ALLIANCE

A hoListic framework in the quality Labelled food supply chain systems' management towards enhanced data Integrity and verAcity, interoperability, traNsparenCy, and tracEability

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ALLIANCE in a nutshell

Topic

HORIZON-CL6-2022-FARM2FORK-01-04

Fair, healthy and environmentally-friendly food systems from primary production to consumption

Consortium

- 25 partners from 12 countries
- 5 x Research Institutes and Universities
- 7 x Industrial Organizations (LEs, SMEs)
- 5 x Associations
- 4 x Food Certification Authorities
- 2 x Retailers
- 3 Think Tanks and NGOs

Dates

- Start Date: November 1st, 2022
- End date: October 31st, 2025
- Duration: 36 months

Funding

- IA – Innovation Action
- ALLIANCE has received € 3 843 571,25 from European Union's Horizon Europe research and innovation programme under grant agreement No 101084188 (Total cost: € 4 408 546,25).

Aim

ALLIANCE will provide a holistic framework that **safeguards data intregrity and veracity**, enhances **traceability and transparency** and reinforces **interoperability** in quality labelled supply chain of organic, PDO, PGI, and GI food through innovative technology solutions and validate approaches.

How

Examining the food fraud landscape and proposing systemic solutions that move beyond current practices through novel cost-effective methods and tools that can detect adulteration on the spot and provide trusted quality labelled FSCs

- **Blockchain** for transparent and immutable transactions
- **Early Warning System** for Food Fraud Prevention
- **Advanced Spectroscopy** for Identification of Adulteration and Provenance of Food Products
- **Rapid Testing** for Authenticity Validation & Proof of Geographical Origin
- **Vulnerability Risk** Assessment

ALLIANCE Demonstration

7 quality-labelled Food Supply Chains in different countries

Pilots

- PDO/PGI Extra Virgin Olive Oil @ **Biocos, Italy**
- PDO Feta Cheese @ **Olympos, Greece**
- Organic Honey @ **WBP, France**
- PGI Faba Beans @ **ASINCAR, Spain**
- PGI Lika Potatoes @ **UPLK, Croatia**
- Organic Pasta @ **Alce Nero, Italy**
- PDO Arilje Raspberry @ **Original, Serbia**

