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Applications for distributed ledger technologies in the farming and food sector

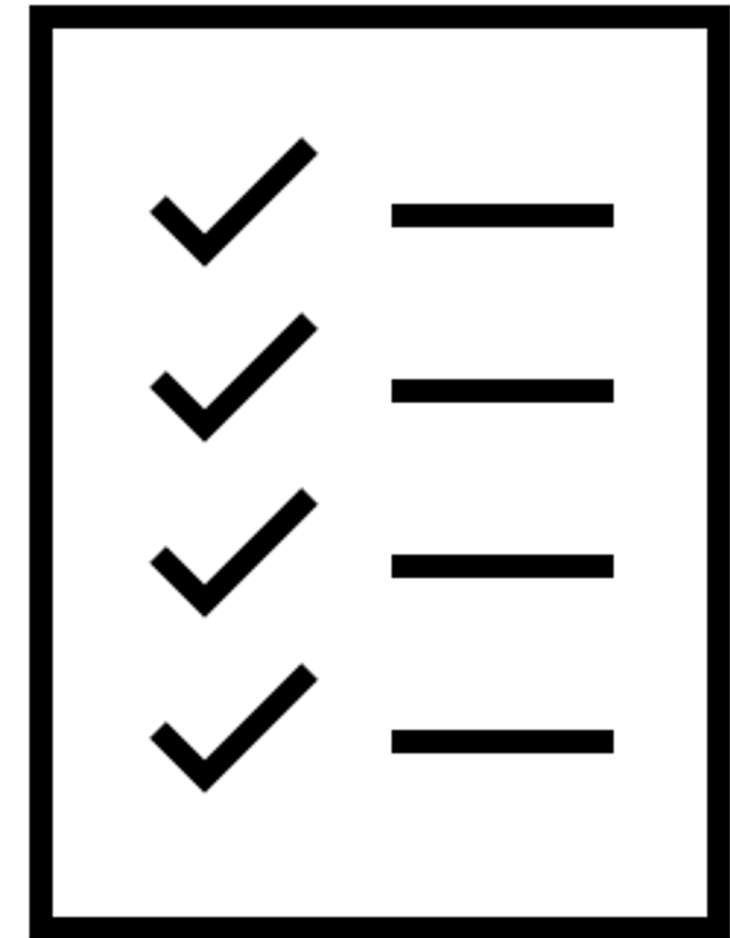
CONTENT 3 Climate-Smart Agriculture: legal aspects of a new model of agriculture in the EU

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Program

1. General introduction to the digitalisation of the agri-food system
2. The distributed ledger technologies and the blockchain applications
3. The recognition of the distributed ledger technologies in the agri-food sector at the EU level
4. The recent Italian case: a first step towards legal recognition



WHAT IS PRECISION FARMING?

Set of technologies that allows to manage variability in the field

The goal is to maximize production and increase the quality of the production, reducing losses with a consequent gain for the farmers and the environment

Precision farming complies with the rule of three DOING:

