

Internet of Things in Agriculture

Area 2 – Technologies

Lesson 9 – Communications

Sequence ID – 31

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DISCLAIMER

A2.L9.T3 Internet of Things in agriculture

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Overview

Agriculture 4.0 & High Tech Farming are strictly related with connectivity between manager system and instruments (devices and equipment) and that is the Internet of Things (IoT) approach. The definition of the Internet of Things is evolving due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. In farming system like vineyard and tillage crops, the main applications are related to monitor soil, environment and crops but also to provide prescription maps essential to control the automatic operation of devices and equipment. The IoT system permits to have augmented knowledge on the whole process that is essential to manage sustainability and product quality. Traceability by blockchain is enhanced by IoT.

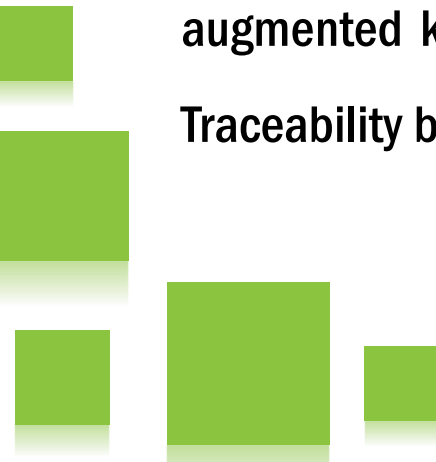


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1. IoT: Enabling Technologies & Systems of Systems



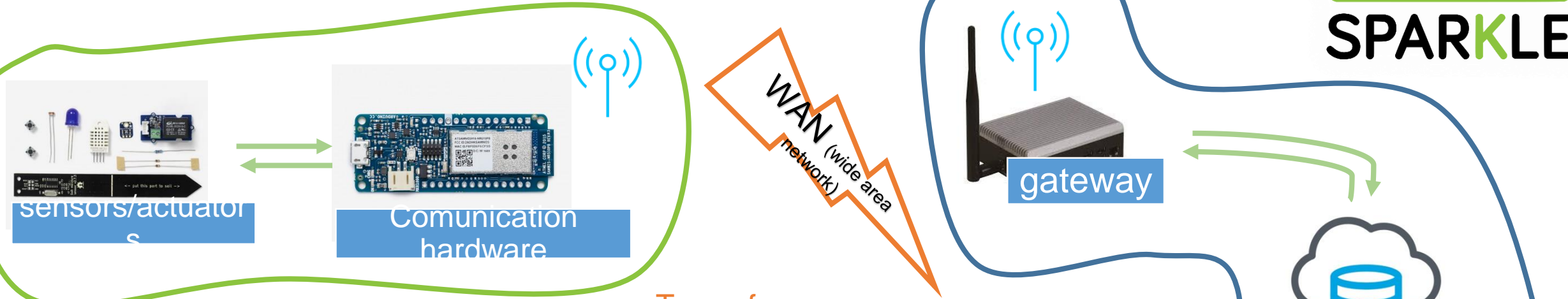
The **Internet of Things**, or **IoT**, is a network of Internet connected objects able to collect and exchange data. In a simple way: You have "things" that sense and collect data and send it to the internet.

In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", covering devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers.



1. IoT: How can IoT works

private company infrastructure (paid subscription to use)



To buy and install on field

Type of wan communication

<p>IoT/M2M SIM</p> <p>For communication between devices (no voice and no SMS) with global signal coverage.</p>	<p>LoRa sigfox</p> <p>LPWAN (low power wide area network). Designed to allow long-range and low power communications, such as sensors/actuators operated on a battery.</p>
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- [LoRa \(wikipedia\)](#)
- [SigFox \(wikipedia\)](#)