ALLIANCE Consortium

Agricoltori biologici
dal 1978

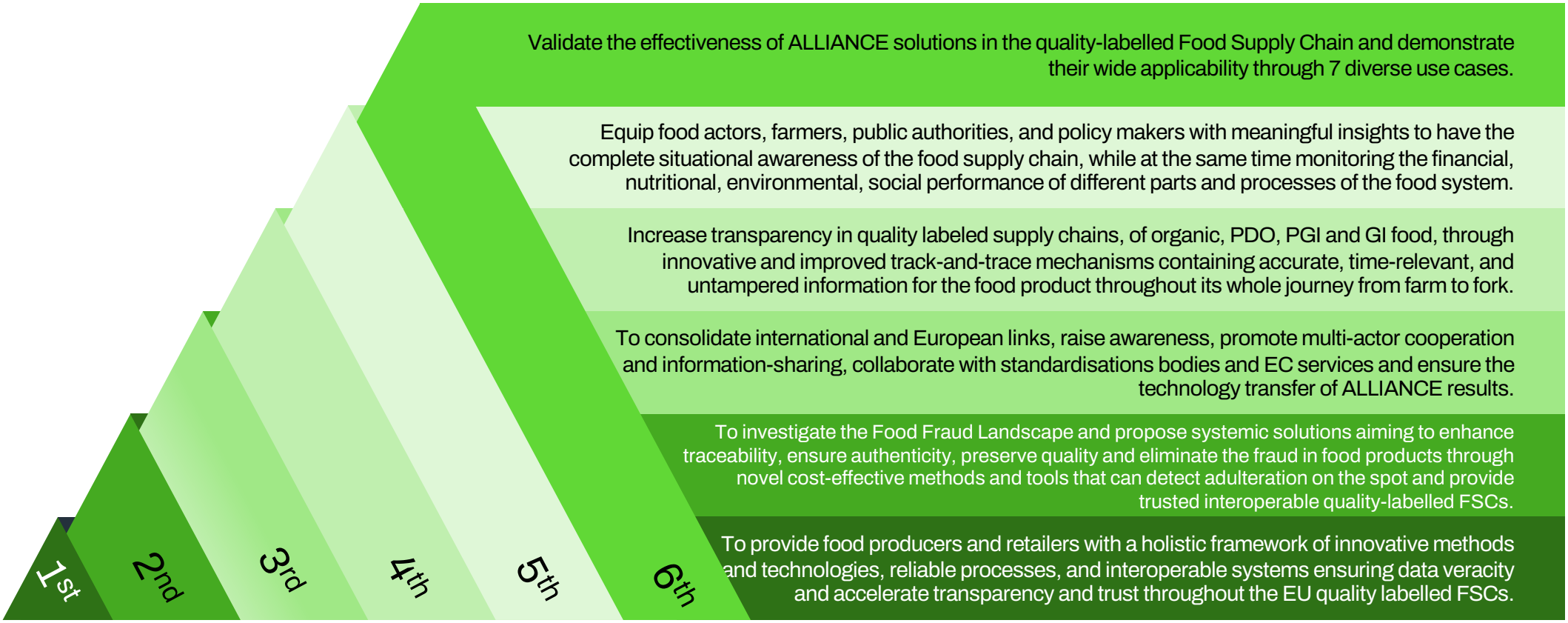
Expectations from the call

Topic

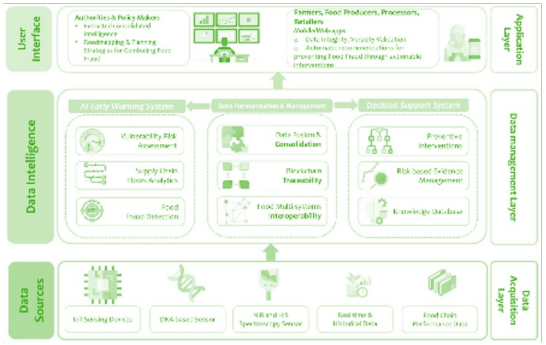
HORIZON-CL6-2022-FARM2FORK-01 04 - Fair, healthy and environmentally-friendly food systems from primary production to consumption

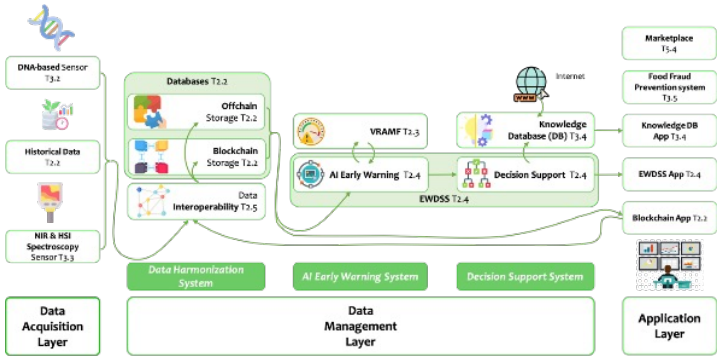
- Tools and field-deployable methods for rapid and cost-effective verification of claims related to quality-labeled food products
- Unlock potential of new technologies and business models for farmers, food businesses and policymakers enabling traceability and transparency
- Improved functioning of the control systems in EU and the EU's legislative framework for organic and GI food products.
- Increased data availability, interoperability and improved analytical capacity for enhanced traceability and transparency along
- Well-informed decision-making by farmers, food businesses and policymakers to improve climate, environmental, economic and social sustainability

ALLIANCE Objectives



ALLIANCE Architecture





Transition from the Concept Design to a Reference Architecture

Key Offerings

Blockchain Technology

Enhancing traceability with tamper-proof records, enabling transparency and verifying authentication of claims

AI Early Warning System:

Analyzing data performance metrics from various steps in the food value chain and detecting patterns and anomalies indicative of food fraud in real-time, offering timely decision making to food actors

Next-Gen Portable DNA Sequencing

For verification of the geographic origin of EVOO and honey correlating specific genetic markers confirming the authenticity of the product

Predictive Analytics

Forecasting future risks with historical and real-time data analysis and identifying high-risk areas to proactively countermeasure vulnerabilities in the supply chain

Advanced Spectroscopy

Providing precise, rapid, and reliable analysis of Faba beans, ensuring their authenticity and safety throughout the value chain

Digital Knowledge Base

Providing and sharing comprehensive information on food products, supply chain practices, and known fraud incidences, informing involved stakeholders and actors

Blockchain Technology

Transparency & Traceability

Allow food actors, policymakers, and consumers to trace validated information of food products from farm to table.