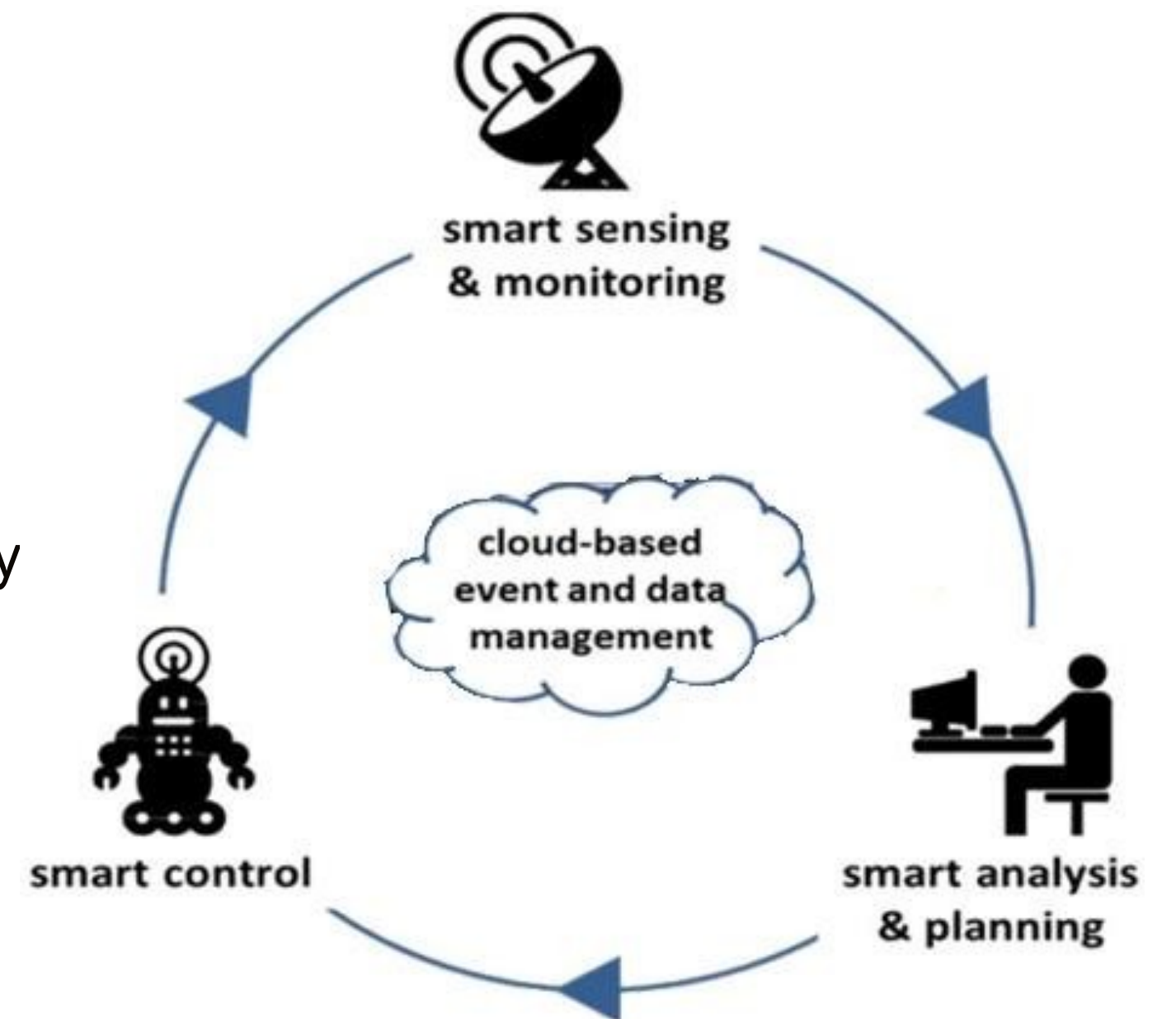
1. DO THE RIGHT THING...
2. ...AT THE RIGHT TIME...
3. AT THE RIGHT PLACE. (Gebbers and Adamchuk, 2010)

ARE WE MOVING TOWARDS DIGITAL AGRICULTURE?

The digitalization of the agri-food sector is characterised by integration of three key enabling technologies:

1. Precision farming
2. Automation
3. Information systems and clouding

Disruptive technologies are those that can significantly alter the life of a company or the way in which entire economic sectors operate



WHAT ARE BLOCKCHAIN TECHNOLOGIES?

The **blockchain** is a **distributed, digital ledger** of transactions that are recorded and duplicated in real time on a network of nodes.