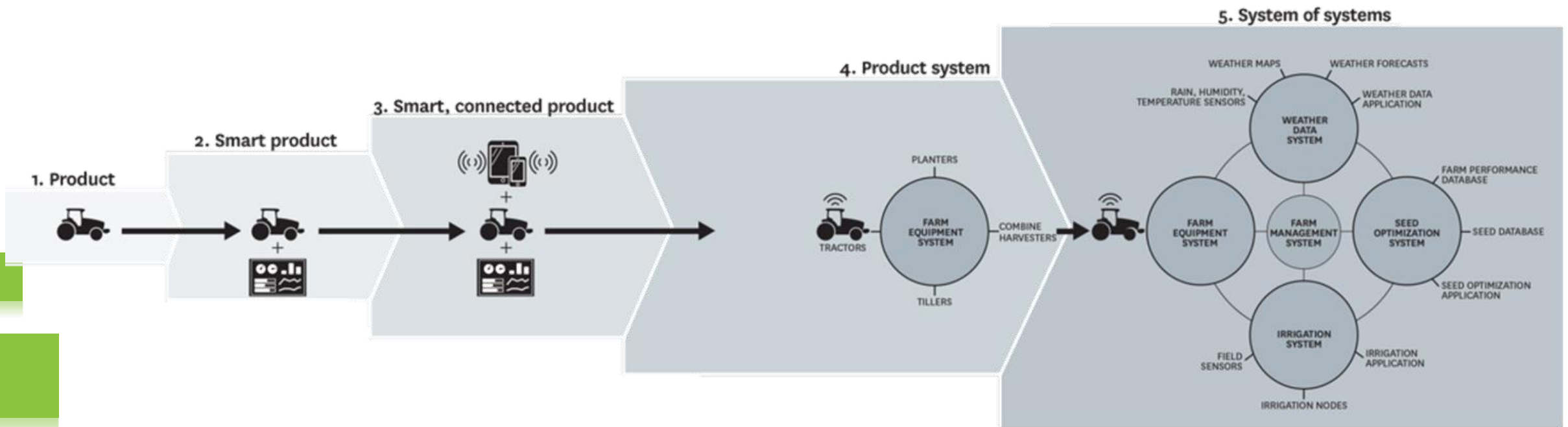


1. IoT: Enabling Technologies & Systems of Systems



Internet of Things permits to reach connectivity and interchangeability systems, generates opportunities for smart-and connected machines and products that work together.

Communication and Control are now possible from everywhere. A huge opportunity for farming.



How Smart, Connected Products Are Transforming Companies

Michael E. Porter James E. Heppelmann

Harvard Business Review, November 2014

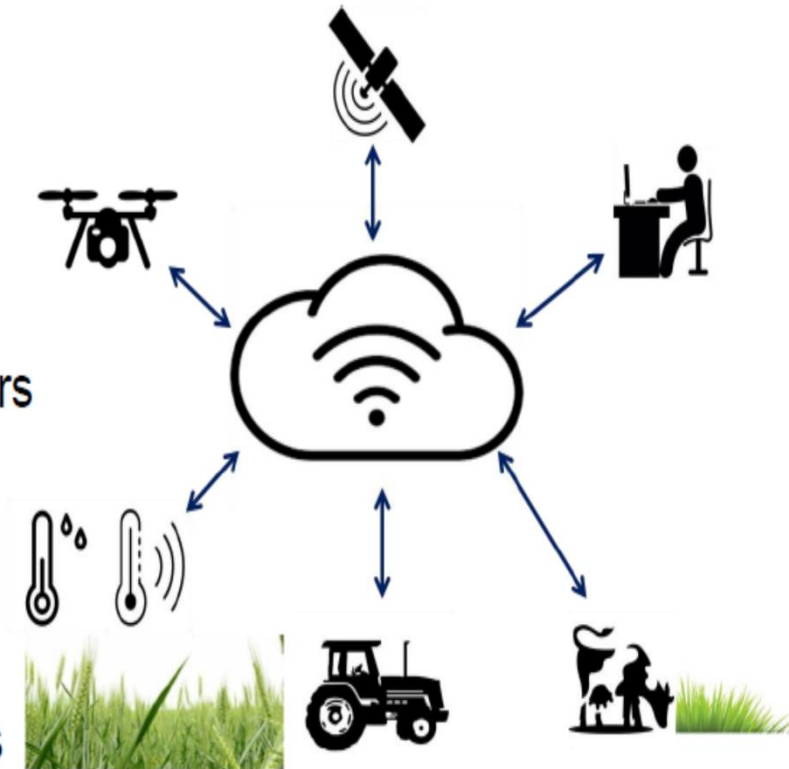


2. Smart Agriculture: the Cyber Physical System Vision



Will IoT be the Agriculture 4.0?
YES, IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging. It is the application of modern ICT (Information and Communication Technologies) into agriculture.

