

The Watson approach to transparency and integrity

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Zhijun Wang, Postdoctoral researcher
BfR Academy, Berlin, Germany, 28 May 2024

Global commodity chains from
a risk assessment
perspective



27.–29.05.2024

International Conference: Global commodity chains from a
risk assessment perspective

University College Dublin

UCD School of Biosystems & Food Engineering (SBFE) is the leading center for education and research in the application of engineering principles to agriculture, food and renewable resources in Ireland.

Led by Dr Dimitrios Argyropoulos, the **Digital Tech Lab** within the UCD School of Biosystems Engineering is focused on the application of "smart systems" to the agri-food and bio-resource sectors.

Areas of interest

Technology-wise: sensor and sensing systems, multi-copters, agricultural robotics, agri-food electronics, computer controlled micro dryers, Internet-of-Things and machine learning.

Sustainable agri-food systems, automation and digitisation (€1 million research funding awarded annually)

| Project Title | Funding Agency | Duration |
|---|-------------------|--------------------------|
| 1. A holistic framework with Anticounterfeit and intelligence-based technologies that will assist food chain stakeholders in rapidly identifying and preventing the spread of fraudulent practices (WATSON) – Project Coordinator | EU/Horizon Europe | 1 Mar 2023 - 28 Feb 2026 |
| 2. Democratizing digital farming through smart solutions for small farms (Farmtopia) | EU/Horizon Europe | 1 Sep 2023 - 31 Aug 2026 |
| 3. Agroecology for weeds (GOOD) | EU/Horizon Europe | 1 May 2023 - 30 Apr 2026 |
| 4. Nanoencapsulation of bioactive compounds from plant by products to produce sensitive skin cosmetics (NanoCosmos) | EU/Horizon Europe | 1 Jan 2023 - 31 Dec 2026 |
| 5. Multi-actor collaboration dynamics and capacity building network inside and between AKIS to foster the upscaling of SFSCs across Europe (EU4Advice) | EU/Horizon Europe | 1 Oct 2022 - 30 Sep 2027 |
| 6. From vineyard to bottle – trace sustainable practices in wine-growing under full transparency (Oenotrace) | EU/H2020/DAFM | 1 Jun 2023 - 31 May 2026 |
| 7. Agrifood quality estimation using hyperspectral techniques (SpectroFood) | EU/H2020/DAFM | 1 Mar 2021 - 28 Feb 2024 |
| 8. Unlocking data-driven innovation for improving productivity and data sharing in mushroom value chain (MUSHNOMICS) | EU/H2020/DAFM | 1 Mar 2021 - 28 Feb 2024 |
| 9. Promote online education for agriculture in a sustainable environment (POEASE) | EU/Erasmus+ | 1 Feb 2022 - 31 Jan 2024 |
| 10. The food industry of the digital era: new practices in training and skills development through Extended Reality (Foster-xR) | EU/Erasmus+ | 1 Sep 2020 - 31 Aug 2023 |

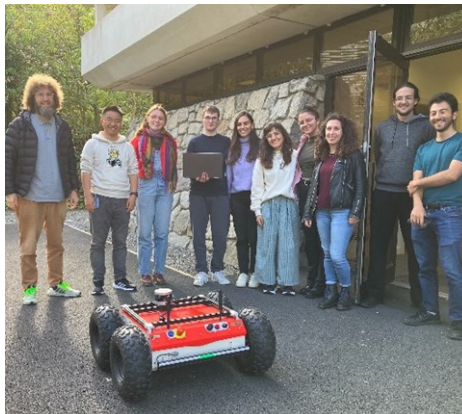


Digital Tech Group:

- 3 Postdocs; 5 PhD researchers;
- 2 research engineers;
- 2 project managers
- 3 visiting researchers

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MSc Digital Technology for Sustainable Agriculture (One Year Full Time / Sep start)

MSC DIGITAL TECHNOLOGY FOR SUSTAINABLE AGRICULTURE

This programme offers hands on experience, on a range of novel digital technology, training in state-of-the-art labs and applied research in a real life environment at the Lyons Research Farm.