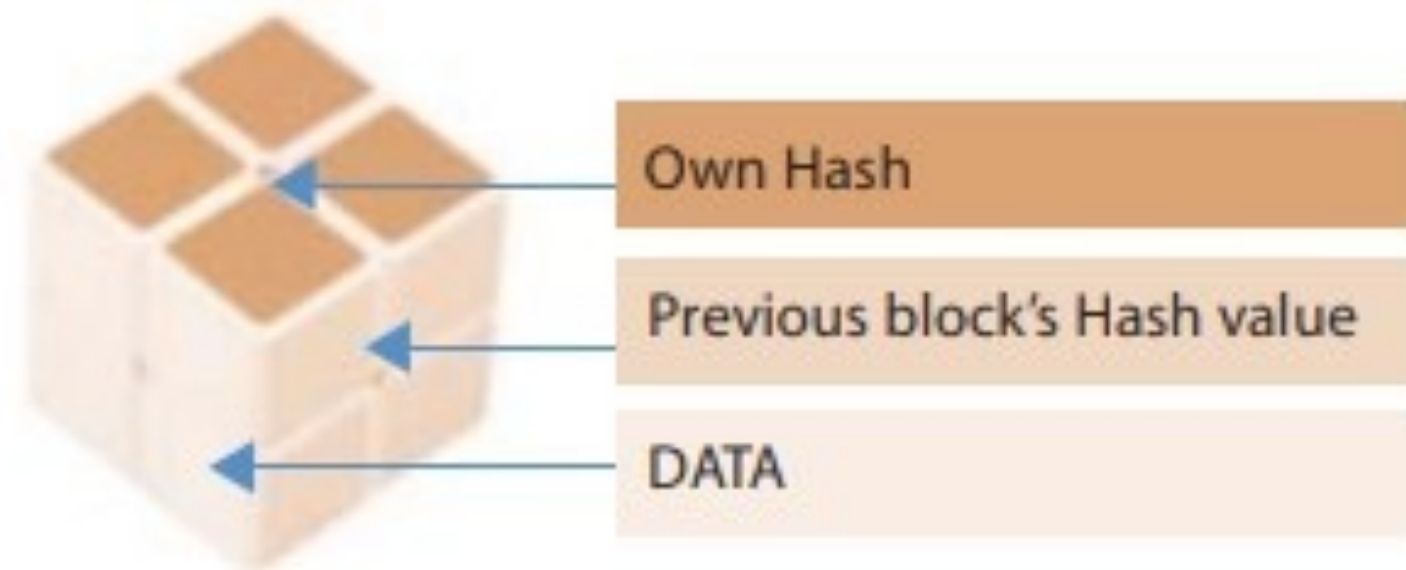
To better understand, let's take the example of the ledger used in business accounting

→ A ledger is a register in which all the data that affect the management of an activity are collected and combined

Similarly, **blockchain technology** allows to collect and record transactions made between users of a network

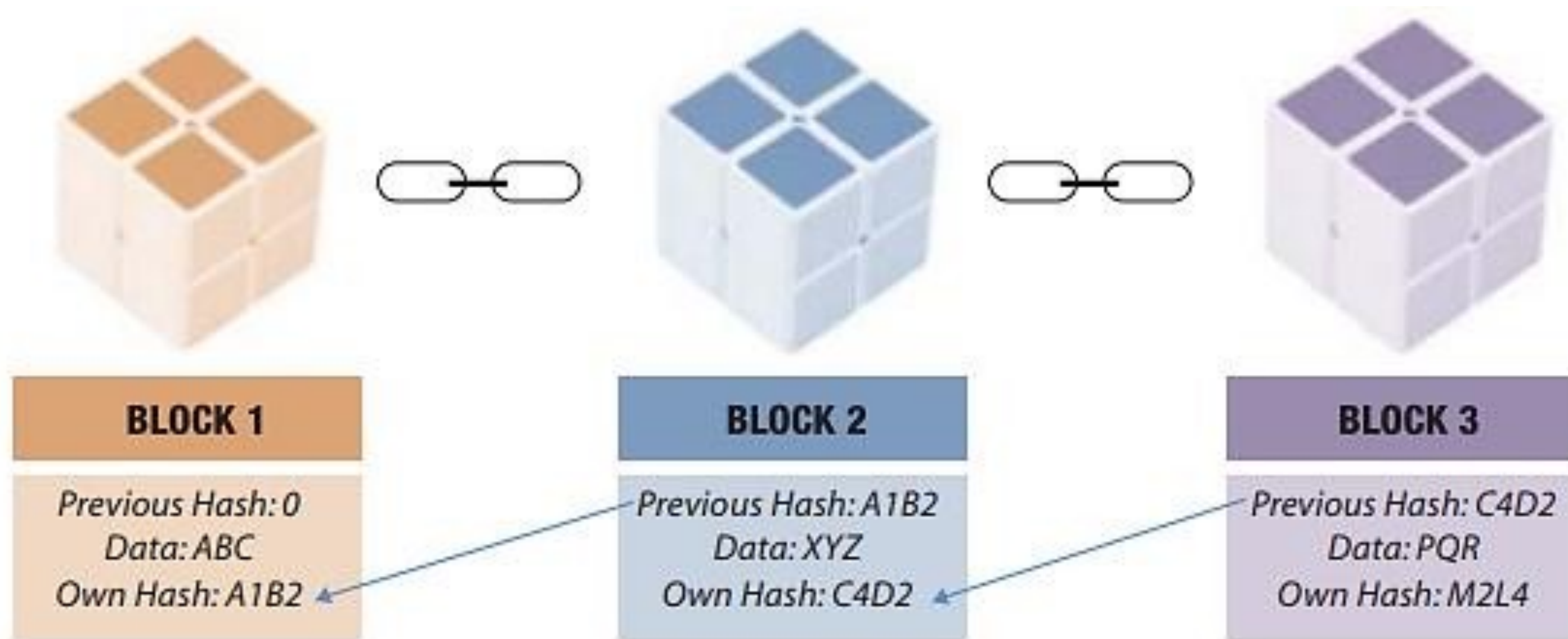
By transaction, here, we mean an exchange of information between users that can include data, currencies, contracts, and everything that can be of value to users.

