FP Plant</th>
<th>Cargill DC</th>
<th>Customer DC</th>
<th>Restaurants or Retail Stores</th>
<th>Consumers</th>
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<tr>
<td>Feed</td>
<td>Certificates</td>
<td>Certificates</td>
<td>Certificates</td>
<td>Inventory mgmt</td>
<td>Inventory mgmt</td>
<td>How my food was made</td>
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<td>Fertilizer</td>
<td>Weather</td>
<td>Lab Analysis</td>
<td>Lab Analysis</td>
<td>M2M settlement</td>
<td>M2M settlement</td>
<td>How animals were treated</td>
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<td>Transportation conditions</td>
<td>Enhanced Sust. Metrics</td>
<td>Product claims</td>
<td>Product claims</td>
<td>Orders in transit</td>
<td>Sustainability</td>
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<td>Sustainability metrics</td>
<td>Orders in transit</td>
<td>Ship To changes</td>
<td>Waste mgmt</td>
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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

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 Digital Supply Chain Platform
Enabling Tech: BLOCKCHAIN   IoT   APIs
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!