IoT and Edge: Agrifood and Rural communities

OPEN DEI
Ambassador of the Agrifood domain, senior researcher in agrifood sector since 20 years

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Marianna Faraldi

Open the eyes of European industry and society to the benefits from digital transformation

WHO WE ARE…

OPEN DEI is a H2020 Coordination and Support Action

Own shareholders: 31 Italian food industries

TECNOALIMENTI

RTO, no-profit, Consortium of food industries

It acts as a **THINK TANK**

Collector of needs, requirements, trends, new technologies…
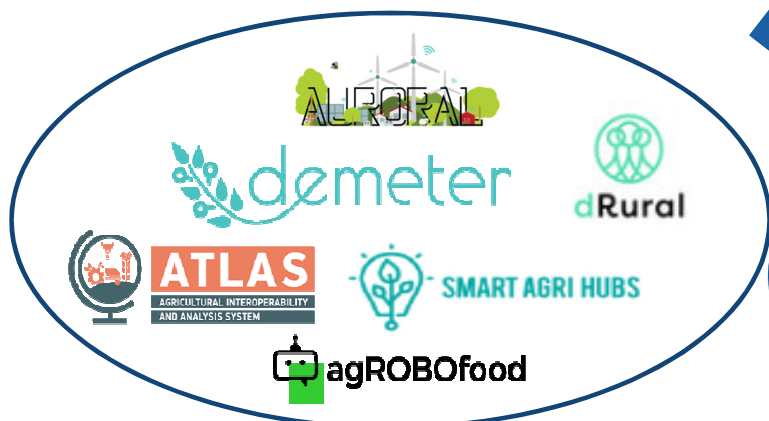
Agrifood Ecosystem of Projects (LSPs)

Own industrial Network

EIT Food

Regional/National Clusters
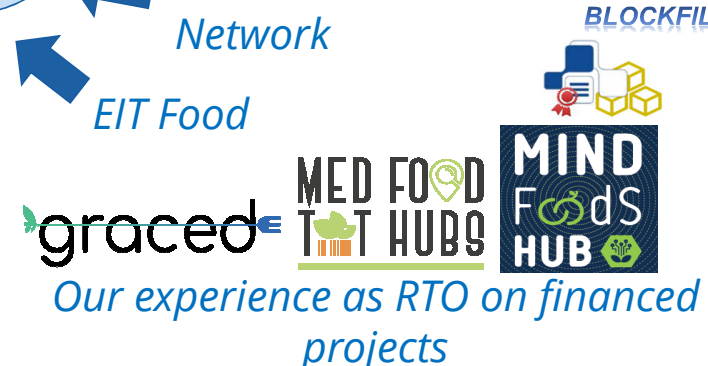
Our experience as RTO on financed projects

Let's move the point of view: from Agriculture to Agrifood supply-chain

From FARM……………………………> To FORK

Today when we refer to food related context, the following terms are used:

- SMART AGRICULTURE (= primary production)
- SMART FACTORY (= manufacturing)

