Blockchain Technology in Agri-Food: State of Play and Outlook

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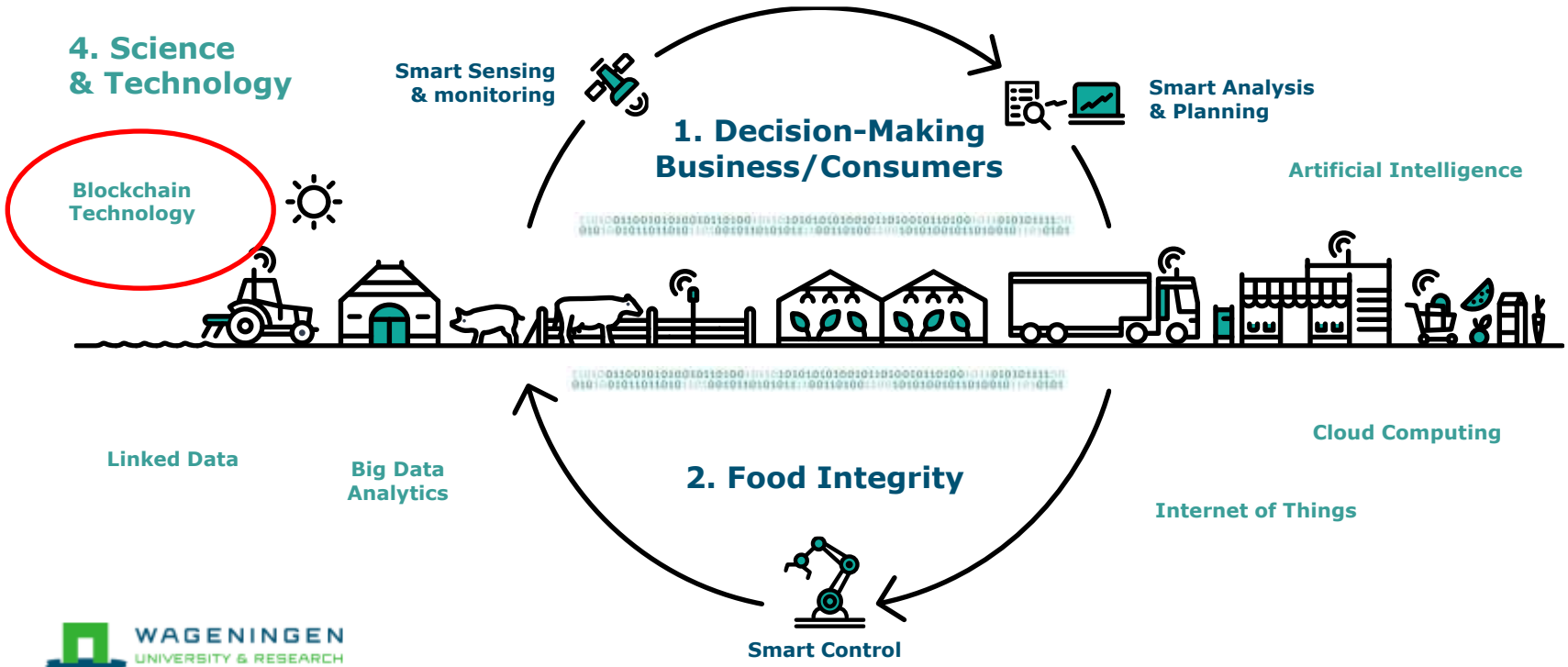
Outline of this presentation

1. Setting the scene: digital transformation of agri-food
2. Key concepts of Blockchain Technology
3. Illustrative example from Beef supply chain
4. Opportunities and challenges of Blockchain
5. How to start with Blockchain?
6. Wrap-up and conclusions

