



ALLIANCE

BLOCKCHAIN

HIGH LEVEL POLICY MATERIALS

PROJECT INFORMATION

The ALLIANCE project, a three-year initiative funded by the European Union's Horizon Europe program, aims to establish a comprehensive framework for ensuring data integrity, veracity, enhanced traceability, and transparency within quality-labelled food supply chains.

This framework is designed to foster evidence-based decision making for proactive interventions and actionable planning, ultimately strengthening the resilience and trustworthiness of the food sector.

ALLIANCE is developing systemic solutions that transcend current industry practices to improve traceability, guarantee authenticity, preserve quality, and eliminate fraud in food products. This involves deploying innovative methods and tools for on the spot adulteration detection and increasing transparency in quality-labelled supply chains—specifically for organic, Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), and Geographical Indication (GI) foods—through advanced track-and-trace mechanisms. The project's ultimate goal is to provide food actors, farmers, public authorities, and policymakers with meaningful insights, demonstrated through seven diverse use cases.

MULTI-STAKEHOLDER COLLABORATION



FOOD SUPPLY CHAINS



**INDUSTRY-SPECIFIC
TECHNOLOGICAL
DEVELOPMENT**



PUBLIC POLICY



**INNOVATION
MANAGEMENT**



ACADEMIA



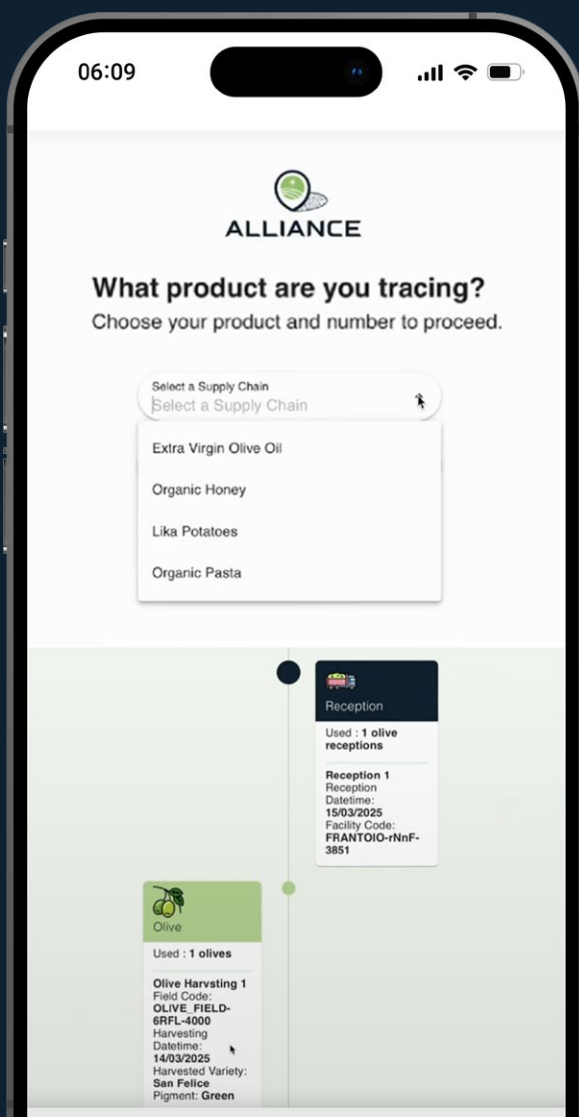
**PUBLIC
ADMINISTRATIONS**

**HOLISTIC APPROACH TO ADDRESS FOOD FRAUD,
SUPPLY CHAIN INTEGRITY**

BLOCKCHAIN APP OVERVIEW

Blockchain technology offers a decentralized approach to record-keeping, where transactions, authentications, and interactions are recorded and verified across a network rather than through a single central authority. This innovation eliminates reliance on a central data collection point, enabling distributed operations where all participants maintain their own copy of the stored data. Data are primarily generated by IoT devices and human users of the developed applications, and once stored on the blockchain, these data are immutable, preventing any unauthorized tampering.