- The blockchain consists of **blocks**. Each block contains **data** (anything of value that can be written in code) and has a **hash value**
- The cryptographic hash function plays a crucial role. It is a mathematical algorithm that allows mapping data with an arbitrary length into a binary string of fixed size.
- The hash function takes as input a string of arbitrary length m and outputs a string of fixed length $h(m)$.



Example:
SHA-256 hash of the word **FAO**:
`dbf99f2954da9cfa1a9e74fb65736ce6baec9`
`7c00ce6a401c3556434c9725500`

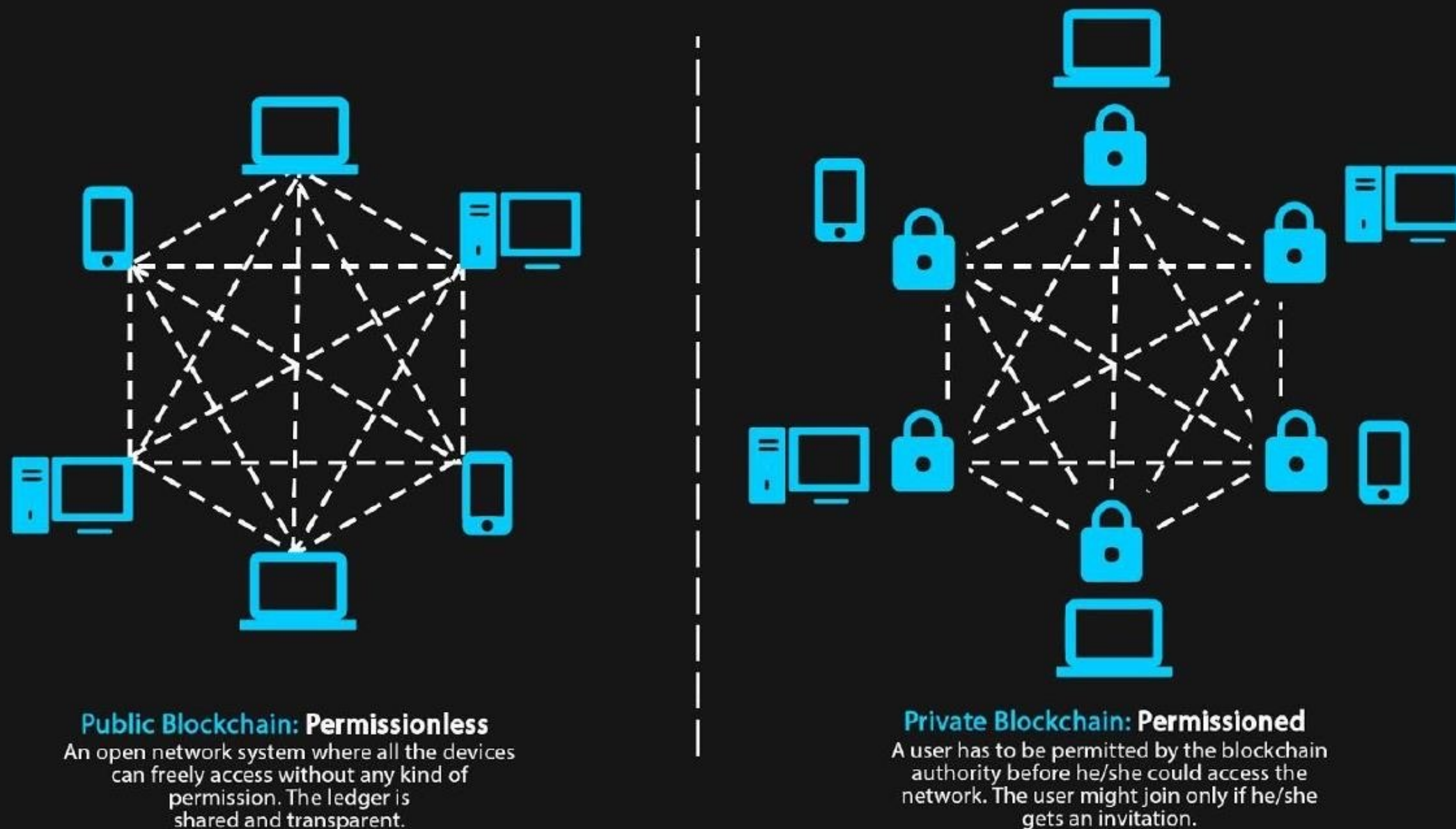
THE BASIC FUNCTIONING OF THE BLOCKCHAIN



What are the application for blockchain technology?

Three levels of blockchain usage:

1. Digital data retention
2. Digital asset exchange
3. Execution of smart contracts



What are the application for blockchain technology?

Smart Contract Explained



A **smart contract protocol** is an automated contract that runs based on predefined and predetermined events.

Contract clauses are assessed, and the relevant code is executed without human intervention