- Sensors
- Drones
- Satellite
- Phones/Tablets/Computers
- Smart farm equipment
- Animal monitors
- Cloud computing
- Wireless communications



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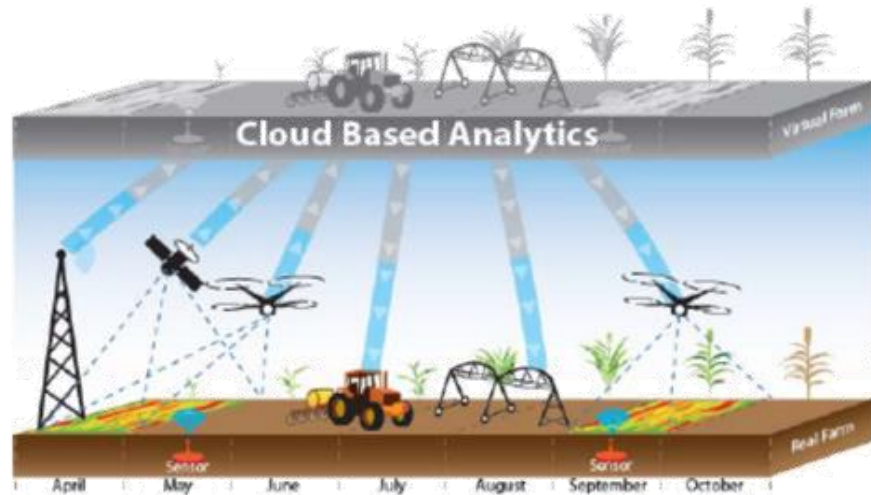
A Context-Aware Middleware Cloud Approach for Integrating Precision Farming Facilities into the IoT toward Agriculture 4.0

<https://www.mdpi.com/2076-3417/10/3/813/htm>

2. Smart Agriculture: the Cyber Physical System Vision



IoT and Agriculture 4.0 it is essentially connectivity and CyberPhysics aid. The development of agricultural tools for connectivity also introduces new challenges in fundamental need of data exchange in the corporate ecosystem and the need to invest in new infrastructure and instruments.



This CyberPhysics approach makes a multidimensional control possible. An augmented knowledge that allows “cise” and “Aware” management.

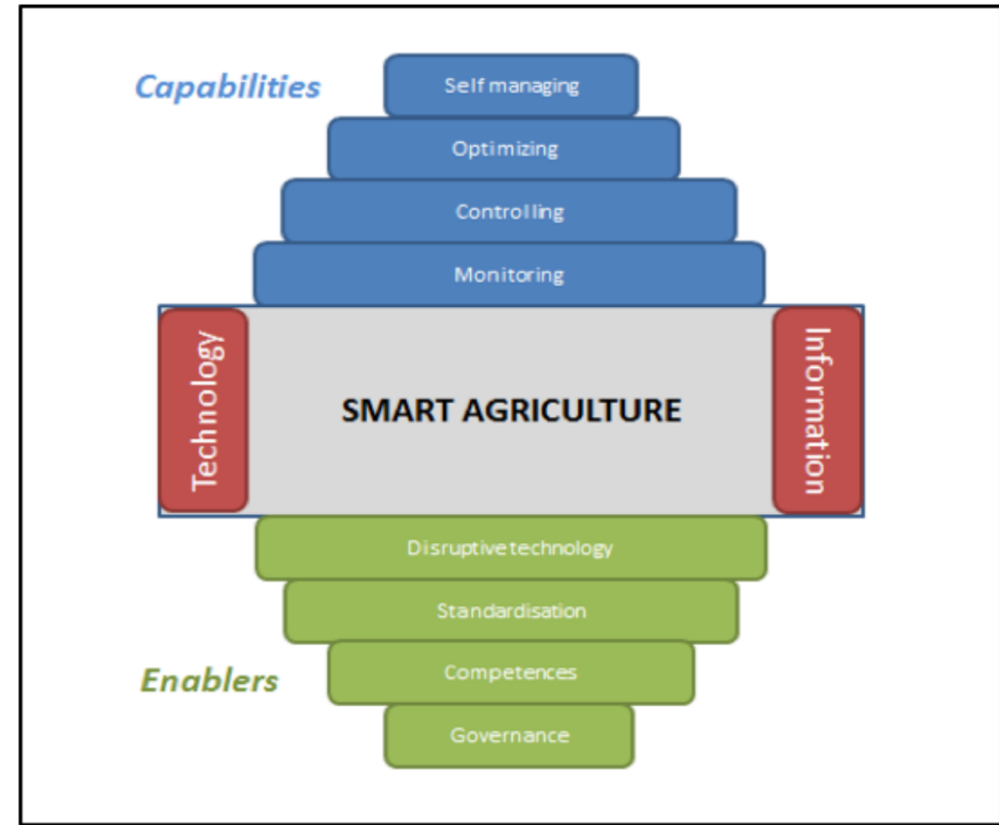
2. Smart Agriculture: the Cyber Physical System Vision



