



SPACE4GREEN

TRUSTED DIGITAL DATA SHARING

Trusted and GREEN traceability through EU SPACE Technologies

SPACE4GREEN Technologies & Pilots



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The Project

The SPACE4GREEN Project offers a technological solution that enables a trusted platform for stakeholders of various types, facilitating the automated certification that an activity has occurred or an object is present at a specific location and time, without the need for third-party human verification.

Through its six pilot trials, SPACE4GREEN demonstrates the effective integration of European Space Technology, including Galileo OSNMA and Copernicus Services, with blockchain and IoT innovations. The resulting solutions have proven effective in generating validated and secure data, facilitating reliable transactions and addressing key challenges in multiple sectors.

The Problem

Traditional verification methods in the Agrifood sector depend excessively on human intermediaries, introducing significant inefficiencies and a heightened risk of fraud. Additionally, current technological and market solutions lack the capability to accurately pinpoint geolocation, which complicates the traceability process.

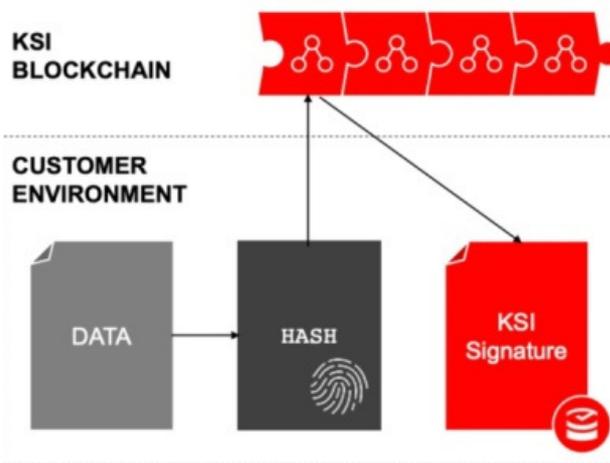
The Solution

The SPACE4GREEN project effectively addresses the aforementioned challenges by deploying advanced solutions that significantly enhance traceability and security throughout the supply chain, thereby streamlining processes and mitigating risks.



Our Technologies

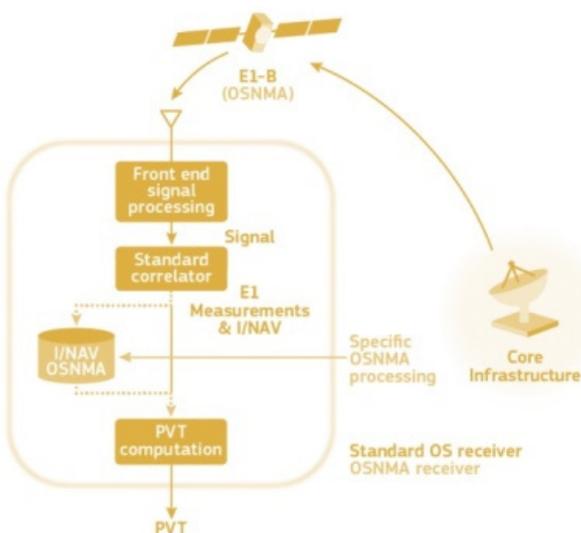
Blockchain



Blockchain is a distributed ledger record of events, an append-only record of events where each new event is cryptographically linked to the previous.

In Space4Green, KSI Blockchain is used as a trust anchor for creating an immutable chain of events in an agri-food supply chain, where all steps are independently cryptographically verifiable.

OSNMA



OSNMA is a security feature implemented in modern GNSS signals. OSNMA is designed to prevent the spoofing of GNSS signals by verifying the authenticity of the navigation messages.

OSNMA technology plays a critical role in SPACE4GREEN by safeguarding GNSS signals from spoofing, thus ensuring the integrity and authenticity of navigation messages which is crucial for accurate geolocation verification.



Pilot 1: Transparency, Traceability, and Trust in Local Food Production

This pilot, led by TC in collaboration with the Digital Innovation DIH AGRIFOOD, focused on integrating technologies within the Green Point Short Food Supply Chain (SFSC) in the Pomurje region of Slovenia. Green Point, established in 2013, serves as a key distribution center for locally grown vegetables, fruits, and other regional products, directly connecting over 70 local farmers with a wide range of consumers, including public institutions such as schools and hospitals, as well as private businesses like restaurants. The pilot project leveraged the existing operational framework of Green Point to introduce new technological solutions that enhance efficiency and traceability.

Applied Technologies

The blockchain solution allowed farmers and other stakeholders to generate digital certificates for food items, enabling consumers to verify product origin via QR codes. Each blockchain transaction recorded key details like timestamps, digital identities, and logistics data, with additional information such as certificates and photos stored on decentralized networks like IPFS or Swarm. Galileo's OS-NMA technology was used to authenticate location and time-stamped photos at various production stages, providing secure, traceable proof accessible to consumers.

Results

- 01 Improving of products' traceability, from the farm to the retail shelves.**
 - 02 Optimizing logistics and streamlines processes, reducing inefficiencies and delays.**
 - 03 Boosting consumer confidence in the Green Point SFSC.**
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Pilot 2: Enhancing Common Agriculture Policy Rules Monitoring and Auditing

The pilot, led by Cooperativas Agro-Alimentarias de Andalucía, integrated S4G technology to improve the processing of Common Agricultural Policy (CAP) aid files, benefiting over 641 cooperatives and 295,000 farmers. Running from March to October 2024, the project developed, tested, and deployed the S4G application, offering workshops to ensure smooth adoption. The successful implementation enhanced transparency and trust, with real CAP files tested and feedback incorporated for further improvement.

