MED Food TTHubs - Trace & Trust Hubs for MED Food

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0.10			

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Abbreviations

ACRONYM	DEFINITION
B2B	Business to Business
BLE	BLuetooth Low Energy
D2.2	Deliverable 2.2
D3.2	Deliverable 3.2
DOA	Description of Action
EFSA	European Food Safety Authority
ERD	Entity Relationship Diagram
GLN	Gobal Location Number
GTIN	Global Trade Item Number
HTTPS	Hyper Text TRansfer Protocol Secure
ICT	Information and Communication Technoloogy
IoT	Internet of Things
IP	Internet Protocol
LIDAR	Light Detection And Ranging
LoRa	Long Range
QR	Quick Response
TDD	Test Driven Development
TrceID	Trace Identificator
UI	User Interface
UML	Unified Modeling Language
UNECE	United Nations Economic Commission for Europe
WP	Work Package

Executive summary

This deliverable reports the technical design of the e-Platform supporting the implementation, monitoring and documentation of the Authentication and Quality Assurance Protocol that should lead to the development of Task 4.2 Software Development (beta version) and external pilot testing. The starting point has been represented by a in-depth analysis of previous project Deliverables released in WP2 and WP3 to capture needs and requirements able to guide the ePlatform definition and structure.

The design of the Med Food TTHubs **e-Platform** has the following objectives:

- To design and develop a user-friendly web-based platform based on a blockchain technology to support the traceability process, the authentication and quality assurance and the nutritional profile of Mediterranean food products;

- To design and develop 10 core modules that will support functions of the TTHubs e-Platform.

This deliverable is built on the following inputs:

- Deliverable 2.2 "Requirements analysis report";

- Deliverable 3.2 "Full-path traceability protocol";

- The e-Platform and modules presented in Table 1.

The following methodology was used to elaborate this deliverable:

- Analysis of the DOA, D2.2, D3.2 to extract technical requirements;

- Analysis of existing documentations related to already existing modules;

- Consideration of best practices on security measures and requirements prioritization.

This deliverable covers the following topics:

- **Business requirements** showing the result of the analysis of deliverables D2.2 and D3.2.

- **State of the Art** describing the main business and technical aspects of the alpha version of the e-Platform, the current software requirements, implementation status, and Integration status.

- **Software requirements** which details the software functional, operational and technical requirements specifications.

- **Software architectural design** which provide details concerning each different module and the interaction between the different modules as parts of the e-Platform. This description will be provided in terms of Work Flow and Data Flow Diagrams per role using swim-lanes approach.

- **Software detailed design** which describes the Functional units defined in the Software Architectural Design and further analyses the data structure of each module.

The development of the Med Food TTHubs platform will be release-based (alpha, beta, and final releases). For the implementation of the Med Food TTHubs e-Platform and the supporting modules, SCRUM and Test Driven Development (TDD) Agile methodologies are proposed.

1 Introduction

1.1 MED Food TT Hubs: context and Scope

The Med Food TTHubs is a funded project by the European Commission, PRIMA that seeks to support the implementation of full-path tracing practices through the distribution channel from seed to customer in order to achieve safer, more sustainable food products and open the opportunity for farmers, producers and exporters to compete in the European markets. Furthermore, the project seeks to establish seven Trace & Trust Hubs, which will form a permanent transnational network playing the role of a one-stop-shop for traceability and authenticity for 'added value' Mediterranean food products in each of the countries involved. Med Food TTHubs implements a **"Voluntary Scheme of Traceability (VST) of MED foods"**, as common protocol for the network of these Hubs, acting as a point of reference for the products of the different involved areas. This protocol includes detailed guidelines, audit procedures and KPIs in relation to practices and processes towards traceable, authenticated and of high nutritional quality products. In addition, an **e-Platform** will fully support the operation of the TTHubs. The dedicated web-based platform, will encompass a number of modules in order to:

1. Facilitate sharing of information across the whole food supply chain,

2. Support the documentation of traceability and authenticity,

3. Support the effective provision of more trustful processes for certification and quality control.

Ultimately, Med Food TTHubs vision is to support full transparency concerning the traceability and authenticity of Mediterranean food products towards the creation of an end-to-end trust-chain in the food sector.

The Med Food TTHubs **e-Platform** will be piloted focusing on Mediterranean food products as key points in the reform of tracing and authenticity procedures of traditional Mediterranean foods.

1.2 Purpose and scope of the Deliverable

This deliverable, D4.1 "Software Design", is the first Deliverable of the WP4, "Design & Development of an e-Platform for traceability and authenticity control"; it's associated to task 4.1.

The main objective of this Deliverable is to report the **technical design** of the **e-Platform** supporting the implementation, monitoring and **documentation of** the **Authentication and Quality Assurance Protocol** that should lead to the development of task 4.2 **Software Development (beta version) and external pilot testing**.

This Deliverable details, for the e-Platform and the modules indicated on the DOA:

- The **software requirements** description containing details about each module in terms of Epics /Use Cases.

- The **Software architectural design software requirements** in the form of:
    - workflow and data flow procedures;
    - activity and process flow diagrams, using Unified Modelling Language (UML)[1] and swim-lane approach;
    - Software functional, operational and technical requirements;

- The **Software detailed design** with:
    - Detailed behaviours and logical structure of each module;
    - Logical structure of databases and database fields;
    - Quality Assurance System to ensure uniformity between IT modules;
    - Technical details towards the implementation of the modules and the Platform.

1.3 Relationship with other tasks and WPs

This deliverable is built on the following inputs:

- Deliverable 2.2 "Requirements analysis report";

- Deliverable 3.2 "Full-path traceability protocol";

- The e-Platform and modules presented in Table 1.

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[1] https://www.uml.org/

Technology	Original Project/Partner	Starting TRL	Ending TRL
Farm App Module	GP/CERTH	5	7
IoT Module	GP/CERTH	6	7
Quality Module	UoP	5	7
Isotopic Profile Module	UoP	5	7
DNA Markers Module	CERTH	5	7
Nutritional Profile Module	UPM	6	7
External Tracing Module	ENG/TCA	6	7
Internal Tracing Module	ENG/TCA	6	7
B2B App Module	GP	6	7
Consumer App Module	GP	6	7
e-Platform	GP	6	7

Table 1 Med Food TT-Hubs project's Innovation potential

According to the DOA, this deliverable should specify the requirements for the Pilot version of the software and serve as input for task 4.2 "software development of (alpha version) & internal testing". Nonetheless, This deliverable speficies the design of the e-Platform and supporting modules for task 4.3 "software development of (beta version) & external testing due to the following timings:

- This deliverable 4.1 should be finished/delivered by month 18;

- Task 4.2 (software development of (alpha version) & internal testing) started on month 12 and should be delivered on month 20 of the project, giving only 2 months to integrate the specifications of this deliverable on the alpha version of the software;

- Task 4.3 (Software Development (beta version) and external pilot testing) should start on month 18, the month of when this deliverable is finished and the specifications can be integrated from the beginning.

As the software development progresses, due to the Agile methodology, it is expected that the specifications from Alpha version to the Beta version, and from the Beta version to the Pilot version changes with the stakeholder's feedbacks.

1.4   Outline of the report

This document is composed of the following sections:

Methodology describing the methodology followed in WP4 in general and the methodology followed to produce deliverable 4.1.

Business requirements showing the result of the analysis of deliverables D2.2 and D3.2.

State of the Art describing the main business and technical aspects of the alpha version of the e-Platform, the current software requirements, implementation status, and Integration status.

Software requirements which details the software functional, operational and technical requirements specifications.

Software architectural design which provides details concerning each different module and the interaction between the different modules as parts of the e-Platform. This description will be provided in terms of Work Flow and Data Flow Diagrams per role using swim-lanes approach[2].

Software detailed design which describes the Functional units defined in the Software Architectural Design, as well as the data structure of each module.

Conclusions.

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[2] https://www.smartdraw.com/swim-lane-diagram/

2 Methodology

2.1 Work package 4 methodology

As stated in the DOA, WP4's objective is to:

- "Design and develop a user-friendly web-based platform based on a blockchain technology to support the traceability process, the authentication and quality assurance and the nutritional profile of Mediterranean food products"

- "Design and develop 10 core modules that will support functions of the TTHubs and integrate them in the platform following interoperability standards".

WP4 follows SCRUM (scrum.org, 2021) and Test Driven Development (TDD) (Agile Alliance, 2021) Agile methodologies for the implementation of the Med Food TTHubs e-Platform and the supporting modules. The development of the platform will be release-based. WP4 consist of the following tasks:

- Software specification and design;

- Alpha version release;

- Beta version release;

- Final version release.

The tools and elements already developed by the technical partners involved in this project will be used for a more rapid development (see Table 1).

There is a particular concern regarding the interoperability with other EC projects, research infrastructures and initiatives. In particular, **it is predicted an integration of the TTHubs platform with the METROFOOD Research Infrastructure.** However, the METROFOOD Research Infrastructure is still in its early stages of implementation (starting at 2021 and ending at 2024), and the deliverables of this initiatives were not available at the moment of writing this document.

2.2 Deliverable 4.1 methodology

For this deliverable, we followed the methodology described below.

The first phase consisted of the analysis of the DOA, deliverables D2.2 (Requirement analysis report) and D3.2 (Full path traceability protocol). This analysis resulted in the business and

technical requirements, as well as to the development of user stories for the Software Architectural design.

Next, the analysis of the documentation of existing modules and e-Platform listed in Table 1 was performed. This step enabled the identification of the gaps between the gathered requirements and the implemented modules.

With more details on the implemented modules and e–Platform, the study of security measures was carried out. At the same time, there was a close collaboration with the team developing the alpha version of the modules and e-Platform with several meetings per week. These meetings served the following purposes:

- Analyse specifications from the previous analyses;

- Define the overall specifications that will be developed on the Alpha Version on top of the existing modules;

- Prioritization of the requirements for the development of the Alpha and Beta versions.

- Maintain an open communication channel for the leaders of Tasks 4.1, 4.2 and 4.3 to follow the evolution of the requirements analysis to further prepare/execute the tasks.