Capabilities and enablers in Smart Farming

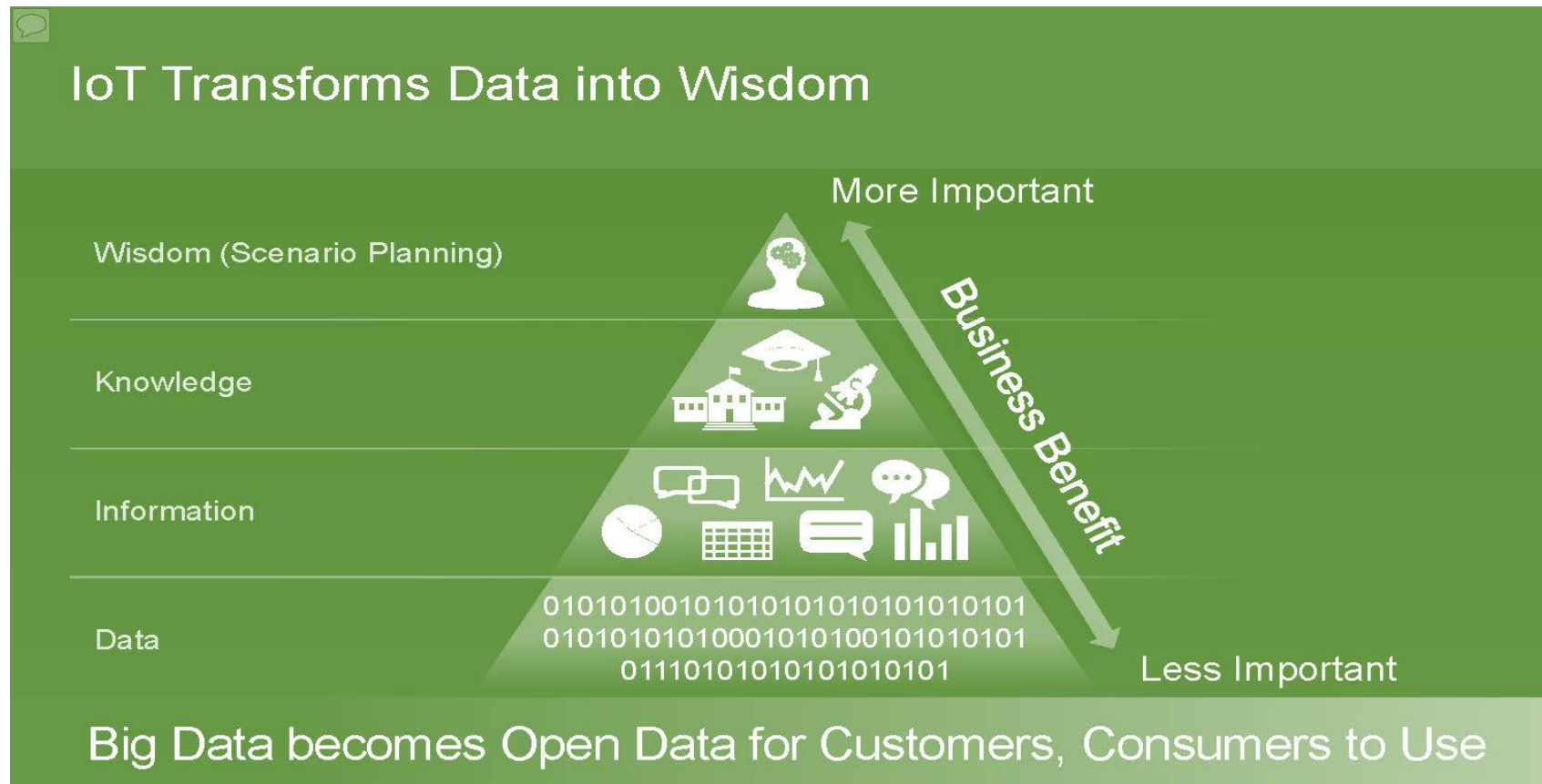
Field Digitalisation

The digitalization of agriculture is based on a number of technologies coming from outside the agricultural sector, like global positioning systems, cloud computing, drones, Internet of Things (IoT) etc. In essence these technologies support very detailed data capturing that in principle can easily be shared (cloud technology) and interpreted with big-data techniques.



