

IoT, Smart Farming & Future of Agriculture

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Digital Transformation Paradigm

- Cisco defined the Internet of Everything (IoE) as the networked connection of people, process, data, and things.
- The benefit of IoE is derived from the compound impact of connecting people, process, data, and things, and the value this increased connectedness creates as "everything" comes online.



IoT in Agriculture: Opportunities

- Reduce greenhouse gas emissions
- Reduce water consumption and pollution
- Enhance food supply chain traceability
- End-to-end farm management systems
- Livestock monitoring and management
- Climate monitoring and decision making



IoT in Agriculture: Farm to Table

Farm & Livestock ID & Sensors Food packaging sensors Retail Supply Chain Monitoring Health Services



AIN: 840 003 123 456 789

Location: ID: Braymeadow Farm FR #00285453543 Slaughterhouse ID: #45205343 Sensor: Temperature. Accelerometer

Maria and her daughter are picking up groceries for the week. Using packaging with printed sensors, the two can make sure the ground beef they are purchasing has never reached unsafe temperature levels while on the shelf or being transported.

The packaging also contains a QR code which they can use to query the cow's RFID tag and bring up its history:

- Where it was raised - Where it was slaughtered - Where it was packaged - What it was fed - How it was transported - The last time it was inspected.

A week later the U.S. Department of Agriculture's Food Safety Service determines ground beef from originating from a regional packing company and sold at a neighboring store is contaminated with E. coli O157:H7. All packages from this distributer change their alert color and notification messages are sent to those shoppers that may have been impacted.

IoT in Agriculture Internet of Food Supply Chain



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Limiting Factors in Agriculture?

Limited availability of high quality data

Gap in data analysis and management Lack of appropriate policies and best practices

Limited of data interoperability



MH



The sector of the economy with the lowest IT intensity is farming; IT accounts for just 1% of all capital spending.



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Limiting Factors in Agriculture?



IoT: Interoperability





Technical Interoperability



Operational Interoperability



Legal Interoperability



Semantic Interoperability



Data Traceability



Technology Solution: Pipeline for Agriculture Data



- Enables management of the availability, usability, integrity, and confidentiality of data
- Connects people and things (systems): access control and identity management
- Ensures reliability and system availability
- Ensures compliance: policies, procedures, and best practices
- Monitors/validates activities, transactions, and events



IoT Platform Solution: Blockchain





IoT Platform Solution: Blockchain [cont'd]



Ethereum

• Ethereum is a platform to build decenteralized applications using blokchain technology.





Regulatory Compliance

- General Data Protection Regulation (GDPR)
- EU Code of Conduct
- Use of smart contract to ensure compliance





Convergence of AI and IoT Platform: Decentralized AI

- Scalability
- Energy consumption
- Security and privacy
- Efficiency
- Data gates





Regulatory Compliance

- <u>AI will be the front and center of every digital</u> <u>technology</u>
- IoT needs autonomous agents to manage data, system/things, and processes efficiently and effectively

I believe this artificial intelligence is going to be our partner. If we misuse it, it will be a risk. If we use it right, it can be our partner. Masayoshi Son