At the end, a final review was carried out.

3 Business requirements

As described in the Med Food TTHubs project DOA, this project aims at reforming the tracing and authenticity procedures of traditional Mediterranean foods and adding value to high quality food products, by providing:

- documented traceability of the whole "seed-to-shelf" supply chain;

- proofs of authenticity for final products and ingredients.

- detailed information on the nutritional profile of the product.

The DOA describes the overall project objectives and requirements. To achieve the project's objective, two deliverables were elaborated:

- D2.2, entitled "Requirements analysis report", which includes requirement needs of a step-by-step traceability system;

- D3.2, entitled "Full-path traceability protocol", which includes step-by-step guidelines for designing and applying full-path traceability processes internally and externally covering the whole food supply chain.

This chapter is dedicated to the business requirements of the Med Food TTHubs e-Platform. The DOA, D2.2 and D3.2 were analyzed and the business requirements for each document is listed in the next subsections.

3.1 Business requirements from DOA

As stated in the DOA, the solution that Med Food TTHubs brings is geared to achieve:

- Safer and more sustainable Mediterranean food products for people around the world;

- Full transparency concerning the traceability and authenticity of these products towards the creation of an end-to-end trust-chain in the food sector.

To this end, several business requirements must be met. The analysis conducted on the DOA enabled the extraction of the following requirements for the e-Platform and the supporting modules:

- Must guarantee food quality and safety;

- Should collect and store all product data relevant for authenticity purposes;

- Should collect and store all product data relevant for traceability purposes;

- Should show relevant traceability information for supply chain participants;

- Should show relevant information regarding the product authentication;

- Should show food information related to food components;

- Must guarantee privacy of traceability information for entities not participating in the supply chain;

- Must ensure data security through the use of blockchain technology;

- Must support several popular reader/sensor technologies;

- Must support interoperability with other systems.

These requirements are further supplemented/developed in deliverables D2.2 and D3.2 and are described next.

3.2 Business requirements from Deliverable 2.2

Deliverable 2.2, "Requirements analysis report" is the final deliverable of Work Package 2, "Critical analysis and requirements analysis of traceability and authenticity control system" who's objectives are:

- To map in detail the whole current status in the involved countries concerning the level of traceability and authenticity controls in the food sector;

- To understand the full range of needs of the markets and the consumers concerning traceability and authenticity information sharing in the supply chain of food sector.

D2.2's objective is to "lay the foundation for the design of the project platform providing high level and business requirements for the e-Platform beta version". As described above, this deliverable includes requirement needs of a step-by-step traceability system.

The analysis conducted on D2.2 enabled the gathering of the following business requirements:

- The e-Platform must support full transparency concerning the traceability and authenticity of Mediterranean food products;

- The e-Platform must provide full transparency concerning the traceability and authenticity in the food supply sector;

- The e-Platform must enable the creation of standardized approaches to food production processes and location identification, transparent monitoring procedures and innovative business partnerships;

- The e-Platform must enhance the documentation of products' traceability and authenticity by including nutritional profiles of Mediterranean food products;

- Through the Consumer App module, consumers from around the world must be able to access detailed and accurate product information.

- The e-Platform must act as a common interface for the involved in the Mediterranean food-industry stakeholders

- The e-Platform must support the implementation, monitoring and provision of Authentication and Quality Assurance Protocols and certifications concerning the entire product lifecycle in order to improve market and consumers' confidence.

3.3   Business requirements from Deliverable 3.2

Deliverable 3.2, "Full-path traceability protocol", is the final deliverable of Work Package 3, "Development of integrated framework for traceability and authenticity control of Mediterranean food products", who's objectives are:

- To develop a Common Authentication and Quality Assurance Protocol based on genetic and genomic approaches, on isotope analysis and on quality control from farm to self;

- To develop a full-path Voluntary Scheme of Traceability for MED foods based on documented authentication of products using the genetic and genomic data along with the isotope analysis data.

D3.2 aimed to fulfil the following objectives:

- To "develop a Common Authentication and Quality Assurance Protocol based on genetic and genomic approaches, on isotope analysis and on quality control from farm to shelf."

- To "develop a full-path Voluntary Scheme of Traceability for MED foods based on documented authentication of products using the genetic and genomic data along with the isotope analysis data."

- To deliver "step-by-step guidelines for designing and applying full-path traceability processes internally and externally covering the whole food supply chain. The system will be fully compliant with GS1 standards (GS1, 2021) and it will support internal (within place of food handling or process) as well as external (between different parties of the supply chain) traceability."

As described above, this deliverable includes step-by-step guidelines for designing and applying full-path traceability processes internally and externally covering the whole food supply chain.

The analysis conducted on D3.2 enabled the gathering of the following business requirements:

- The e-Platform and supporting modules must support the full-path tracing traceability system that will support all stages process of food traceability (Identification, Capturing, Evaluating, Sharing);

- The e-Platform and supporting module must be fully compliant with GS1 standards;

- The e-Platform and supporting module must enhance the identification, traceability and detection of any fraud to protect consumers and producers and also increase the value of the product.

- The e-Platform must help prevent fraudulent attempts that pose a risk to consumer health as they can cause toxicity and allergic episodes but also attempted financial fraud.

- The e-Platform and the supporting modules must enable the combined use of the genetic identity-DNA and the isotopic footprint, in order to simultaneously identify the uniqueness of the product based on DNA and the place of production based on isotope ratios.

4 State of the art ("AS-IS") of the e-Platform and supporting modules

According to the DOA, Med Food TTHubs project acts as a hub of existing infrastructures. The following laboratories will be connected to our project:

- **Plant Production laboratory (UoP):** offers integrated services concerning the identification of Geographical Origin of Agricultural Products using determination of stable isotopes ratio. More information can be found on the following website: **http://www.deapt.upatras.gr/en/research/laboratories/plant-production.**

- **IWaterFood – Molecular Center of Food and Water Quality (UoP):** An innovative laboratory that is specialized in molecular identification of DNA / RNA viruses, parasites, bacteria and fungi. More information can be found on the following website: **http://www.iwaterfood.gr/en/.**

- **M2Q (TCA-ENG):** A public-private laboratory to perform R&D initiatives in the field of agro-industry, specially in order to support SMEs by facilitating their access to large retailers and international markets, through support for innovation in products and processes, qualification and certification of commodity production, and promoting environmental sustainability of production.

The following platforms/modules were already built and will be further developed into the modules presented in the DOA:

- **Kalathos (GP):** A web platform (www.kalathos.net), which aims to facilitate online business-to-business collaboration (B2B) between growers and traders concerning focusing on traceability and quality from farm to fork.

- **TRACEBACK (TCA-ENG):** An Integrated solution to traceability in food supply chains and companies, while specifically addressing the tomato and feed-dairy products and sectors. The reference architecture for this Traceability Information System (RATIS) provides a specification for collaborative and distributed service-oriented traceability information systems. For more information, please visit the following website: **https://cordis.europa.eu/project/id/36300.**

- **SAFE&SMART (ENG):** An information platform based on service oriented, multichannel and multidevice architecture, to guarantee the integrity of the milk chains and their traceability. For more information, please visit the following website: **https://www.eng.it/en/case-studies/safesmart-liot-per-la-sicurezza-del-cibo.**

4.1 Main business and technical aspects of the alpha version of the e-Platform

In this section we describe the state of the art (at the moment of writing) concerning the Alpha Version implementation of the e-platform and modules.

4.1.1   Med Food TTHubs e-Platform and integrated B2B and Consumer App Modules

The Kalathos platform will serve as the basic infrastructure for the development of TT-Hubs e-Platform, and it already has built in functionalities for the B2B App Module and the Consumer App Module.

The Kalathos platform was created to deliver appropriate conditions for more fair prices for the producers by widening the selling opportunities through the creation of the appropriate environment for a unique placement of quality products in the European and global market.

The web platform is accessible via the following webpage: www.kalathos.net (see Figure 1). By using the search field, the user may search for offered products by typing either a product family, a variety or a trademark. The platform operates a smart auto-filtering process based on the provided keywords and it returns the results. Through this page an unregistered user may also submit a request for specific products by asking for specific quantities.
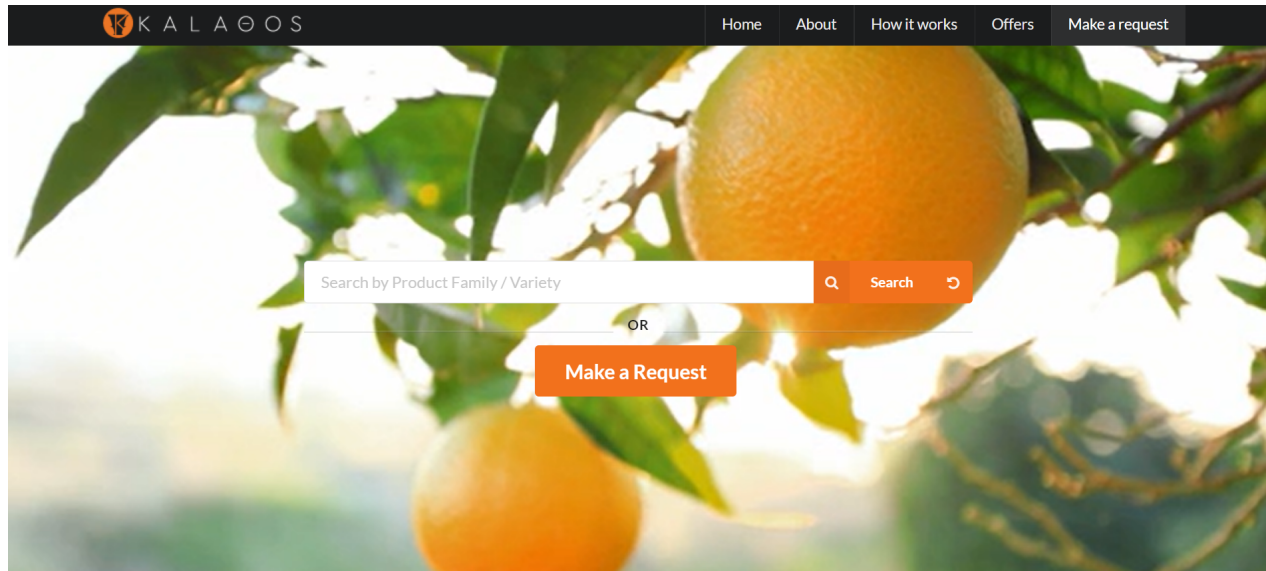
Figure 1 Kalathos webpage at www.kalathos.net