Within the ALLIANCE project, a dedicated Blockchain web-application allows administrators and personnel within Food Supply Chains (FSCs) to oversee supply chains, monitor the state of food product processing, and input data related to their activities. Access to relevant data is permission-based, ensuring that workers only view information pertinent to their function within the FSC. This application ultimately facilitates end-to-end product tracing, enabling the demonstration of a product's journey to prospective consumers, thereby reinforcing the authenticity and superior quality of food products.



The web interface of the ALLIANCE Blockchain app allows easy access to traceability information by entering the relevant Lot number found on the product package.

Information available includes any data recorded at each of the steps in the supply chain from farm to the grocery store, such as date and location of harvest and of processing, recorded storage temperature (if relevant), as well as any results of any DNA tests or chemical analysis to confirm the cultivar/variety.

Figure 1: Screenshots from the ALLIANCE Blockchain app user interface

ALLIANCE utilizes a permissioned blockchain model, where multiple organizations form a consortium to create the network. Access and permissions are governed by a predefined set of policies, which can be modified over time through consensus among the consortium members. Each participating organization contributes essential components, including clients, peers, and orderers.

The orderers collectively form the ordering service, serving as the network's administrative hub by managing the channel configuration. The channel acts as the communication conduit connecting all other components, including peers (responsible for maintaining blockchain copies) and clients (responsible for generating transactions).