Applied Technologies

The pilot integrated blockchain technology to ensure the authenticity and traceability of photographs used in CAP aid processing, embedding images with KSI blockchain signatures to prevent alterations and certify timestamps. Combined with Galileo's precise geolocation data, the system provided verifiable proof of when and where crop photos were taken, enhancing transparency and preventing fraud.

Results

- 01 Reduction of CAP aid application processing times.**
 - 02 Tamper-proof and traceable photographs to their original source.**
 - 03 Blockchain's immutability prevented image manipulation, building trust among stakeholders.**
 - 04 Precise, verifiable geolocation data, enhancing the accuracy of documentation.**
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Pilot 3: Transparency and Traceability of Olive Oil

This pilot, led by PDO Aceite de Lucena, situated in the south of Spain (Córdoba), involving key stakeholders in the olive oil supply chain, implemented a control system to monitor the transportation, processing, and labeling of olives, ensuring product authenticity and real-time transparency. This pilot refined traceability mechanisms, enhancing consumer trust and setting the stage for broader adoption of these solutions in the olive oil industry.

Applied Technologies

The KSI Blockchain established a secure, immutable record of olive oil production events, documenting each transaction with a KSI signature and linking GPS information to provide a verifiable trail of authenticity. By using OSNMA-enabled devices and integrating Galileo technology, the pilot ensured accurate and secure geographic data, creating a tamper-proof record that enhanced supply chain efficiency and monitoring.

Results

- 01** A secure and immutable record of the olive oil supply chain was established.
 - 02** Robust location data, verifying both the geographical and temporal aspects of the olive oil's journey.
 - 03** Streamlined logistics operations enabled producers, and distributors to monitor olive oil transportation more accurately.
 - 04** Tamper-proof data for each transaction, significantly reducing the risk of fraud.
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Pilot 4: Traceability and Authenticity of Wine

The pilot in Cyprus's Commandaria region aimed to enhance the quality and marketability of local wines, focusing on grape varieties like Mavro, Xynisteri, and Maratheytiko, while ensuring compliance with PDO standards through the S4G app. By documenting key production stages with real-time data on grape transport, vinification, maturation and chemical analyses securely recorded on an immutable blockchain, the pilot fostered transparency and trust among farmers and consumers regarding the authenticity of Commandaria and other Cypriot wines.

Applied Technologies

Blockchain technology was integrated to create a secure, immutable record of each stage in the Commandaria wine production process, ensuring regulatory compliance and reducing administrative complexities for producers. The addition of Galileo technology enabled real-time location tracking of vineyard operations, optimizing activities like grape harvesting and transportation while promoting sustainable agricultural practices.

Results

- 01 Successful demonstration of compliance with PDO regulations.**
 - 02 Enhanced consumer confidence in the authenticity and quality of Commandaria and other Cypriot wines.**
 - 03 Improved management of vineyard activities resulted from real-time location tracking.**
 - 04 The pilot set a precedent for broader adoption of advanced traceability solutions in the Cypriot wine industry.**
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Pilot 5: Environmental Sustainability Index of Cotton production/Cultivation

The pilot led by ACP aimed to enhance the environmental sustainability of cotton production in Giannitsa, Greece, by developing and implementing the ESI module for systematic monitoring of key sustainability indicators. Through workshops and training sessions, local farmers were educated on using the ESI module to collect data on critical metrics like fertilizer usage, fuel consumption, and irrigation practices, enabling them to adopt best sustainability practices.

Applied Technologies

Blockchain technology was integrated to enhance the trustworthiness and integrity of data in cotton production by securely linking every farmer-submitted data point to a KSI Blockchain, creating an immutable record that ensures data authenticity and prevents alteration. The combination of Galileo signals with blockchain enabled automated verification of location and time data, allowing for high-resolution, geotagged photographs to document on-ground activities and crop conditions, thereby improving the credibility and traceability of sustainability practices in cotton farming.

Results

- 01 Successful assessment of key sustainability indicators, including water usage efficiency and soil health.**
 - 02 Structured and timely data collection facilitated the gathering of essential metrics supporting operational efficiency.**
 - 03 Improved transparency in the cotton supply chain resulted from stakeholders' ability to independently verify data integrity.**
 - 04 The success of the pilot established a framework for replicating the sustainability monitoring system in other agricultural sectors.**
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Pilot 6: Environmental Sustainability Index in Vineyards Cultivation

The pilot led by OMNIA in the Commandaria wine-producing region of Cyprus utilized the ESI module to comprehensive data collection and monitoring of sustainability metrics. By engaging local farmers, Zambartas Winery, consumers, and regulatory bodies through training sessions, the pilot enabled real-time tracking and verification of sustainability practices, significantly advancing environmental management and providing insights for optimizing vineyard operations.

Applied Technologies

Blockchain technology was integrated to securely sign and store data points related to fertilizer usage, irrigation practices, and pesticide consumption on a KSI Blockchain, creating an immutable record that prevents unauthorized alterations and enables independent verification of data integrity in the wine production process. Moreover, the use of Galileo signals ensured accurate location and timestamp information for vineyard activities.

Results

- 01 All data related to wine production remained immutable and secure.**
 - 02 Precise geolocation data, enabling reliable tracking of vineyard activities.**
 - 03 Successful collection and analysis of key sustainability metrics, including fertilizer usage, water consumption, and CO2 emissions.**
 - 04 Reliable data collected through the ESI module empowered farmers and winery managers to make informed decisions regarding vineyard management.**
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The Partners



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