Without login, the user will be able to filter the results of the available products, as shown in Figure 2, by specifying specific requirements such as varieties, trademark, sizes, origin, quality certifications. The user may also submit a new search for products, having the same functionality for smart auto-filtering.
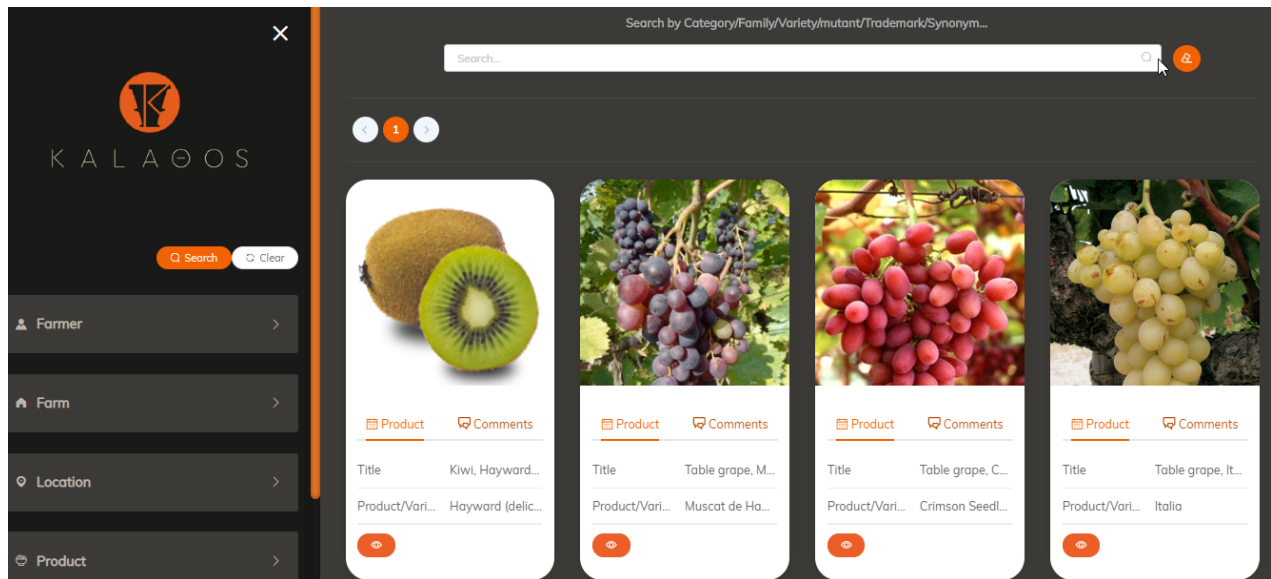
Figure 2 Kalathos page for finding product

For unregistered users the provided information is limited. More detailed information per offered product is provided to registered users. After login, the user can browse through the details of a specific product (see Figure 3) such as the seller, the specific area and cultivation farms, the expected harvesting period, the quality certifications of the products and other information concerning the products. Furthermore, the registered user may search and find on the map cultivation farms per product (see Figure 4) and even find the details of each farm (Figure 5), which includes data concerning the crop history about cultivation applications that have been undertaken at each farm. Photos of products and cultivations are also provided in the platform.
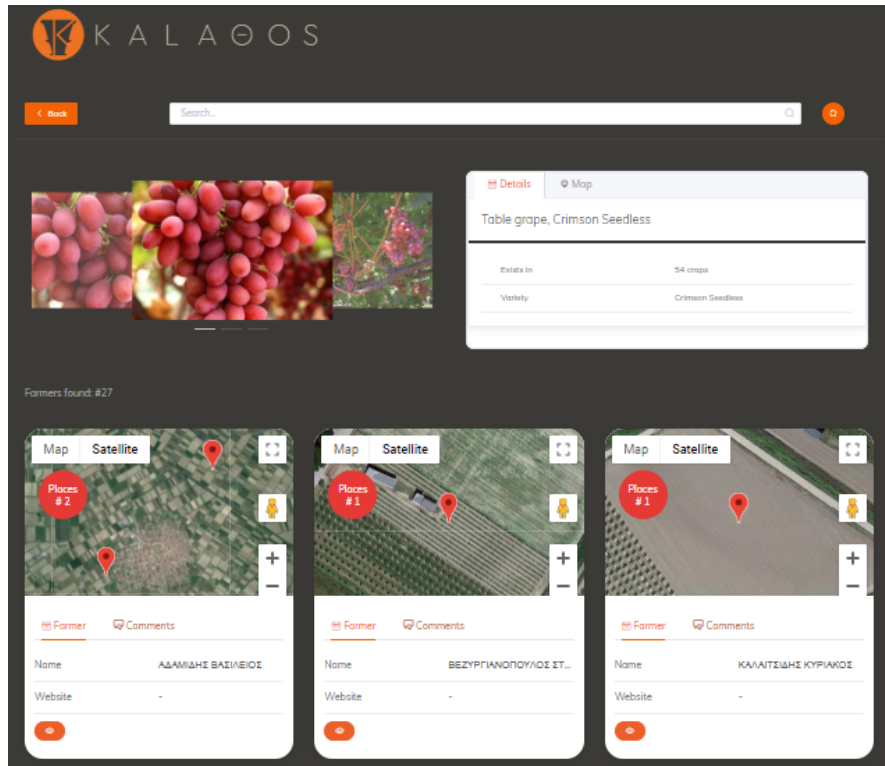
Figure 3 Kalathos page with product details
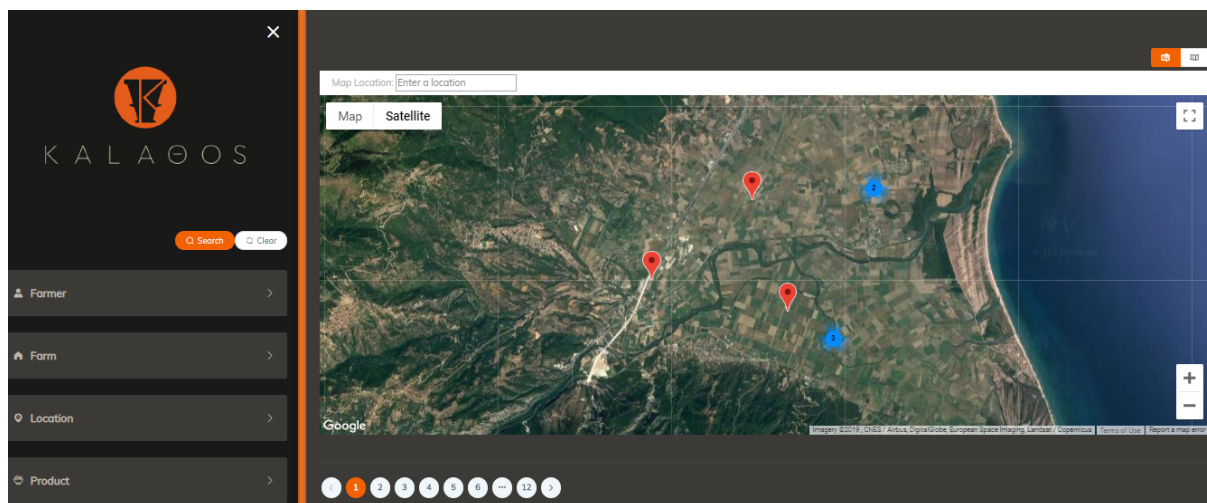
Figure 4 Kalathos page for finding farms per product
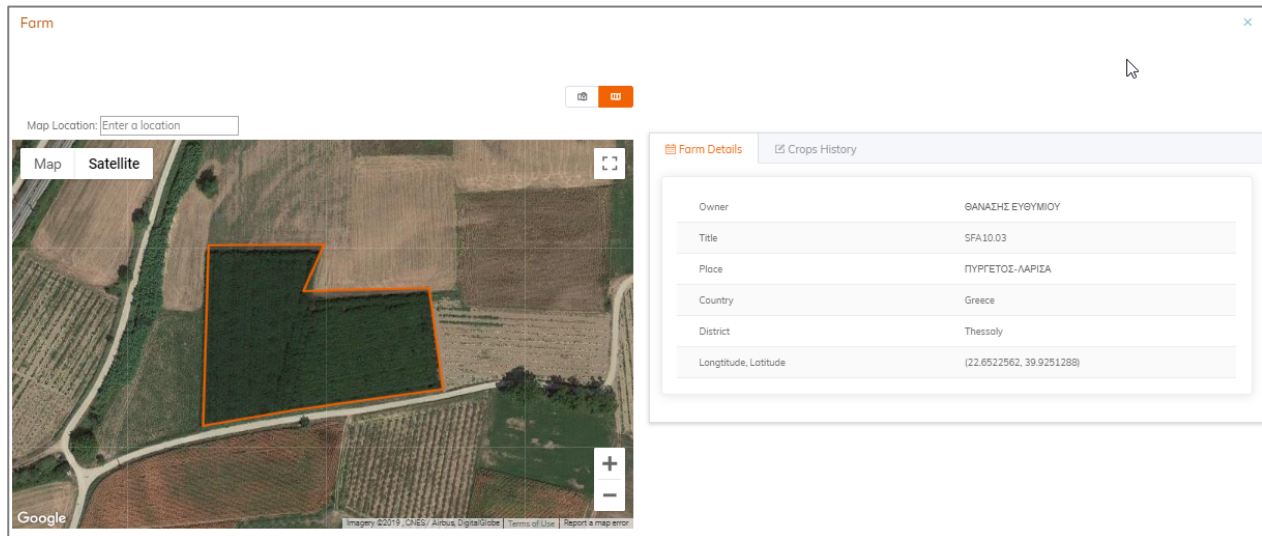
Figure 5 Kalathos page with details of farm

At its current version Kalathos fulfills the following business Requirements:

- The platform supports the implementation and the documentation of comprehensive quality systems concerning the entire fresh product lifecycle;

- Also supports the implementation of full-path tracing through the whole distribution channel from farm to trader;

- The platform provides information concerning attributes that are required by consumers for fruits and vegetables, such as food safety and traceability.