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UCD Project Coordination Team



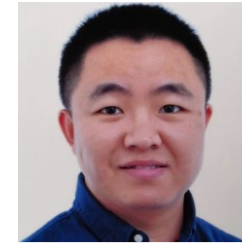
Dr Dimitrios Argyropoulos
Project Coordinator



Sarah Nolan
Operations Manager



Dr Ciara O'Connor
Project Manager



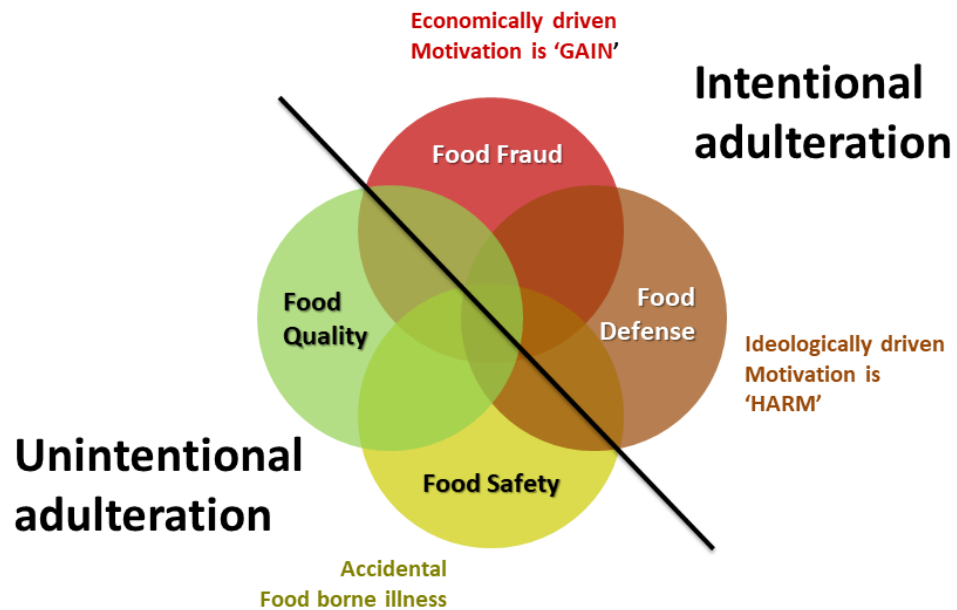
Dr Zhijun Wang
Scientific Manager



Argyro Tsafara
PhD Researcher

Framework for Preventing Fraud in Agri-Food Supply Chains

What is food fraud?



Comparison of food-related definition. Adapted from Food Fraud Think Tank (FoodIntegrity Handbook)



Food fraud: any deliberate action of businesses or individuals to deceive others in regard to the integrity of food to gain undue advantage.

The types of food fraud

1



Dilution

Mixing a liquid ingredient of high value with a liquid of lower value

Substitution

Replacing an ingredient, or part of the product, of high value with another ingredient, or part of the product of lower value.



2

3



Mislabeling

Placing false claims on packaging for economic gain

Counterfeiting

Copying the brand name, packaging concept, recipe, processing method, etc. of food products for economic gain.