Immutability & Security

Once data is recorded in the blockchain, it cannot be altered, ensuring the integrity and security of information related to the quality and origin of food products.

Enhanced Trust & Confidence

Enhances trust and confidence among stakeholders by providing verifiable and immutable records of transactions.

Decentralization & Consensus

Ensure no single entity controls the data, making the system more transparent and secure.

AI Early Warning & Predictive Analytics

Real Time Monitoring

Continuous real-time monitoring of various parameters of the FSCs ensures that any deviations from the norm are immediately detected and addressed.

Risk & Vulnerability Assesment

Assess risks and vulnerabilities in the food value chain, identifying potential points of failure and enabling proactive measures.

Anomalies Detection

Detect anomalies in the food supply chain e.g., unexpected changes in typical performance parameters, allowing for timely intervention.

Informed Decision Making

Data-driven insights from AI enable informed decision-making, helping stakeholders optimize processes and improve food safety and quality.

Portable DNA Sequencing & Advanced Spectroscopy

Authentication of Claims
Ensures the authenticity of quality claims, such as GI, through DNA markers testing.

On Site Testing
Immediate verification of quality characteristics, reducing the time and cost against traditional testing methods

Source Verification
Verifies the source and origin of food products, ensuring transparency and trust in the supply chain.

Rapid Real Time Testing
Increased flexibility for authenticity assessment by food authorities and actors

Advanced Composition Analysis
provide detailed analysis of the nutritional and chemical composition of food products

In Situ Analysis
provide immediate results without the need for laboratory testing

Knowledge Database

Collaboration and Knowledge Sharing

Facilitate collaboration and knowledge sharing among researchers, producers, and regulators, driving innovation and best practices.

Comprehensive Information Repository

On food safety, quality standards, and regulatory requirements.

Continuous Updates and Improvements

Ensure timeliness with the latest research and technological advancements in food safety and quality.

Centralized Access to Data

Ensure that all interested stakeholders can have access to the information they need to maintain food quality and safety

ALLIANCE demonstrators (use cases / pilots)

7 quality-labelled Food Supply Chains in different countries

- The demonstrators will validate the effectiveness of the proposed solutions & demonstrate their wide applicability.
- Different types of food frauds and weaknesses identified in each of the 7 Food Supply Chains.
- Each use case will be tested with a variety of tools and technologies, such as IoT sensors, artificial intelligence, blockchain platforms, and fingerprinting techniques, to ensure food safety and prevent food fraud.

Demonstrator 1 – Olive Oil (BIOCOS)

Types of Fraud:

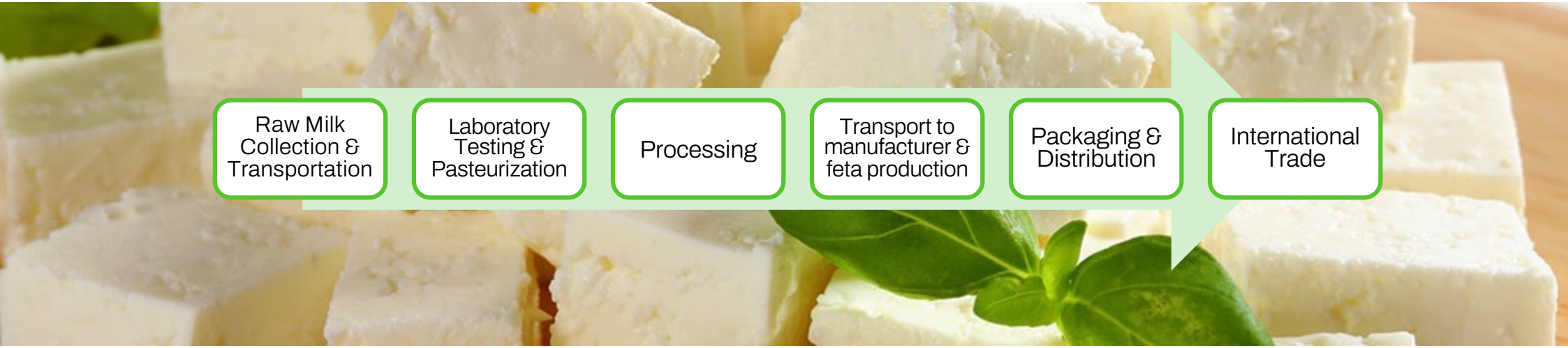
- Mislabelling
- Untrue Origin
- Substitution
- Dilution
- Counterfeit
- Theft

Identified Weaknesses

- Complex and fragmented supply chain with many stakeholders and opportunities for malicious intervention.