Part of the Kalathos infrastructure is the **B2B App Module**, which delivers food product offerings capabilities, enabling farmers to submit offers, and users to find open offers, see details of offer and to place an order. It enables buyers to:

- See an overview of the active offers, requests for offers and selling contracts (Figure 6);

- Search for and find offers by using specific criteria concerning the parameters of the offers such product details, growing method (e.g. organic), price ranging, availability period (Figure 7)

- Browse the details of products including the cultivation area and the deadline for placing an order or for submitting a counteroffer (Figure 8);
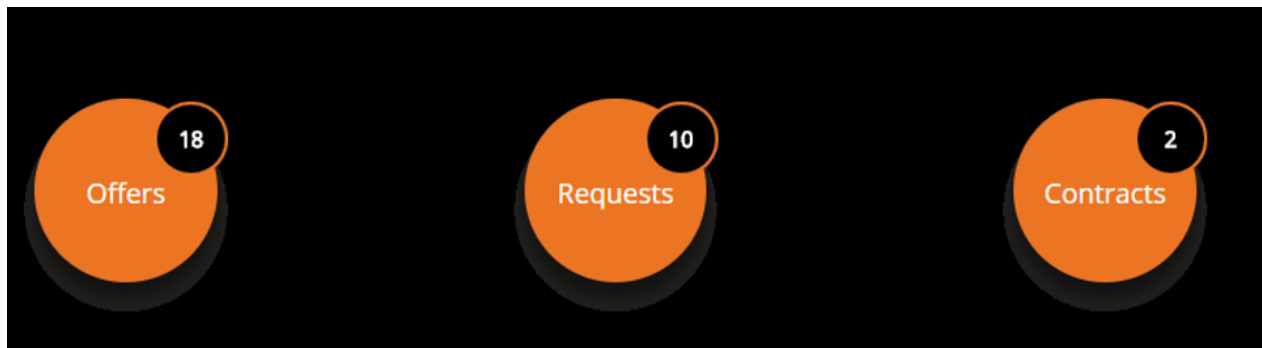
Figure 6 Kalathos page for searching and finding offers
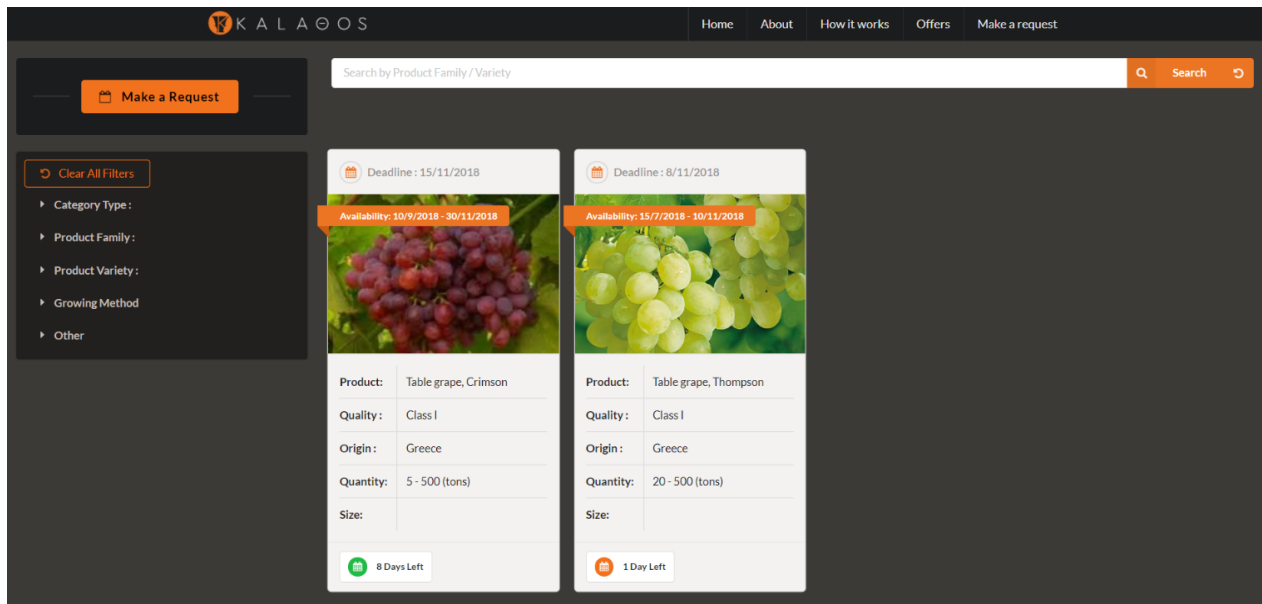
Figure 7 Kalathos page for searching and finding offers
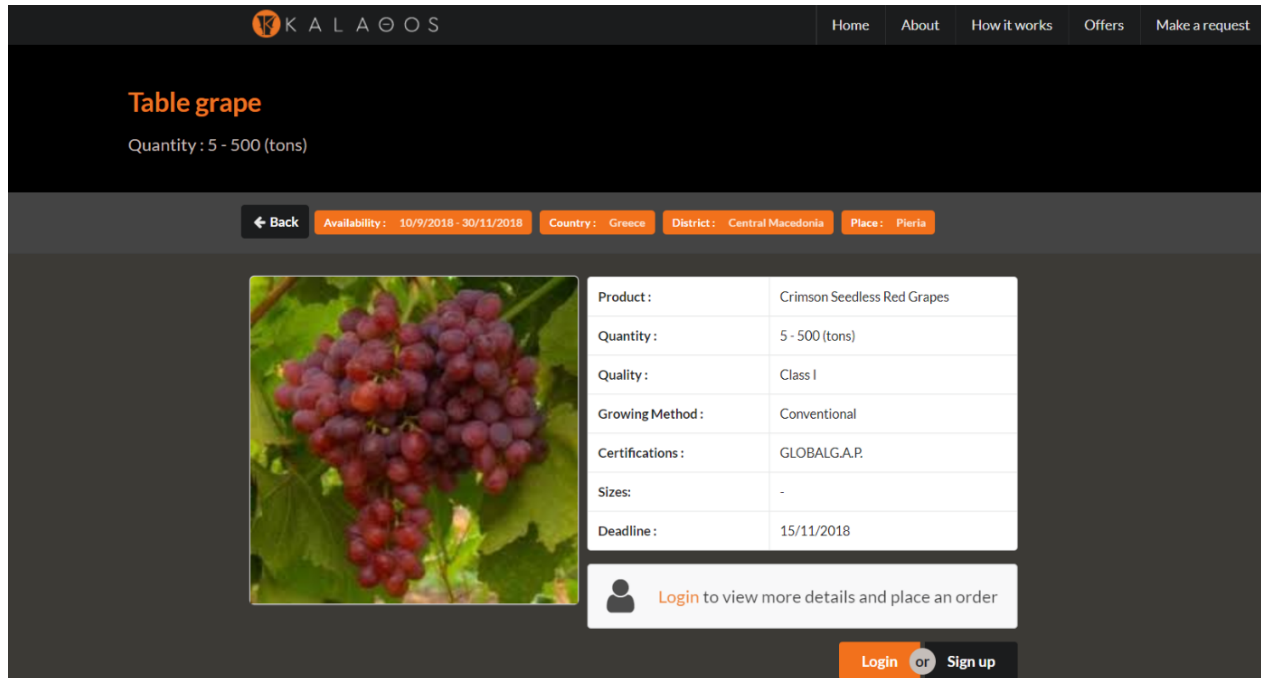
Figure 8 Kalathos page with offer details

After login the buyers have access to more details concerning the active offers. More specifically the users may:

- See more details for each offer and for placing orders(Figure 9);

- Browse through offering details, with the possibility to order or counteroffer (Figure 10);

- Browse through products certifications and logistic information, with the possibility to order or counteroffer (Figure 11 and Figure 12);