The biggest barriers to blockchain adoption

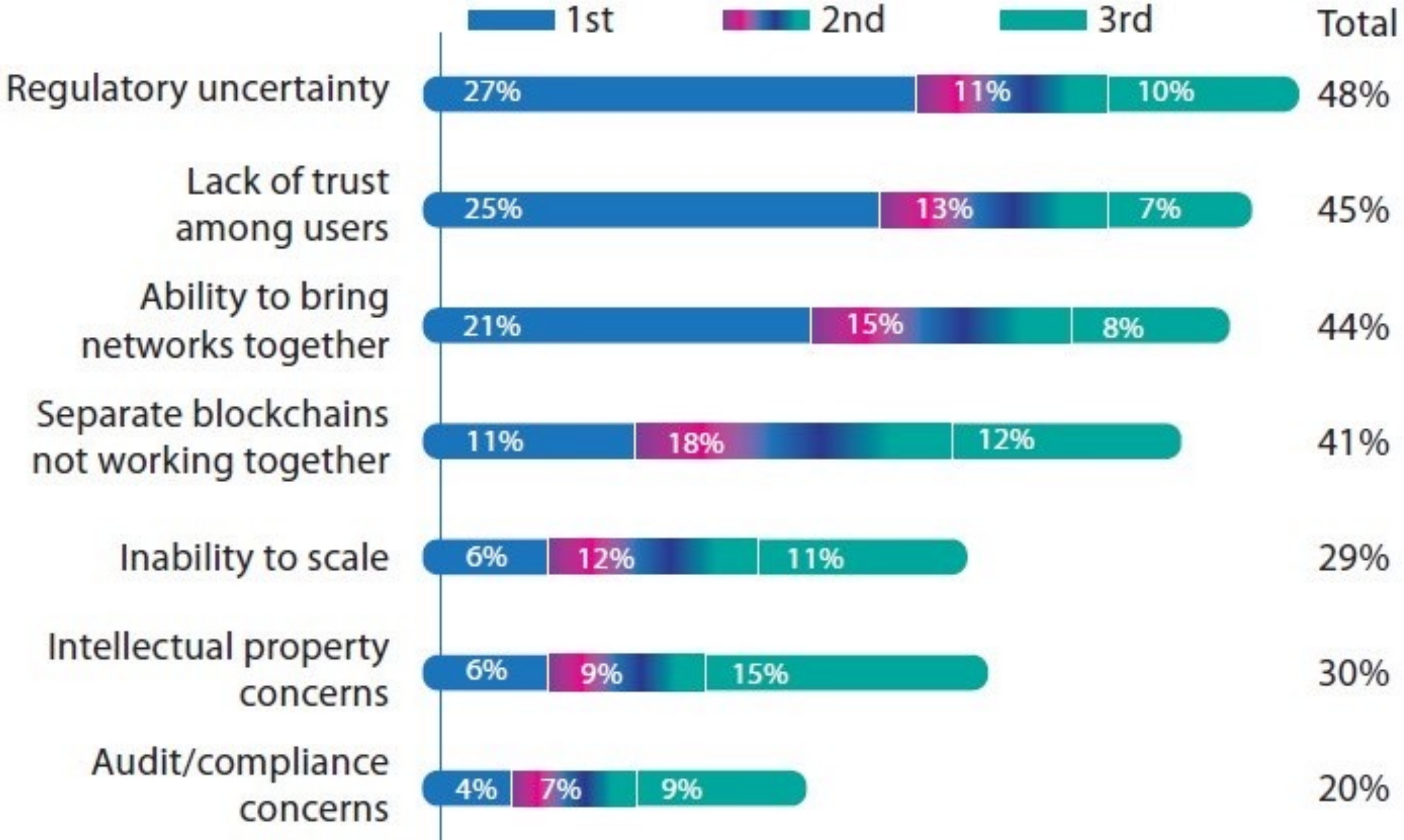


Figure 1: The biggest barriers to blockchain adoption
(Respondents' top three challenges)

Source: PwC blockchain survey

What are the key potential uses of the blockchains in the agri-food sector?



1. System applications for **recording field data** and **processing operations**

2. Applications for integrating and digitalizing **administrative obligations** on blockchain (a way to increase transparency)





QUALITY C



3. Applications for facilitating **control activities and compliance to certifications** (activities of consortia, compliance checking, regulated and private certifications, etc.)

4. Applications for improving the efficiency of customs officers and facilitating international trade





THE EUROPEAN UNION RECOGNITION

- European Parliament resolution of 3 October 2018 on distributed ledger technologies and blockchains: building trust with disintermediation (2017/2772(RSP))

«16. Underlines the significance of DLT **in improving supply chains**; notes that DLT can facilitate the forwarding and **monitoring of origin of goods and their ingredients or components**, improving **transparency**, visibility and **compliance checking**, by providing assurances that **sustainability and human rights protocols** are respected in the place of origin of a product, thus reducing the risk of illegal goods entering the supply chain and ensuring **consumer protection**; notes that DLT can be used as a tool to improve the efficiency of customs officers for counterfeit checking»

LEGAL AND REGULATORY FRAMEWORK OF BLOCKCHAINS AND SMART CONTRACTS

- The European Commission has established the **EU Blockchain Observatory and Forum**
- In September 2019, a first evaluation report was published on the legal framework applicable to blockchain technology
- A recommendations were elaborated for how policy makers might go about the adaptation of blockchain technologies over the short to mid term