Proposed Solutions

- Portable DNA sequencing device for sample analysis on location.
- Olive material classification using trained ML/AI algorithm.



Demonstrator 2 – Feta cheese (Olympos)

Types of Fraud:

- Adulteration
- Dilution
- Mislabelling
- Unauthorised additives
- Counterfeit
- Theft

Identified Weaknesses

- External partners involved in transportation.
- No electronic record of sampling data (done by drivers).

Proposed Solutions

- Registration of milk information in blockchain platform.
- Digitalisation of traceability data.

Demonstrator 3 - Organic Honey (WBP,CIHEAM)

Types of Fraud:

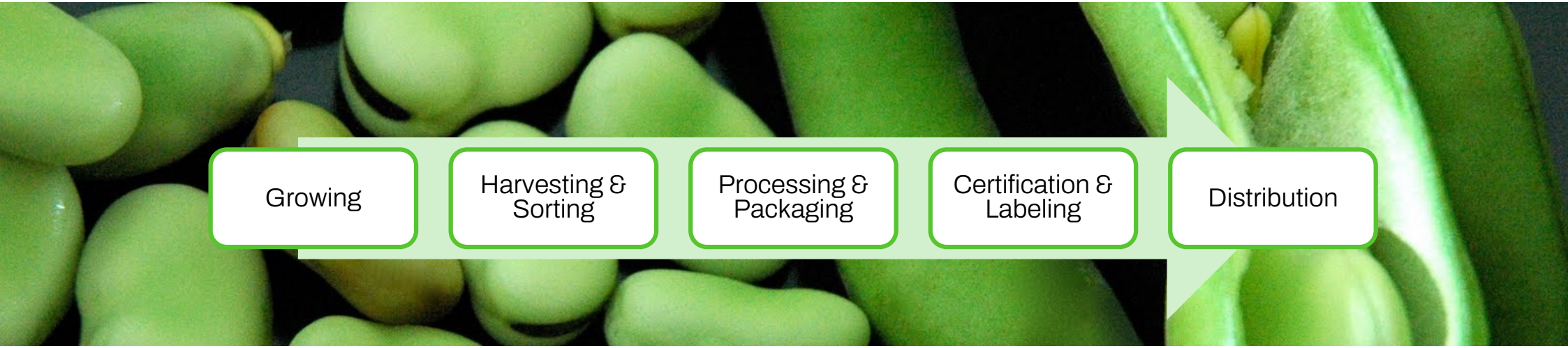
- Adulteration
- Mislabelling
- Contamination or mixing
- Counterfeiting
- Tampering/Diversion

Identified Weaknesses

- Honey packed outside of France loses transparent traceability.

Proposed Solutions

- In-hive sensors paired with manual data.
- Honey testing in commercial laboratories.
- Building of honey data database.
- Knowledge repository for honey food fraud.



Demonstrator 4 - Faba Beans (ASINCAR)

Types of Fraud:

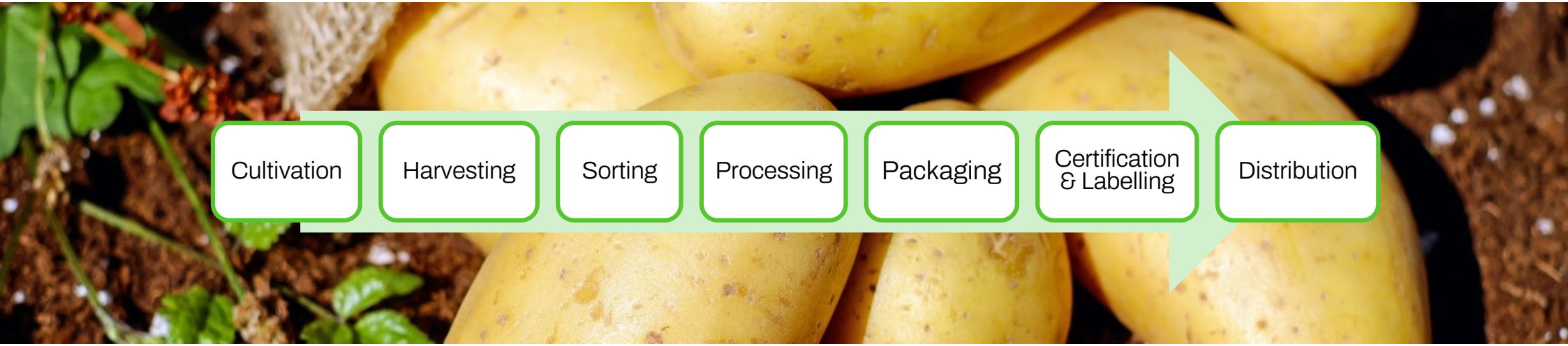
- Adulteration
- Mislabelling
- Origin Fraud
- Substitution