- Browse through the seller information regarding an offer, with the possibility to order or counteroffer (Figure 13).
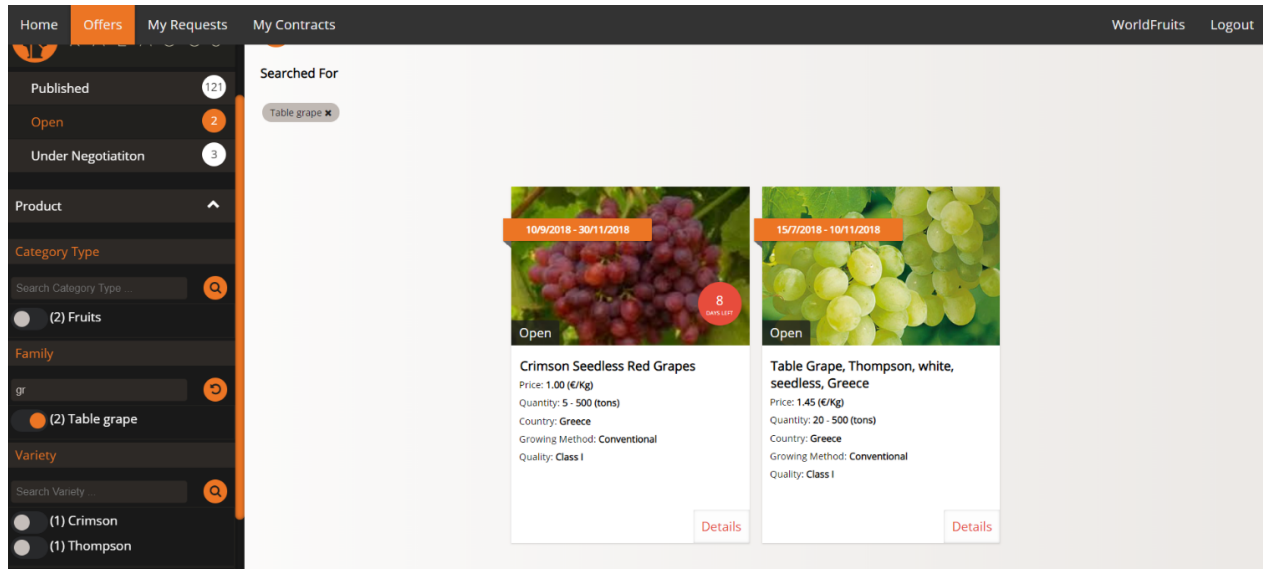
Figure 9 Kalathos page for placing orders
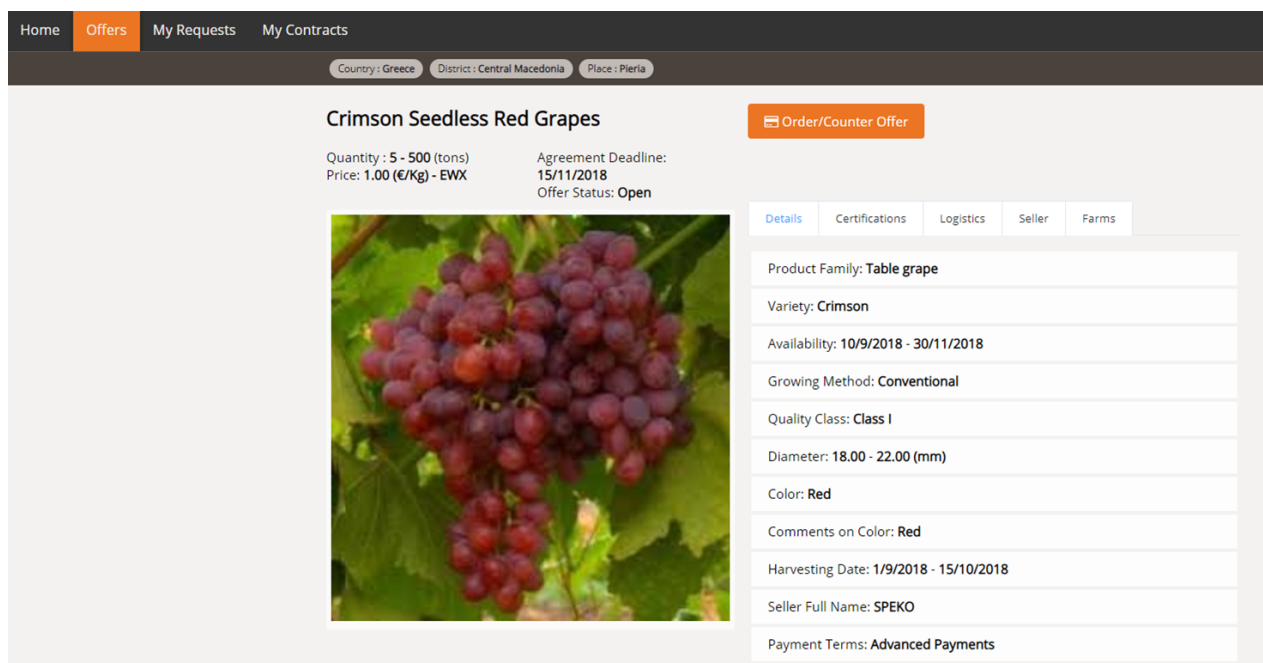
Figure 10 Kalathos page with offer details with the order/counter offer button
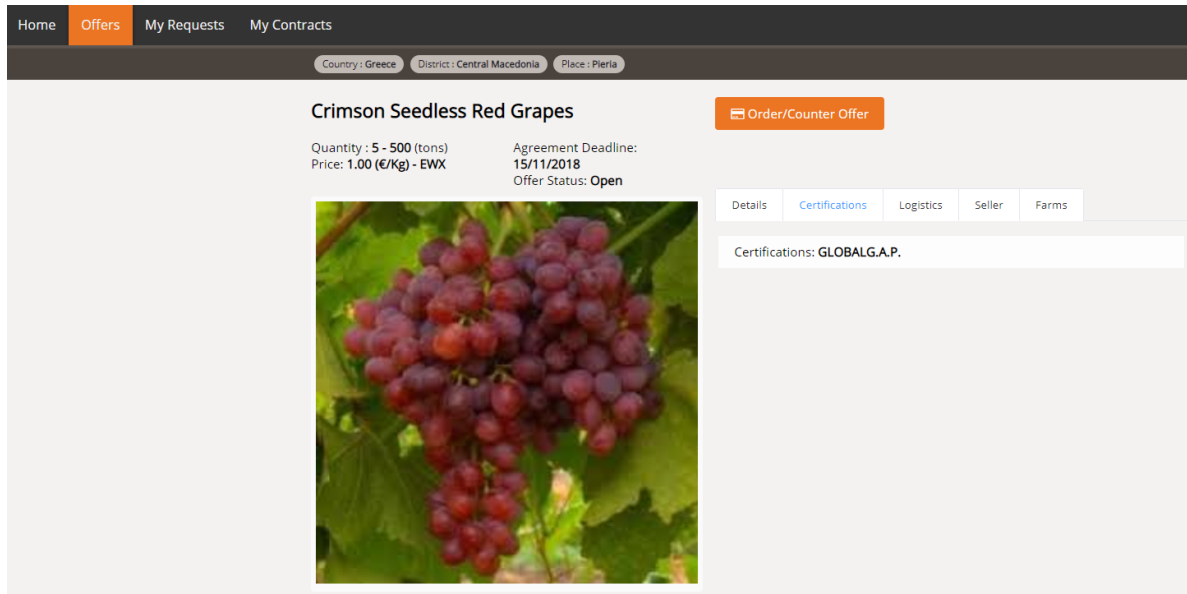
Figure 11 Kalathos page with offer product certifications with the order/counter offer button
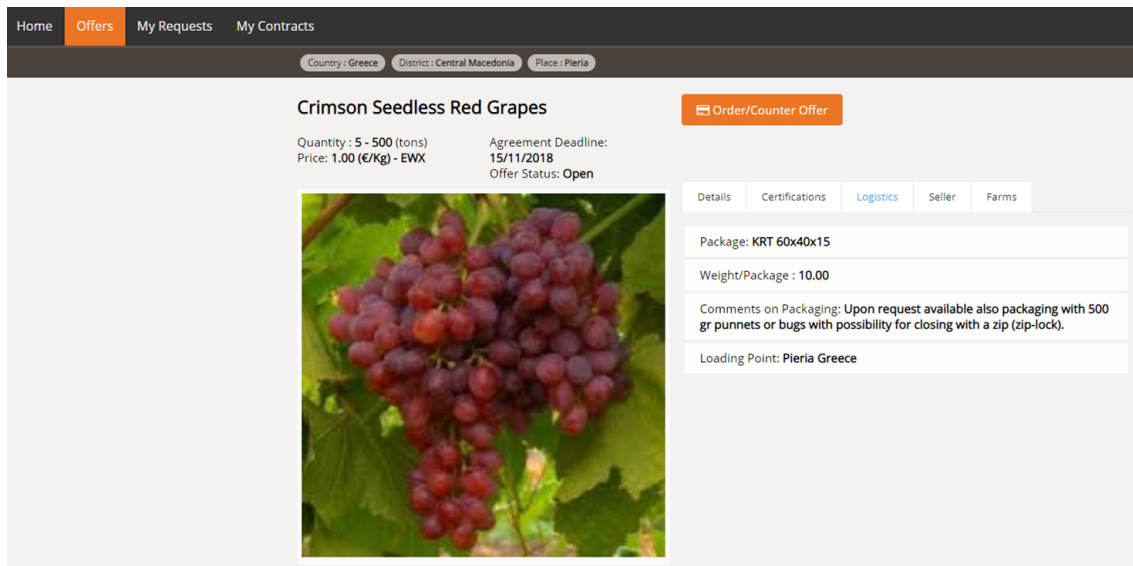
Figure 12 Kalathos page for logistics information regarding a product with the order/counter offer button
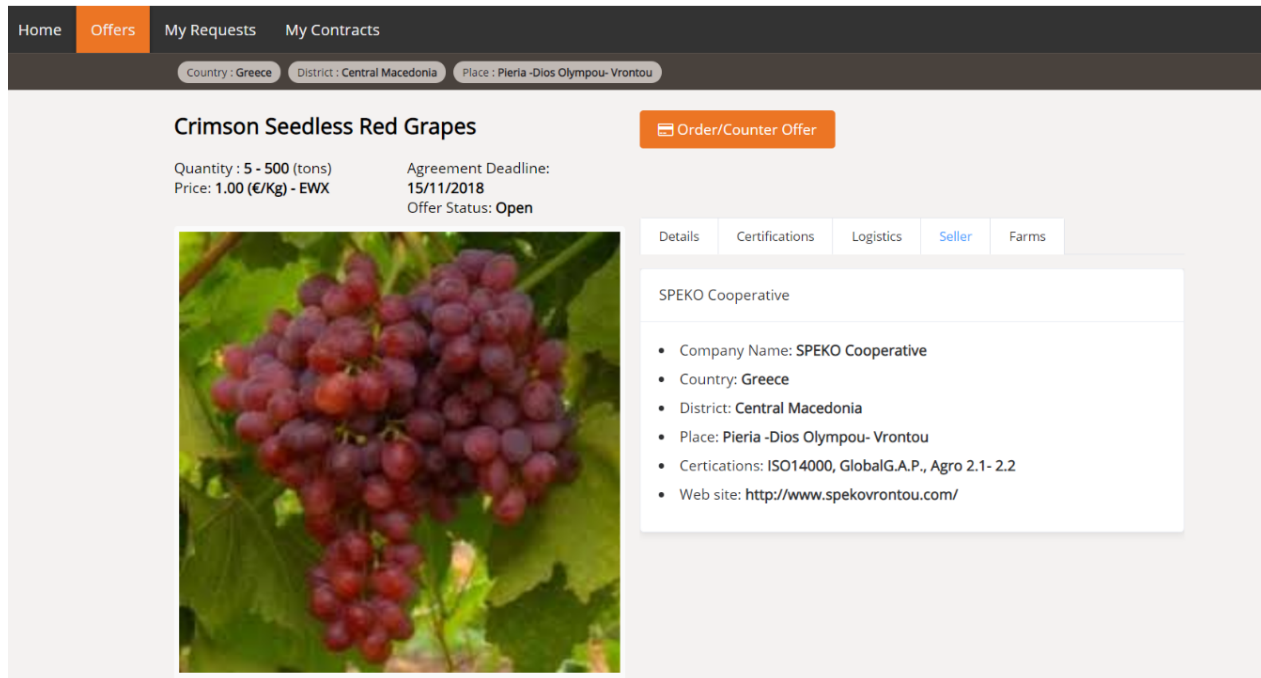
Figure 13 Kalathos page with seller information regarding an offer with the order/counter offer button