a thematic report prepared by
THE EUROPEAN UNION BLOCKCHAIN
OBSERVATORY AND FORUM

The Report recognised the need for clarity to further support the development of blockchain technology and the possibilities offered by its use in economic sectors

The Report also identified areas where the European legislator should act

These include the **legal recognition of territorially distributed registers** and issues related to **liability and protection of data entered**

«**Harmonise the law and interpretations of it.**

Whatever approach individual regulators take, we think it crucial that blockchain and smart contract regulation be as harmonized as possible throughout the EU. That means sharing definitions – and where possible sharing regulations themselves – as well as to the extent possible sharing common interpretations. Blockchain technology and its attendant use cases are international by nature. To be effective across borders, blockchain law and regulation in Europe needs to be aligned across the bloc's borders as well.» (p. 34)

The recent Italian case: a first step towards legal recognition

LAW 11 February 2019, n. 12

Conversion into law, with amendments, of Decree-Law no. 135 of 14 December 2018 containing urgent provisions on support and simplification for businesses and public administration

The Italian Law introduces **legal definitions** of blockchain technology and smart contract, and recognizes specific **legal effect** for data registered in blockchains

According to the Art. 8-ter of the Law:

'Distributed ledger technologies' are defined as technologies and computer protocols that use a shared, distributed, replicable, simultaneously accessible, architecturally decentralised ledger on a cryptographic basis, allowing the recording, validation, updating and storage of data both in clear text and further protected by cryptography verifiable by each participant, unalterable and non-modifiable.