as two separated and independent Areas/domains…

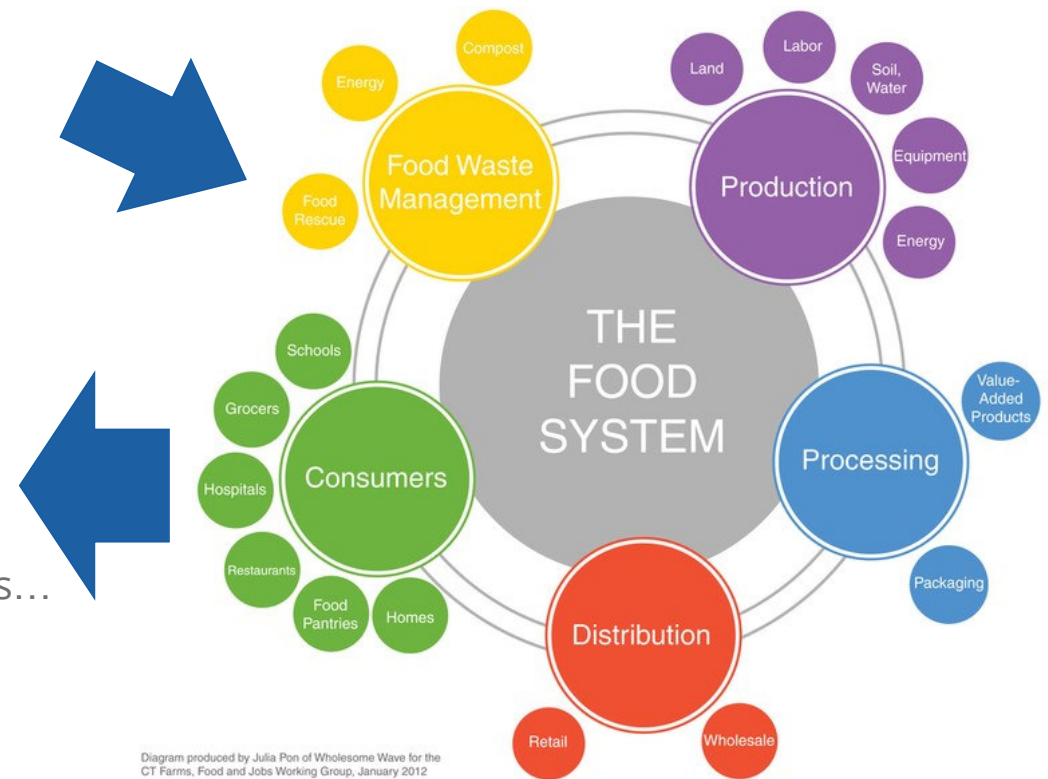Let's enlarge our vision and speak about

- SMART FOOD SYSTEM

Diagram produced by Julia Pon of Wholesome Wave for the CT Farms, Food and Jobs Working Group, January 2012

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And it's in this enlarged context that we have to consider, in perspective, **IoT solutions.**

IoT systems as a wide range of sensors, detectors, vision systems and devices connected to the Internet that can **MONITOR the entire food production process, from the production area to the point of sale**

➡ transparent supply-chain and a large amount of data that allow for information in real time for a better decision-making process

Trends in digital transformation at EU level

At FARM level: There is a growing awareness. Some investments done and/or planned in the near future, but there is still a general delay in digital technologies' application.
Main interest:
- monitoring production costs,
- increase of food production

The needs related to data acquisition, processing and valorisation are not a priority

At Food chain level:

- Small enterprises: delay

➡️ Digital considered as an area 'independent' from the business activity, to be delegated to external agencies, or else a "do it yourself" vision that induces companies to deal with it on their own even in the absence of skills, with not very encouraging results and almost no use of data.

- Large enterprises: more advanced

➡️ Success in companies that consider digital as part of their innovation strategy and feel the need to invest further on it

Still, most of the solutions pour out vertically to a specific phase or function rather than concern the subject as a whole, or even better the whole value chain!

Current IoT applications along the supply-chain

PRIMARY PRODUCTION **Key-words:** monitoring sensors	❑ Systems for monitoring and control of agricultural machineries ❑ Services for mapping crops and fields ❑ Systems of precision irrigation ❑ Systems for monitoring and control of crops and open fields' paremeters TRENDS: → central weather station, monitor the climate, T, hydration and soil pH levels → IoT for detection (e.g. contaminants, through optoelectronics technologies) → Cameras → Often correlated with sDSS (AI)
TRANSPORT AND LOGISTIC	The items can be tagged using simple scannable barcodes, radio frequency identification (RFID) tags, or fully active near field communication (NFC) tags. The food items can be logged at the pallet, sack, box or individual level. Temperature, humidity and gas levels of the vehicles can all be continuously monitored via cameras or satellite devices.
FOOD MANUFACTURING	Raw Material & Inventory Control Factory Operations & Machine Conditions Quality control, Safety, Sustainability Product Delivery & Packaging

Barriers

- Not technological: the technologies are there!
- **Interoperability** limits of different stakeholders systems due to a fragmented supply chain
- Need **to work on the interconnection of the solutions**, the development of specific skills, valorisation of data, data sharing
- Customers are reluctant to accord **access to** their **data** and this affects the entire supply chain
- Risks are often overvalued (perception of complexity)
- Digital technologies not specifically designed to adapt specifically to the agricultural context: high variability of the application context! Need of customisation
- Difficulty in finding technology grounding know-how → Digital skills + domain specific knowledge needed → skills/training

TRENDS/PERSPECTIVES

- Recently the concepts of Big Data and AI are introduced as *complementary technologies* to generate value starting from the large amount of data generated through devices and sensors along the entire food supply chain.

→ **Valorisation of data**: the tendence is to obtain smart data from big data from the whole supply chain, from farm to table. The ability to extract value from data is essential to allow they are readable and usable by other users.

→ **Integration between IoT and advanced AI algorithms as a theme of strong interest** (for instance: real time control powered by IoT devices can record temperature, humidity, light and various environmental factors in order to alert the system of changes and to make any necessary adjustments to keep quality of food products consistent. Performance data on parameters captured by IoT devices & processed by AI can be shown on remote devices and controlled by distance).

- From **IoT** -----evolution ---→ **Internet of Value** (e.g. through the use of blockchain)

Contact

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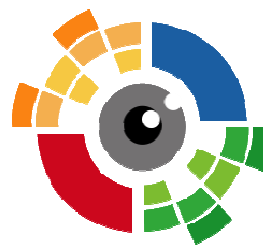
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