Based on the roles that each user has, different capabilities are offered. The sellers for example can:

- Create a new farm crop by providing information concerning the cultivated product, the cultivation period and other details (Figure 14);

- Create a new product instance that will be part of an offer (Figure 15). The product instance refers to a specific crop, having a timestamp concerning the harvesting and the packaging/processing events, details concerning the packaging and other logistics-oriented information. After entering the main information the app provides to the user a functionality which supports the user for the creation and assigning of a LOT number to the specific product instance.

Figure 14 Creation of new farm crop

Figure 15 Creation of Product Instance

Through the current version of the **Consumer App Module**, by using the QR code or Beacons (BLE[3]) at stores (Figure 16 and Figure 17), consumers can access:

- The product's information and tips (Figure 18 and Figure 21);

- The product's nutritional specifications, including personalized nutritional facts (Figure 20);

- The product's exact route from farm to shelf (Figure 19);
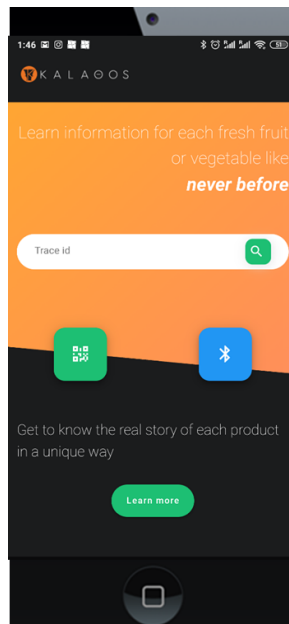
Figure 16 Consumer app module on search page per trace ID

Bluetooth beacons are hardware transmitters - a class of Bluetooth low energy (LE) devices that broadcast their identifier to nearby portable electronic devices. The technology enables smartphones, tablets and other devices to perform actions when in close proximity to a beacon. Bluetooth beacons use Bluetooth low energy proximity sensing to transmit a universally unique identifier picked up by a compatible app, by Consumer App in this specific use case. The identifier and several bytes sent is used to determine the device's physical location and the product which

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[3] BLE: Bluetooth Low Energy - https://www.silabs.com/documents/public/user-guides/ug103-14-fundamentals-ble.pdf

is associated to the device. So, when the user of the app receives a notification in a retail shop from the beacon which is close to user, he/she is informed about the products that are placed in this area of the store. Alternatively, the user may scan a QR on the label of the product or on the package. Furthermore, the user may enter directly in the app the TraceID which is connected to a LOT of a specific product.

Figure 17 Consumer app module on search recurring to Beacons (BLE) on stores

When the user selects to scan for beacons a new screen is shown where the user shall explicitly ask the app to scan for nearby products (actually beacons) (Figure 17).

Detailed information about the specific product which was selected by the user to be explored is provided (Figure 18). This information is about the generic product and not about a specific instance of the product (LOT). Detailed information about a specific LOT of a product is provided in the Story screen (Figure 19). This information includes the producer with link to its web page, the cultivation farm with link to google maps, farms records, LOT number, logistics information concerning the transport, etc.
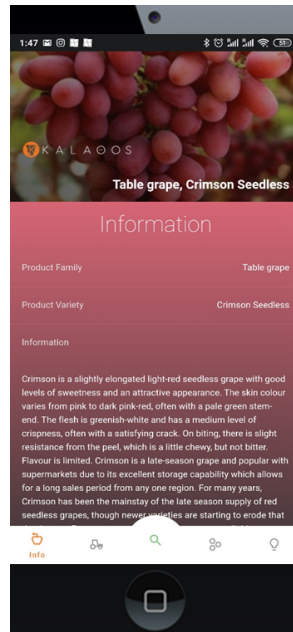
Figure 18 Consumer app module showing product information
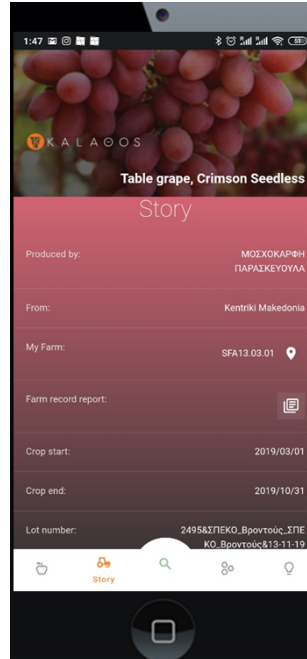
Figure 19 Consumer app module showing product's story
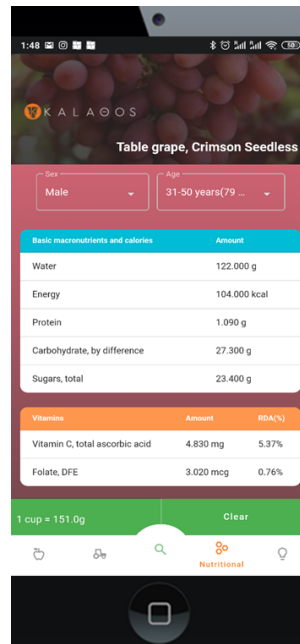
Figure 20 Consumer app module showing product nutritional specifications

Nutritional screen (Figure 20) provides information to user about the nutritional profile of each product for different portions concerning a full set of nutritional elements. Furthermore, the user selects a personal predefined profile (age and sex) and the app provides directly the percentage of the covered daily reference intakes given a specific quantity of specific portion of the product under question.

Finally, the consumer app module provides useful tips of each specific product that has to do with special characteristics of the product, proposals for ways of eating the products and ideas for better conservation (Figure 21).
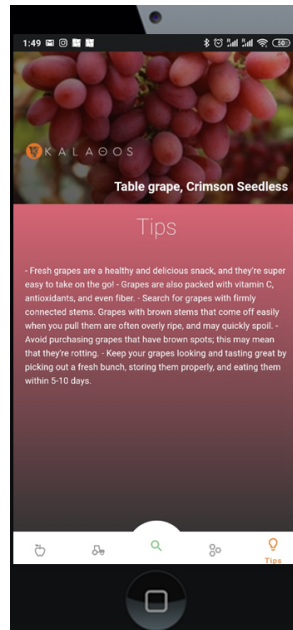
Figure 21 Consumer app module showing product's tips

4.1.2 IoT Module

The IoT Telemetry system was implemented to bring together various IoT technologies, namely meteorological and other sensor devices, devices attached on farm equipment, multispectral cameras and Light Detection and Ranging (LiDAR4) systems. This platform is an effective telemetric system, which satisfies the need for seamless collection and transfer of data from different sources in an effective manner.

The IoT Telemetry System supports data reception and management (on cloud), visualization of data and reporting generation. It also includes a web App for interfacing with the users as well as a set of APIs for exchanging data with third parties' systems.

IoT Telemetry system is accessible to the users through an e-platform using HTTPS (Internet Engineering Task Force, 2021) protocol providing:

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1   4 LiDAR - Light Detection and Ranging: https://www.neonscience.org/resources/learning-hub/tutorials/lidar-basics

- Data management capabilities;

- Device management capabilities.

The architecture of the IoT Telemetry system is depicted in Figure 22.
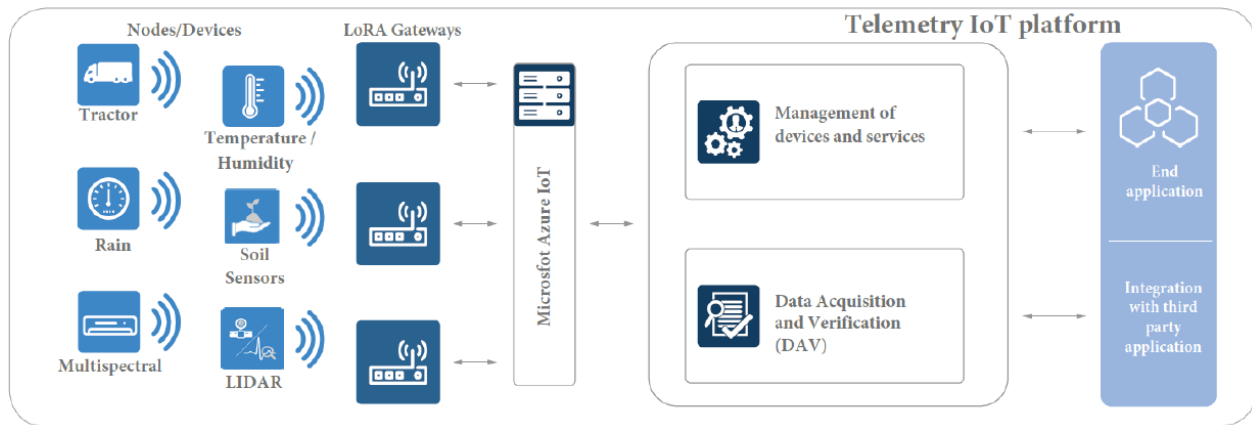
Figure 22 Architecture of the IoT Telemetry System

To summarize the architecture:

- The nodes/devices – meteorological and other sensor devices, devices attached on farm equipment, multispectral cameras and LIDAR systems;

- LoRA (LoRa Alliance, 2021)Gateways and Microsoft Azure IoT (Microsoft, 2021) - the point of gathering, pre-processing and transmitting data and events from all connected devices through the usage of the appropriate APIs;

- Telemetry IoT platform – enables devices and services management and data acquisition and verification. It also serves as interface with the frontend application (website) and integration with third party applications.