4

5



Unapproved enhancement

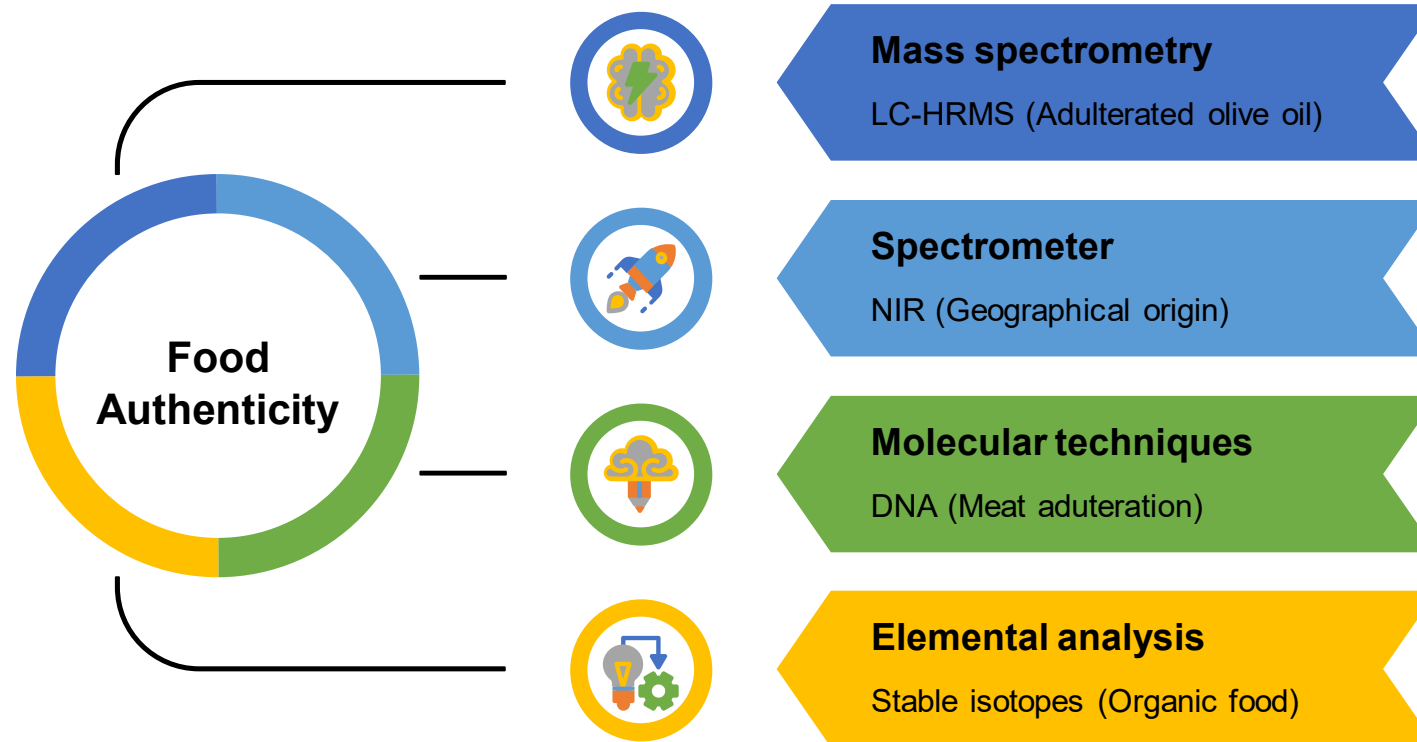
Adding unknown and undeclared materials to food products to enhance the quality attributes

Problem statement

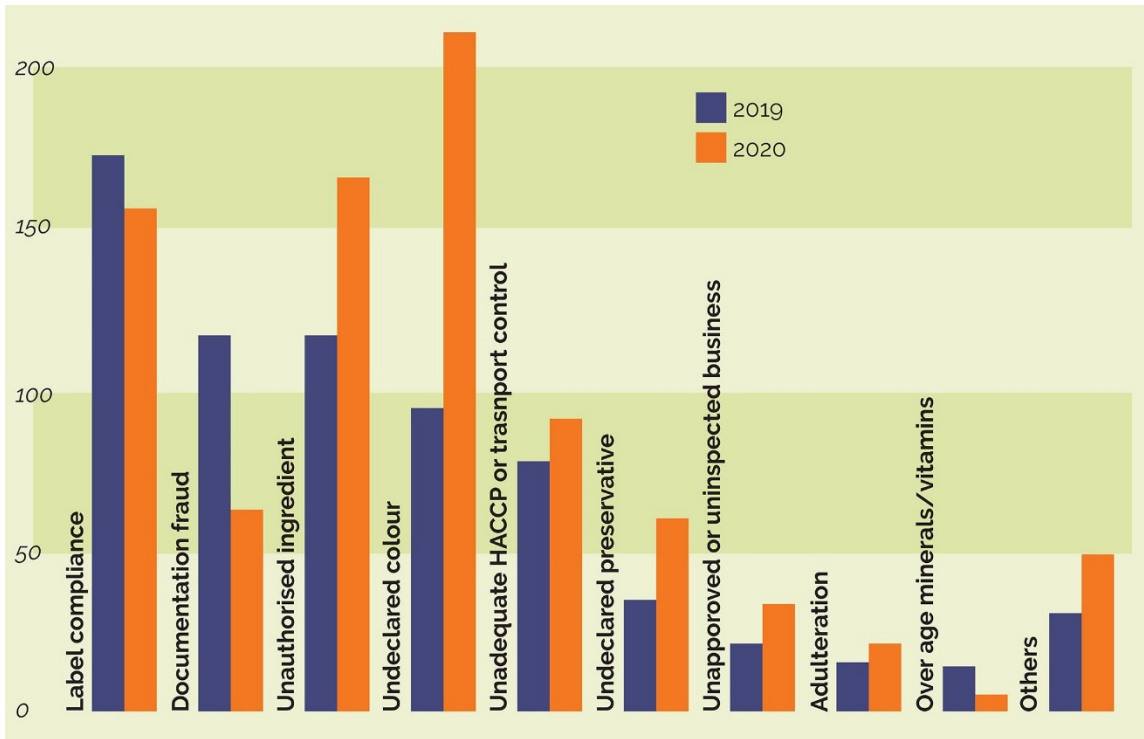
- Blind spots in food supply chains
- Economic losses to consumers
- Consumers' trust in food industries
- Food safety incident
- The cost of regulatory authorities