Identified Weaknesses

- Lack of authentication tools and objective measures.
- Manual data collection, yield readjustments.
- Lack of label traceability.
- “No control over the faba classifiers”.

Proposed Solutions

- Portable NIR device to detect bean mixtures.
- IGPFA process and document digitalization (privacy).



Demonstrator 5 – Lika Potatoes (UPLK)

Types of Fraud:

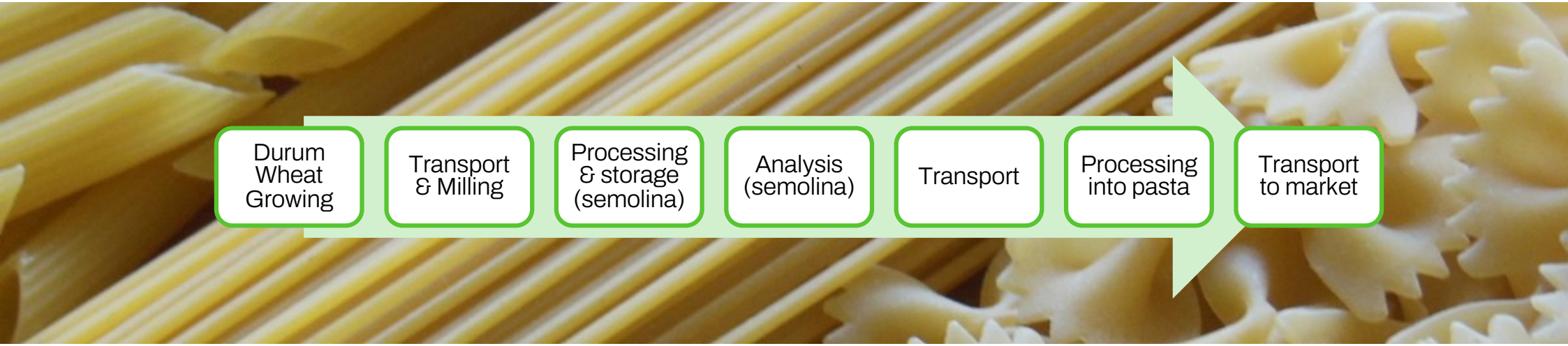
- Mislabelling of potatoes grown in other regions of Croatia as Lika potatoes.
- Mislabelling of imported potatoes as Lika potatoes.

Identified Weaknesses

- Missing verification outside of certification system (majority of producers).
- Traceability system based on paper or Excel; lack of further digitalisation.

Proposed Solutions

- Digitalisation of certification & introduction of blockchain.
- QR code for consumer use.
- Portable dry matter meter.
- Wireless sensor network for monitoring of storage conditions.



Demonstrator 6 – Organic Pasta (ALCE NERO)

Types of Fraud:

- Mislabelling in regards with organic label.
- Authenticity concerns of the specific durum variety.

Identified Weaknesses

- Pesticides in irrigation water, soil, and air.
- Many different suppliers.
- Different supply chain procedures in different parts of Italy.

Proposed Solutions

- System able to merge multi-residual analysis of finished product and raw material with data from AI/IoT sensors.

Demonstrator 7 – Arilje Raspberry (ORIGINAL)

Types of Fraud:

- Misidentification
- Addition of lower quality varieties
- Mislabelling

Identified Weaknesses

- Traceability is manual and relies on hard copy records and experiential knowledge

Proposed Solutions

- Traceability system digitalisation and automatization
- Development of more reliable methods for sensory analysis

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Thank you

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