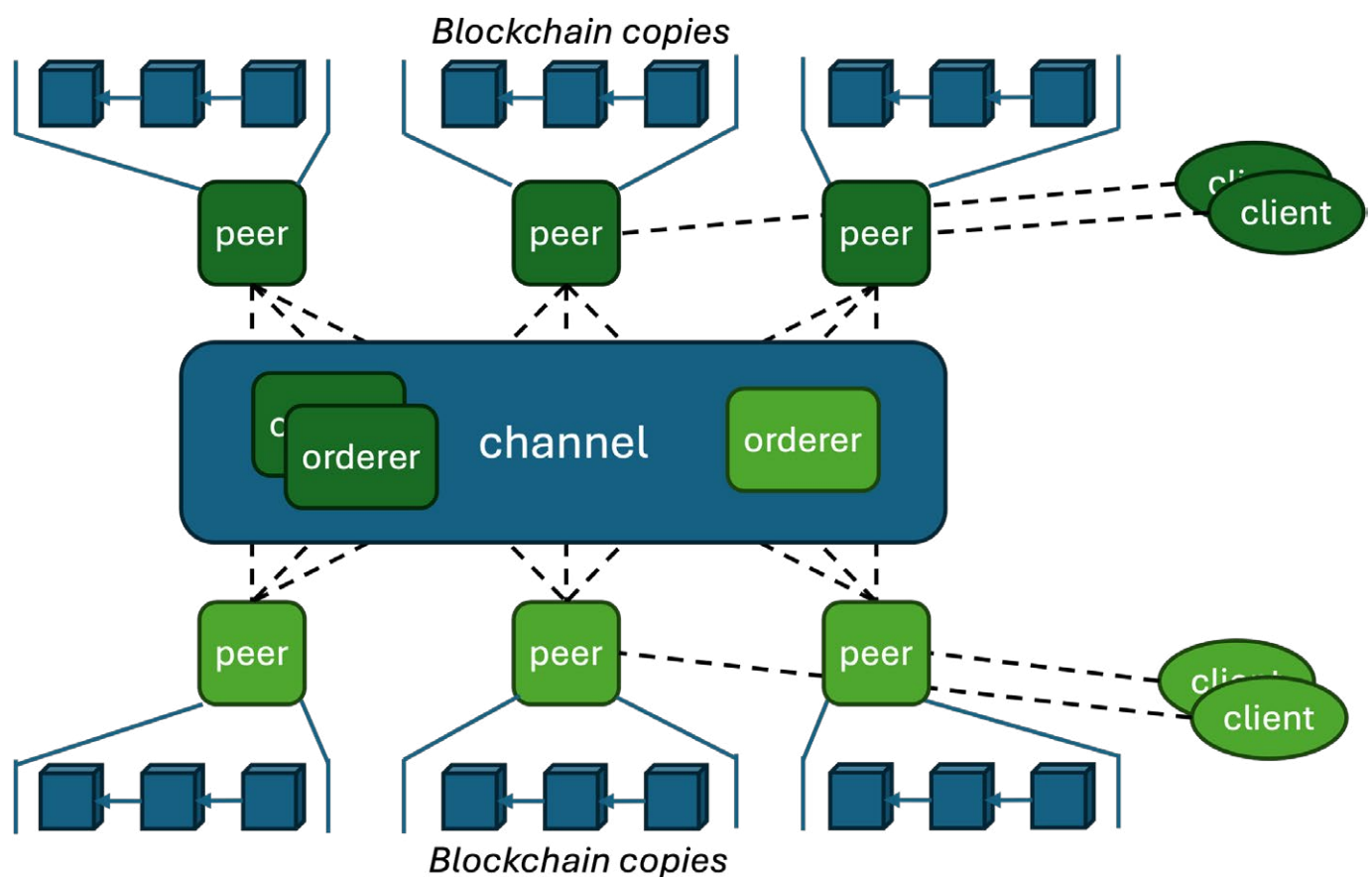


Figure 2: The Blockchain network of ALLIANCE

Each company operates as a distinct organisation in the Blockchain, deploying two peers per department for enhanced resilience against failures or component malfunctions. Each member takes on a specific role within the FSC, dictated by their company and department, utilising one of the two corresponding peers.

ALLIANCE's system efficiency relies on its Execution-Ordering-Validation mode for transaction flow, built with HyperLedger Fabric. Transactions follow a three-stage process: execution and endorsement by a subset of peers, insertion into the latest block of the blockchain by orderers, and final verification by all peers. Upon validation, consensus is achieved, updating the "world state"—a replicated system data set of key-value pairs segmented into modifiable "assets."