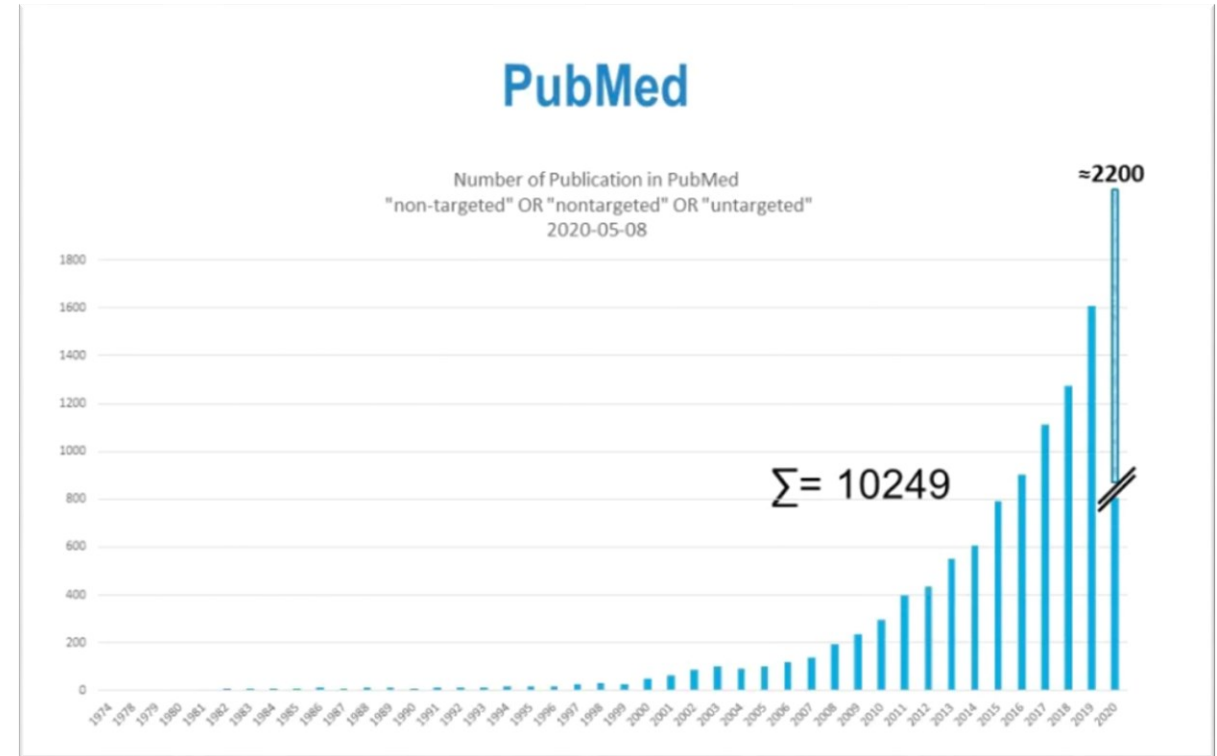
Technology and analytical tools



The limitation of analytical testing



Reported Fraud Incidents, April-June 2019 compared to April-June 2020

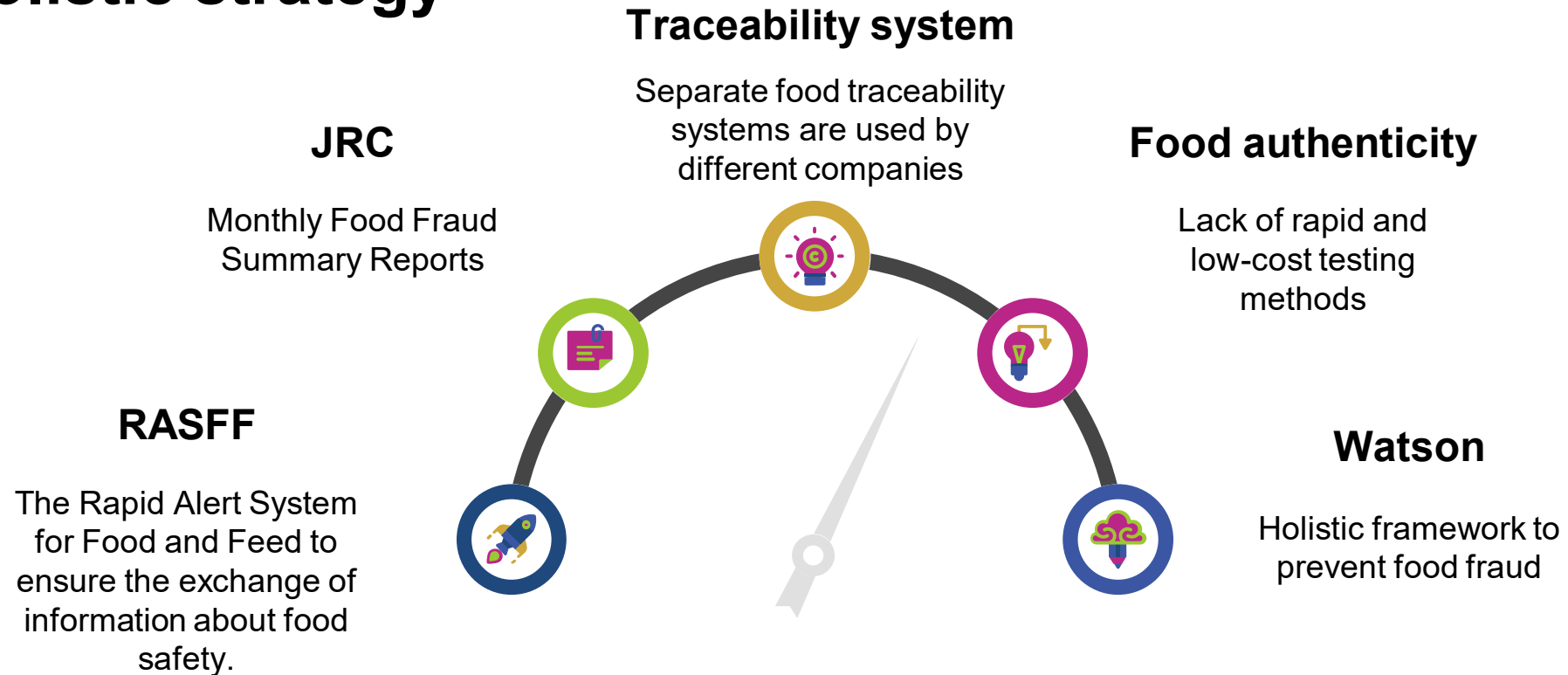


Published paper related to food authenticity

Bert Popping, Food authenticity and the AOAC AMPR program, 2020



Holistic strategy





Project Coordinator of Watson
Preventing food fraud through digital and intelligence-based technologies
Budget: € 11.221,383 million | 45 partners across 20 countries
HORIZON-CL6-2022-FARM2FORK-01-11 - Effective systems for authenticity and traceability in the food system