Digital Transformation of Agri-Food in 4 areas coming together

3. Public decision-making Food Safety Environment Nutrition Climate Health Food Security

4. Science & Technology



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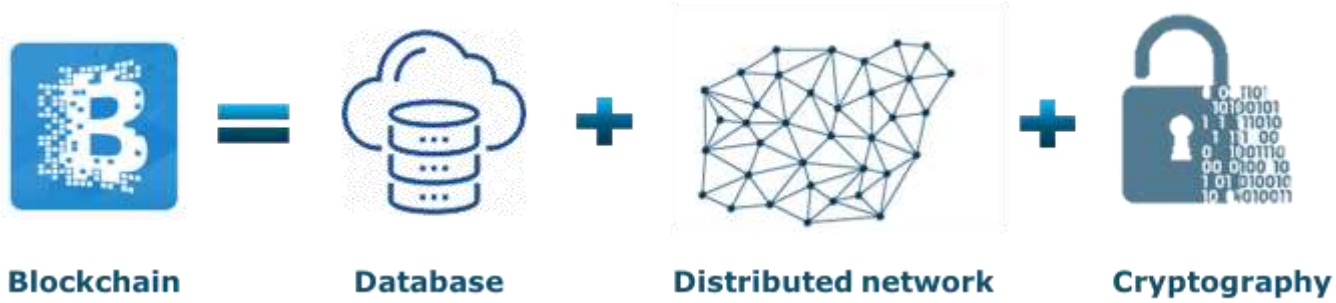
https://www.linkedin.com/pulse/transdisciplinary-data-driven-research-social-sjaak-wolfert/

Key Aspects of Blockchain Application

Blockchain is *an* implementation of Distributed Ledger Technology

- Technology (Components, Architecture, Frameworks, Performance)



- Ecosystems (actors, context, enabling environments)
- Governance & Business Models

Smart Contracts

- Smart contracts are self-executing agreements that are triggered on the basis of predefined and agreed events
  - E.g. Rainfall > 200 mm
  - Market price of commodity > USD 100

Example: Beefchain (Wyoming, US)

BeefChain

Reasons to start:

- Free range cattle: commodity difficult to monetize without giving incontrovertible proof to consumer
- Rancher who diligently raised a cow on the open range receives a price similar to that of a cow raised in unknown conditions.

Goal:

- establish immutable, auditable, provenance to better capture the free range, grass-fed premium

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Beefchain: how does it work?

BeefChain

Cow: RFID tag

Trace cow movement

Consumer is able to get provenance information

+ $ 0.10/pnd

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The Ecosystem: key actors involved

BeefChain

Actor	Role
8 Ranches	Beef suppliers
Beefchain	Blockchain start-up
Avery Dennison	Packaging solution (QR)
True-test (now Datamars)	Animal monitoring
University of Wyoming	Education, blockchain code
USDA	Certification for process verified program

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Governance & Business Models

BeefChain

- rancher-centric supply chain utilizing blockchain was created to recapture the value now realized by third-party feedlots and processors
- end-to-end supply chain solution “Rancher to Retail”: offering exclusive, long-term relationships with buyers across the globe
- consumer has an interest in the value generated in the network
- received USDA certification to create extra trust layer

Why and what for blockchains are used in agri?

Technically:

- Transparency en reliability (by immutability, technical blindness and redundancy in the ledger
- Efficiency in digital transactions by smart contracts
- Data sovereignty and democracy in the data-ecosystem: control over your own data in distributed networks

Purposes:

- Production transparency
- Traceability for food safety and chain optimization
- Information supply to consumers
- Positioning of farmers in the data economy

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What are the challenges?

- Coping with the complexity of the technology and its implications
    - many variations: public/private, open/closed, types of ledgers
- Breaking the hen-and-egg problem: stakeholders are often hesitant to participate in blockchain projects before the value is proven
- Connecting to existing databases and legacy system → scalability

Best practices/learning experiences

- Focus on the problem to be addressed and the need for information in the ecosystem
- Engage end-users from the start of the project and identify the minimum viable ecosystem based on their commitment, urgency and position
- Take an agile approach to design and development, make mock-ups as soon as possible before building the software.
- Build upon 'Common Grounds' (existing data infrastructure, data models, interfaces and standard messages)

Conclusions

- Blockchain is a technology that is not coming alone: business ecosystems, governance and business models are its companions
- This combination can be disruptive in democratizing supply chains changing stakeholders' positions – usually not visible at the beginning
- Together with technical complexity makes Blockchain not easy to apply
- Hence, successful, large-scale examples in agri-food are still rare
- Start with a clear objective, a minimum viable ecosystem, then step-by-step approach based on common grounds

Thank you for your attention

Further reading:

Background paper
https://doi.org/10.4060/cb3495en

Questions and suggestions:

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