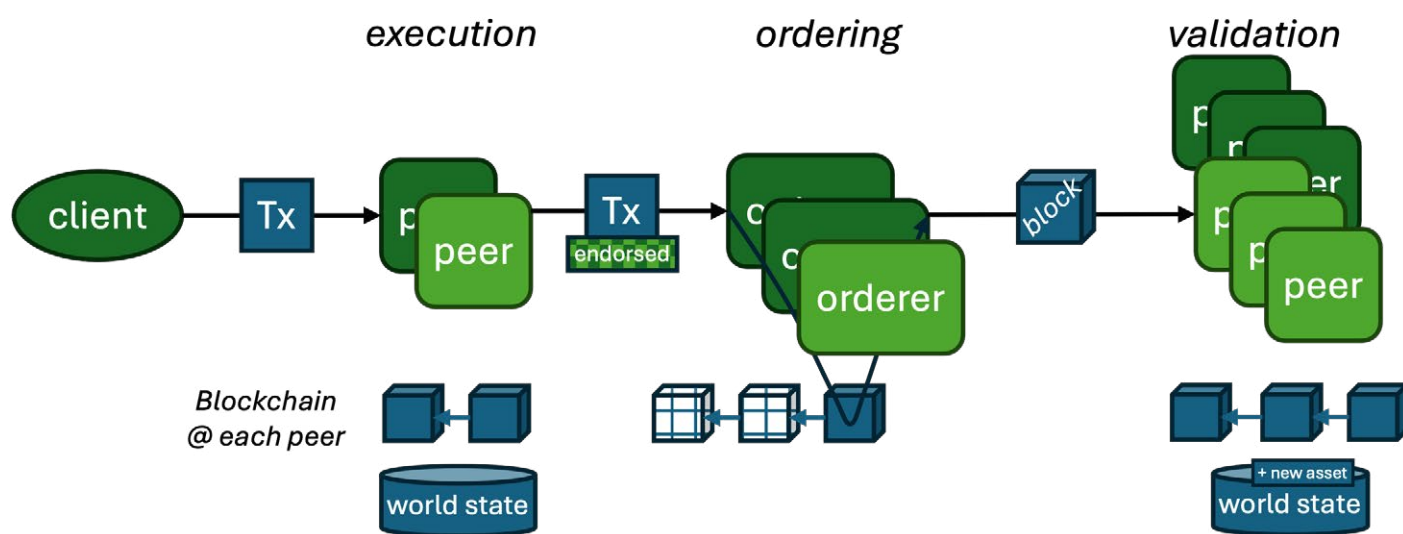
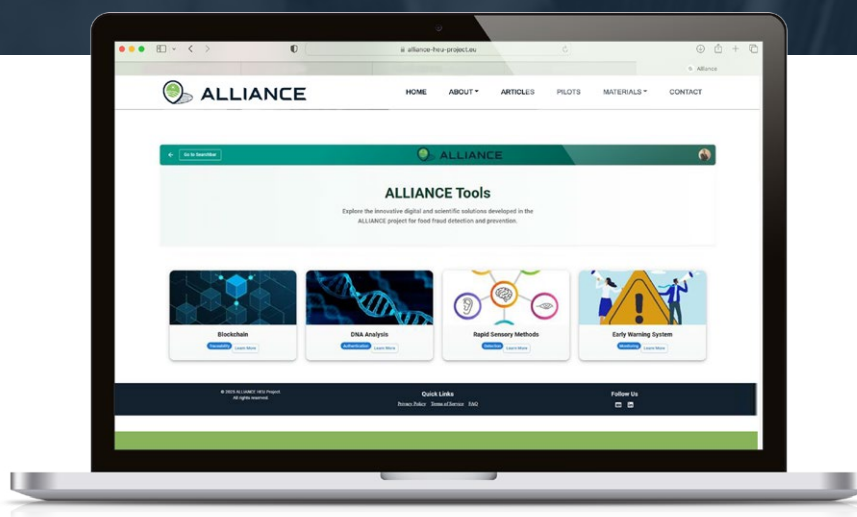


Figure 3: The transaction flow in ALLIANCE

RELEVANCE BEYOND ALLIANCE

The ALLIANCE Blockchain system has been piloted across the project's seven quality labelled Food Supply Chains, establishing comprehensive end-to-end traceability from producers to consumers, and contributing to the digital transformation of agrifood supply chains. Furthermore, Artificial Intelligence (AI) is emerging as a powerful complementary solution to Blockchain, as it could help address existing obstacles, such as ensuring data accuracy and system compatibility, while providing more robust solutions for enhancing food safety and preventing fraud.



The digital infrastructure of the ALLIANCE Blockchain app is scalable, and could be replicated in other food supply chains, and particularly:

- **Other quality-labelled foods:** The main focus of ALLIANCE are organic and PDO/PGI certified products, but blockchain is similarly relevant to products bearing other certifications such as FairTrade;
- **Perishable products** (e.g., seafood, frozen foods): Temperature readings and other environmental conditions such as humidity levels could be recorded at every transfer point, enhancing quality control and reducing spoilage.
- **Baby Food and Allergen-Sensitive Products:** The critical need for precise ingredient information and traceability for these products makes them ideal candidates for blockchain, ensuring safety and compliance for vulnerable consumers.
- **Ingredients for Processed Foods:** Tracking individual ingredients (e.g., specific spices, oils, or flours) used in larger food products could improve accountability for safety and quality within the broader food manufacturing sector.

In all cases, the successful implementation of a comprehensive blockchain solution necessitates **strategic collaboration among stakeholders, continuous technological refinement, and clear regulatory alignment** to fully realize its benefits and overcome the intricate management challenges inherent in traditional food information systems.



ALLIANCE

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ΓΙ
ΝΑΛ



Bavarian Health
and Food Safety Authority

ASINCAR



WISEFOUR

The World Bee Project



AGRICOLTORI ITALIANI
UMBRIA

EuroFIR
European Food Information Resource



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the European Union

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