Watson's Objectives

Preventing food fraud through digital and intelligence-based technologies

- **DESIGN and DEVELOP** a holistic traceability framework that will integrate data-driven services, intelligence-based toolsets and risk-estimation approaches
- **VALIDATE** and demonstrate the effectiveness of the proposed framework and toolset in 6 agri-food use cases
- **ADVANCE** the inspection and control capabilities of food safety authorities through robust, reliable and rapid methods based on emerging technologies
- **ENSURE** wide communication and dissemination of the results, raising awareness and promoting multi-stakeholder cooperation and information-sharing in order to tackle fraudulent activities in the food chain
- **MAINSTREAM** project results towards relevant policy making organisations and standardisation bodies



Watson framework

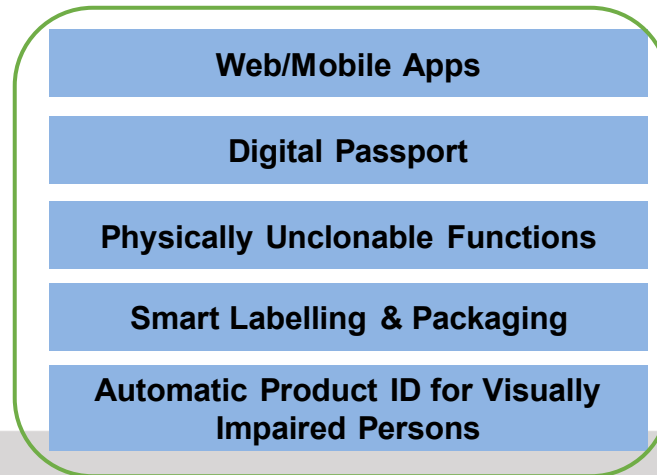
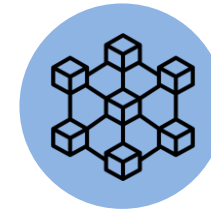
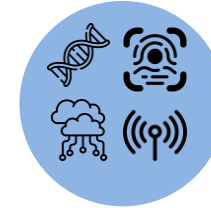
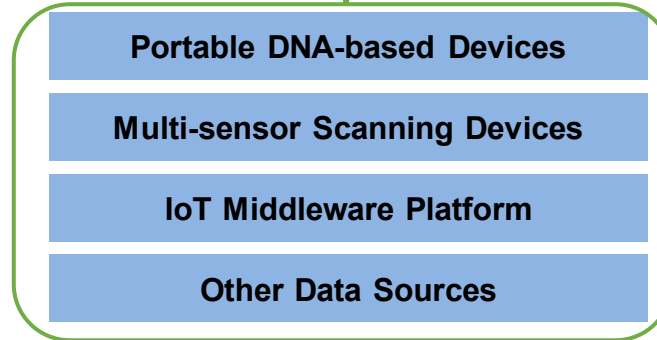
Food fraud vulnerability assessment