According to the Art. 8-ter of the Law:

A "**smart contract**" is defined as a computer program that operates on technologies based on distributed registers and whose execution automatically binds two or more parts on the basis of effects predefined by them.

Smart contracts meet the requirement of written form after computer identification of the interested parties, through a process having the requirements set by the Agency for Digital Italy with guidelines to be adopted within ninety days from the date of entry into force of the law converting this decree.

The storage of an electronic document through the use of technologies based on distributed registers produces the legal effects of the electronic time stamp referred to in Article 41 of Regulation (EU) no. 910/2014

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I *Legislative acts*

REGULATIONS

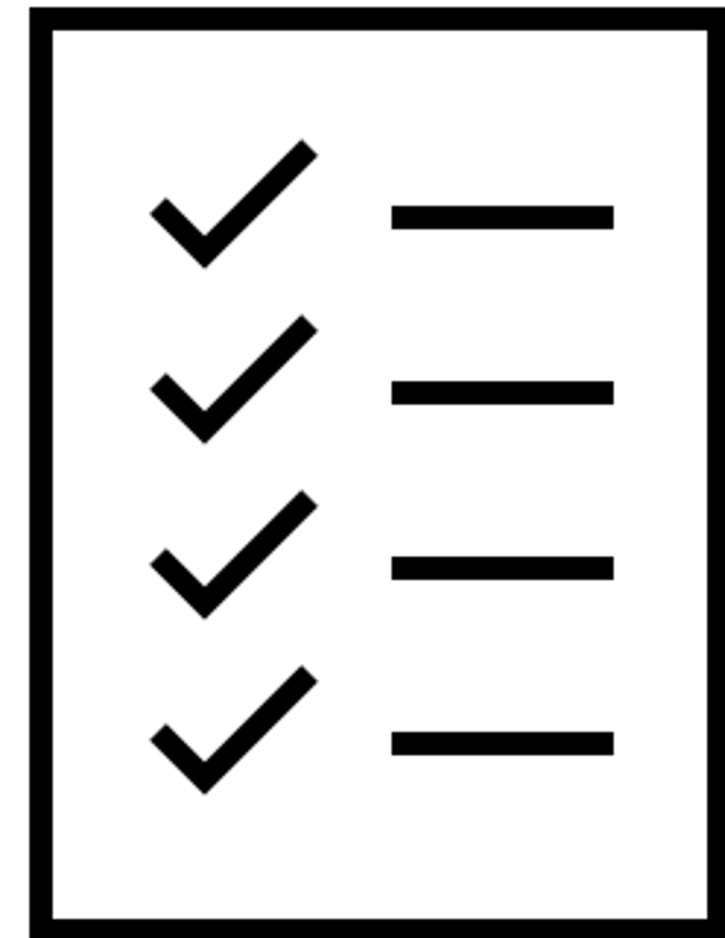
- ★ Regulation (EU) No 909/2014 of the European Parliament and of the Council of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories and amending Directives 98/26/EC and 2014/65/EU and Regulation (EU) No 236/2012 ⁽¹⁾ 1
- ★ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC 73

Article 41: Legal effect of electronic time stamps

1. An electronic time stamp shall not be denied legal effect and admissibility as evidence in legal proceedings solely on the grounds that it is in an electronic form or that it does not meet the requirements of the qualified electronic time stamp.
2. A qualified electronic time stamp shall enjoy the presumption of the accuracy of the date and the time it indicates and the integrity of the data to which the date and time are bound.
3. A qualified electronic time stamp issued in one Member State shall be recognised as a qualified electronic time stamp in all Member States.

Short Summary / key messages of the lecture

1. The digitalisation of the agri-food sector is characterised by integration of three key enabling technologies: precision farming, automation, information systems and clouding
2. The blockchain is a distributed, digital ledger of transactions that are recorded and duplicated in real time on a network of nodes
3. In the farming and food sector, blockchain can provide secure and immutable recording of field data and processing operations, thus facilitating compliance monitoring
4. The EU Blockchain Observatory and Forum recognizes the need for legal clarity to further support the development of blockchain technology
5. In 2019 Italy introduced legal definitions of blockchain technology and smart contract, and recognised specific legal effect for data registered in blockchains



Thank you for your attention

Any question? Doubts?

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