Source: LEI, T&U Board, 2016

3. IoT & Knowledge: from Data to Wisdom



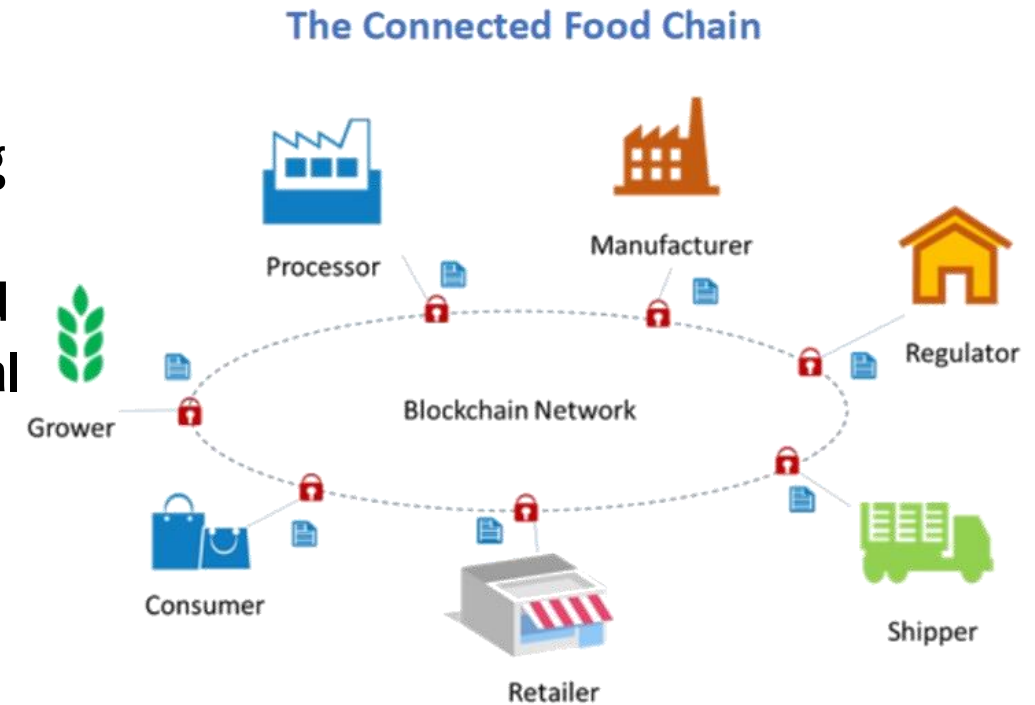
Big Data, the Internet of Things, and the Revised Knowledge Pyramid Murray E. Jennex Fowler College of Business
San Diego State University

The DATA BASE for Advances in Information Systems 69 Volume 48, Number 4, November 2017 p69-79

4. IoT & Blockchain



The blockchain community has come a long way in recent years. We all know it for cryptocurrencies, but other types of use are evolving. Blockchain seems to acquire an increasing importance as an ideal technology to promote transparency along the food chain. The cryptographic features on the food source, quality and freshness can ensure that the data is real and accurate, instilling trust and guaranteeing safety to consumers.



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Blockchain and its Role in the Internet of Things (IoT)

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<https://arxiv.org/abs/1902.09779>

See more here

[BLOCKCHAIN - ERIAFF - Fausto Villani](#)

Reading Suggestions

❖ Wikipedia: https://en.wikipedia.org/wiki/Internet_of_things

❖ IoF2020:

- <https://www.slideshare.net/CorVerdouw/the-internet-of-farm-and-food-project-overview-iof2020>
- <https://www.slideshare.net/SjaakWolfert/iof2020-project-overview-getting-inspired>
- <https://www.iof2020.eu/about/large-scale-pilot-programme>
- www.iof2020.eu

❖ <https://medium.com/datadriveninvestor/iot-applications-in-agriculture-the-potential-of-smart-farming-on-the-current-stage-275066f946d8>



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The Future of Technology in Agriculture

<https://stt.nl/wp-content/uploads/2016/05/ENG-Toekomstverkenning-agri-food-Web.pdf>