The IoT Telemetry platform is already integrated with the Kalathos platform.

The IoT module is a platform accessible to the users through HTTPS (Figure 23) with the following capabilities:

- Locate the IoT devices and gateways on maps (either as ground or satellite maps) (Figure 24);

- Find all placed devices and weather stations (Figure 25, Figure 26);

- Monitor nodes and gateways (Figure 30, Figure 31, Figure 29, Figure 28, Figure 27);

- Remotely operate nodes by setting specific parameters of their operation.
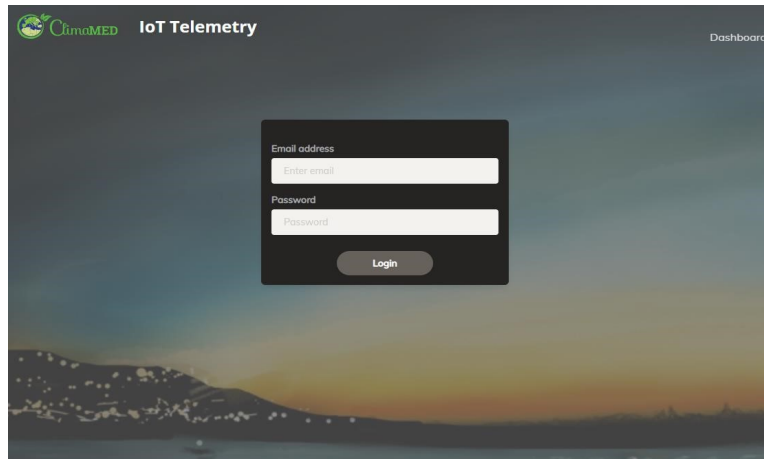
Figure 23 IoT Module login page

In Maps screen (Figure 24) the user is able to navigate to the maps in order to find the locations where the devices are placed. He/she can select the view of the map either as ground or as satellite. He/she may filter devices, zoom in/out, apply the street view option, etc. The list of the devices on the right side of the screen is filtered based on the opacity of the devices on the map.
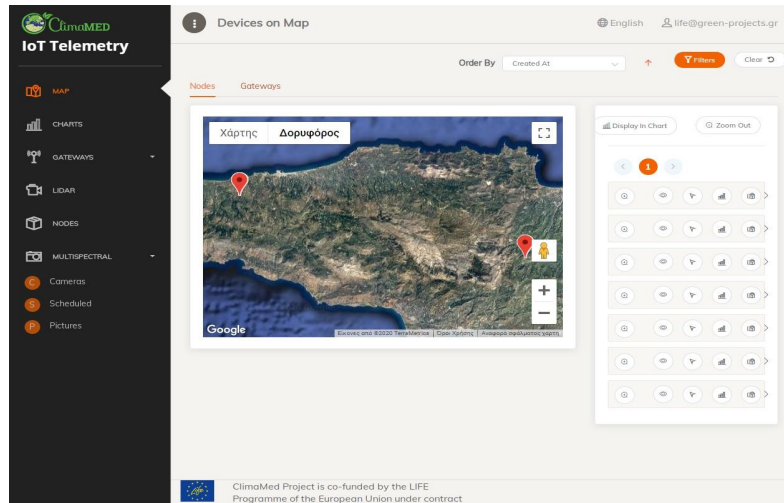
Figure 24 IoT module initial page, after login, showing maps with devices locations
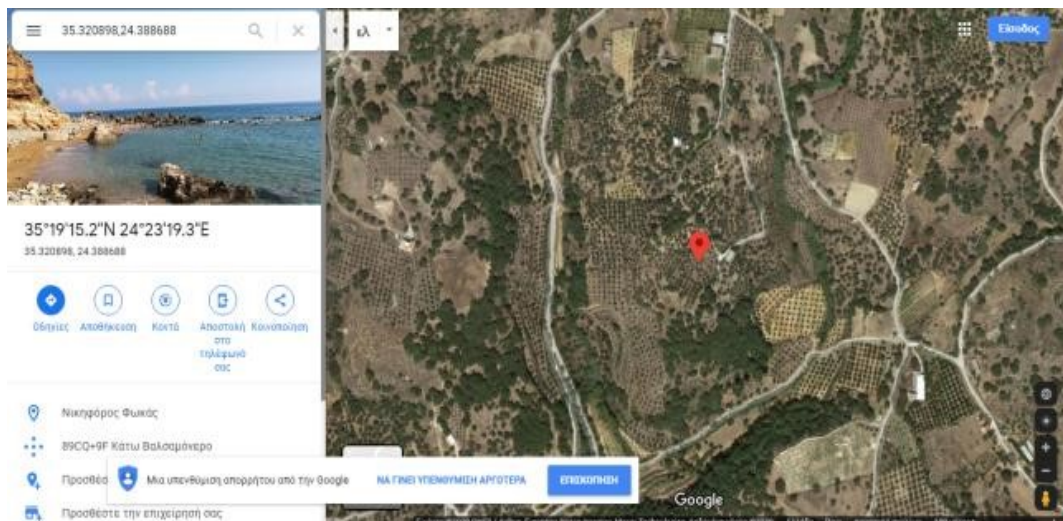
Figure 25 IoT module showing maps with devices locations

The choice "View in Maps" automatically redirects the user to google maps, based on the coordinates of the device location (Figure 25). This functionality is very useful when there is a need for on-site visit to a device.
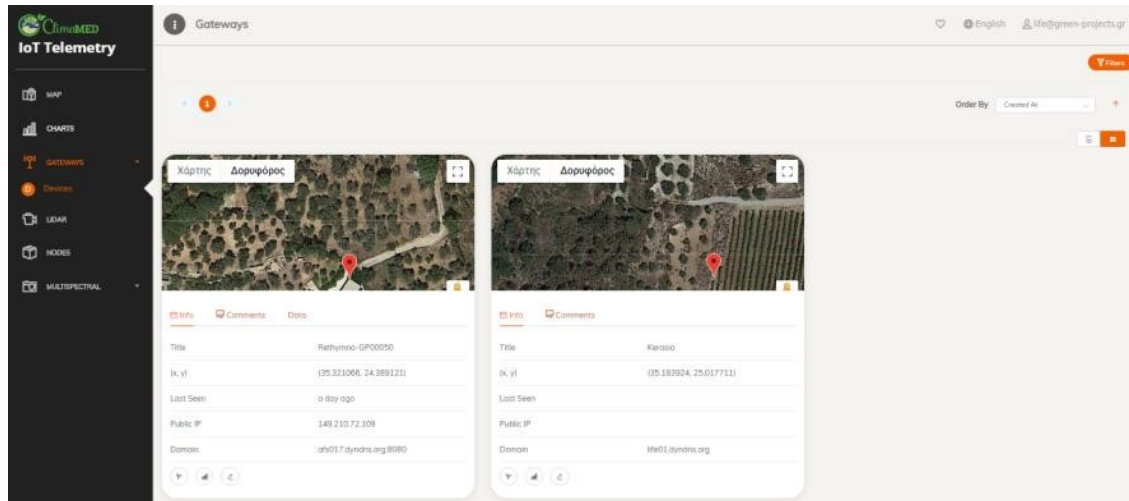
Figure 26 IoT module showing gateways locations

As far as the gateways is concerned, similar functionalities concerning their filtering and tracking on the map is provided by the app (Figure 26). The filters that are applied include the name of the gateway, its status, the timestamp of last communication with the server, etc.
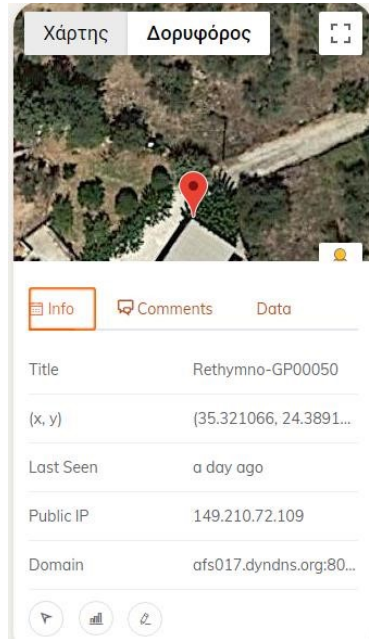
Figure 27 IoT module showing gateway information
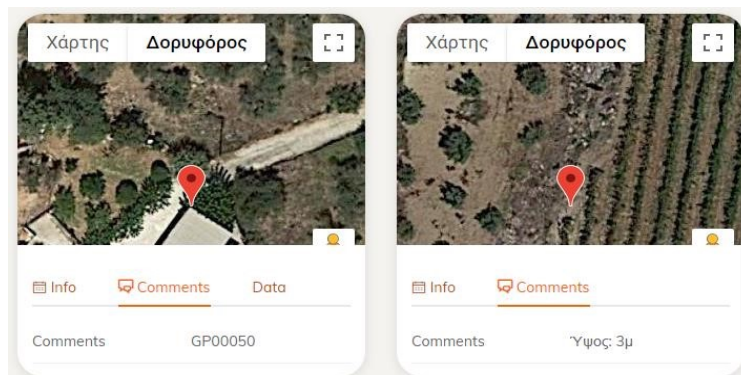
Figure 28 IoT Module showing comments on Gateway
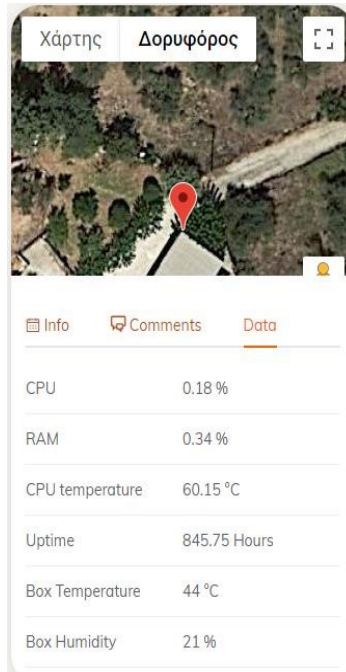
Figure 29 IoT module showing gateways data

In the gateways screen summary information is provided concerning each gateway, which includes its title, the last-seen time, the public IP and its web domain (Figure 27). Under the Comments tab, further, unstructured information is provided to the user (Figure 28). Finally, under the Data tab, technical information concerning the operation status of the gateway is provided (Figure 29).