Food Supply Chain



Hardware devices



Application

Early Warning System

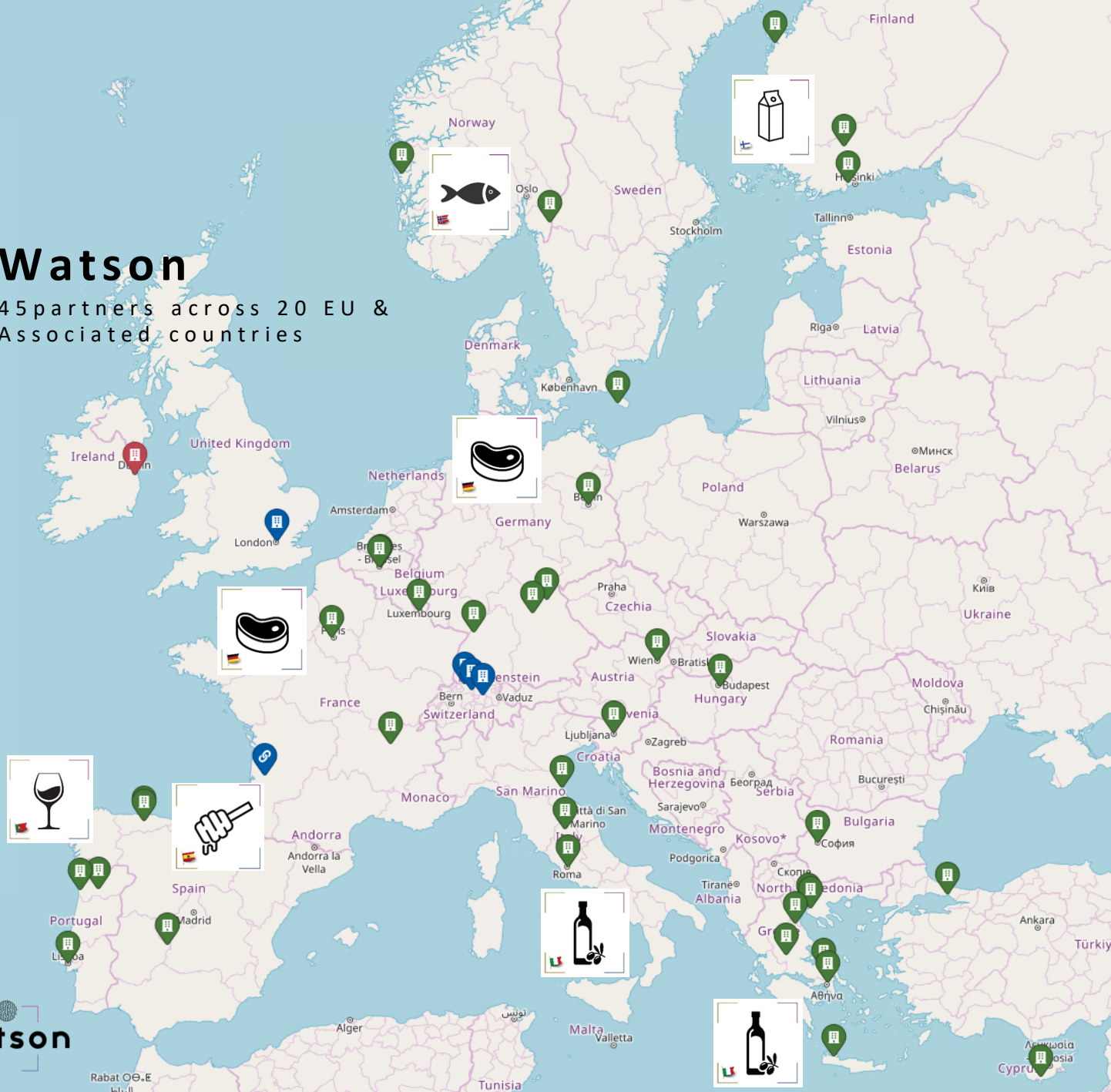


Warning system



Watson

45 partners across 20 EU & Associated countries



➤ The project is organized around 6 agri-food sectors:

- ❑ Tackling counterfeiting of Portuguese wine
- ❑ Preserving the authenticity of Spanish northwest PGI honey
- ❑ Rapid traceability of extra virgin olive oil in Italy and Greece
- ❑ Identification of possible manipulations at all stages of the meat chain in Germany and France
- ❑ Improved traceability of high-value products in cereal and dairy chain in Finland
- ❑ Combating of white fish counterfeiting in Norway

➤ Pilot sites: 6 use cases and validation campaigns



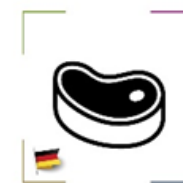
Tackling counterfeiting of Portuguese wine.



Preserving the authenticity of Spanish northwest PGI honey.



Rapid Traceability of Extra Virgin Olive Oil with a Digital DNA Fingerprint.



Identification of Possible Manipulations at All Stages of the Meat Chain.



Improved Traceability of High-value Products in Cereal and Dairy Chain.



Combating counterfeiting of Norwegian White Fish.

Next

● Gap analysis

Food fraud and its vulnerabilities



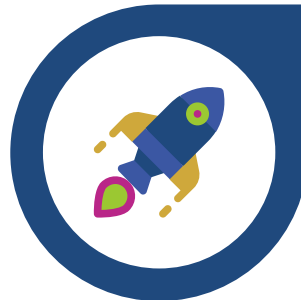
● Digital solutions

Digital technology solutions improving supply chain transparency



● Pilot design

Different approaches for traceability and authenticity across the supply chain



● Food authenticity

Advanced detection to address the food fraud issues





Thank you for your attention!

For Watson updates, follow us on social media:

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