The Chart screen in the app provides access to the measurements of the sensors that are attached on IoT devices. The user first selects from the list the node he/she would like to explore and then he/she selects the specific factors to show on the chart. There is also the possibility to set the time period for which the user wants to see and compare the measurements. Every selected factor has a unique colour, which appears at the bottom of the screen. There is also found the average, maximum and minimum price of each factor per device (Figure 30).
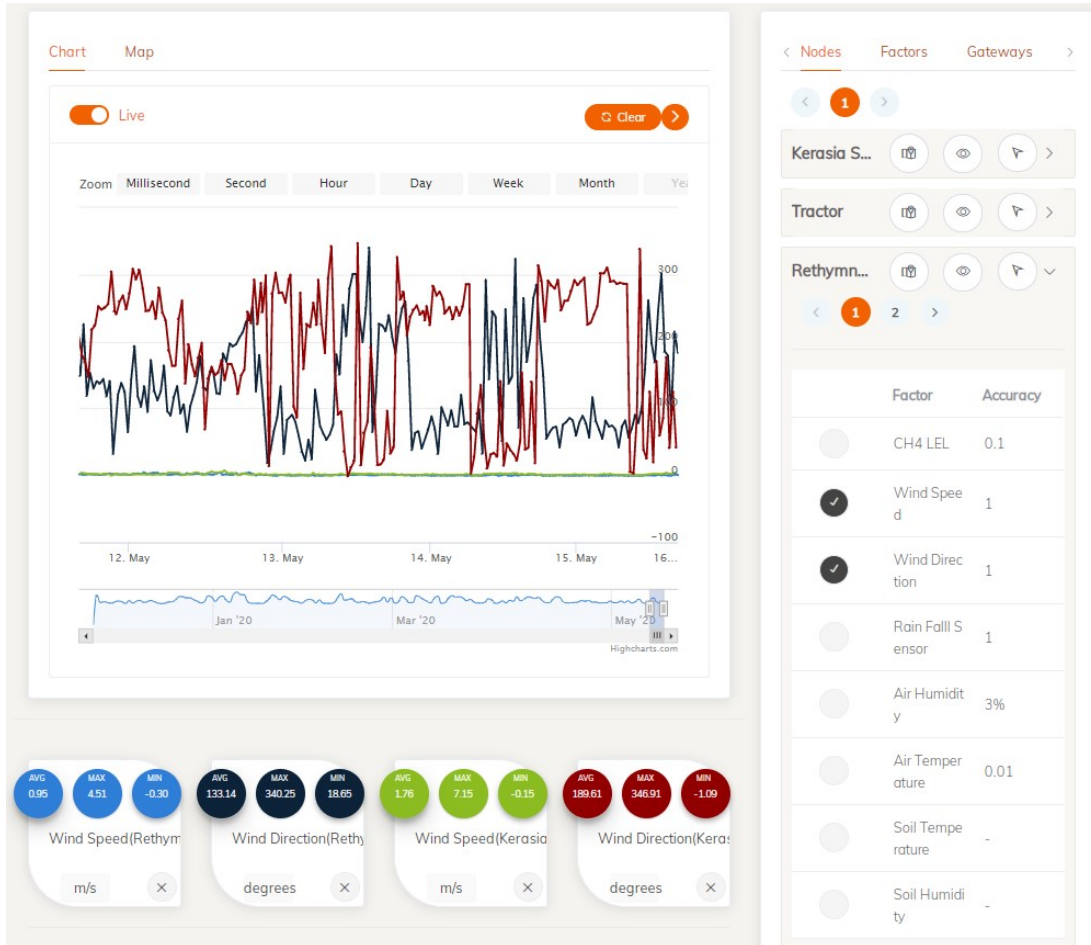
Figure 30 Node monitoring through the IoT platform

Following the same approach, by selecting the per gateway view in the Charts screen, the user is able to monitor the operation of the gateways using a timeline. The user chooses the factors that he/she wants to monitor (Figure 31).
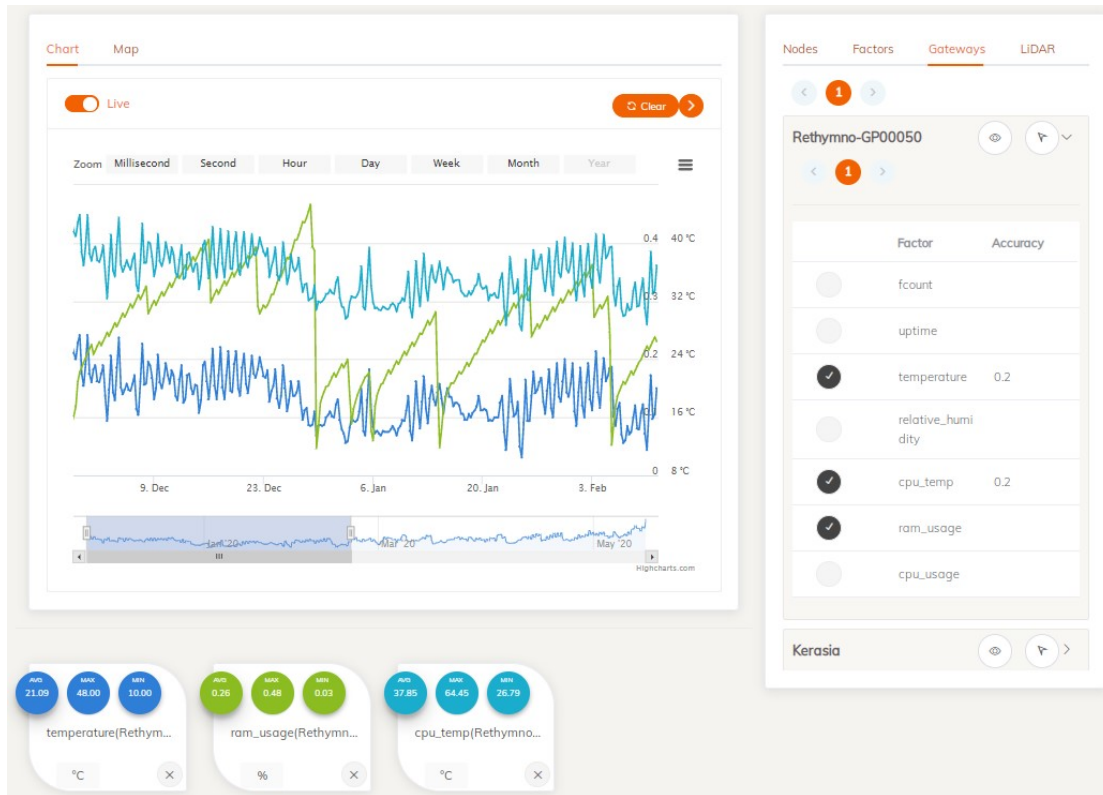
Figure 31 Monitor operations in gateways through the IoT module

4.1.3 Farm App Module

The farm app module, called FarmBook, has the following functionalities for the farmers:

- Listing of, searching for and visit their farms (Figure 32, Figure 33 and Figure 34);

- Shows details from a selected farm, like weather information captured through the IoT module, and tasks performed/to be performed on the farm (Figure 35);

- Manage tasks on a farm location like task assignment (Figure 42), showing details of tasks (Figure 36), adding and managing attachments – like photos - to a task (Figure 39, Figure 40, Figure 43) defining attachment location (Figure 41) confirming task (Figure 38) and deleting tasks (Figure 37);

- Reading QR codes assigned to their machines for easy identification with the smart phone.
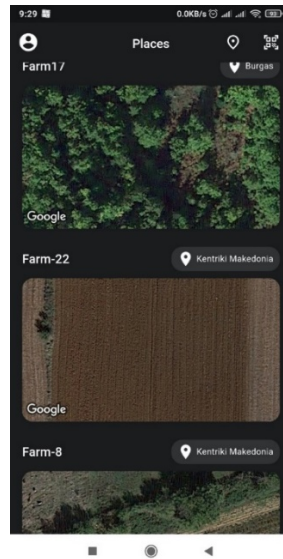
Figure 32 Listing of farms

In the first screen of the app the user sees all of his/her farm, where also the functionality of being transferred to Google Maps at the specific location is offered (Figure 32). In this screen a functionality of scanning a QR code which is connected to the specific farm is also provided to the users. The user, by selecting a farm, is then transferred to a screen with the details of the selected farm.

An alternative way for searching and selecting a farm is through the map screen (Figure 33). In this screen the user may ask the app to find its current position and the app shows all the farms that are close to the current position of the user. Then the user, by using the zoom-in /zoom-out functionality, may spot and select a specific farm for more details (Figure 34).
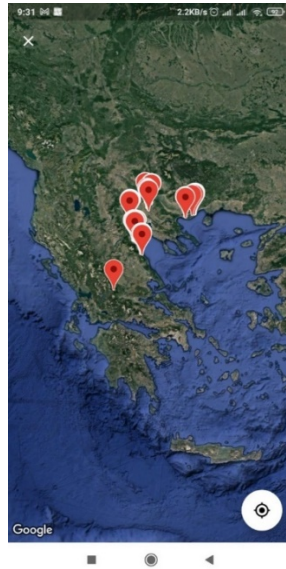
Figure 33 Search for farms

Figure 34 Spot and visit the farm

The farm details screen shows information for a specific farm, which includes weather data and information of all ongoing or implemented tasks on the field. A functionality for selecting a date on a calendar is also provided if the user wants to check what tasks have been implemented in the past (Figure 35).
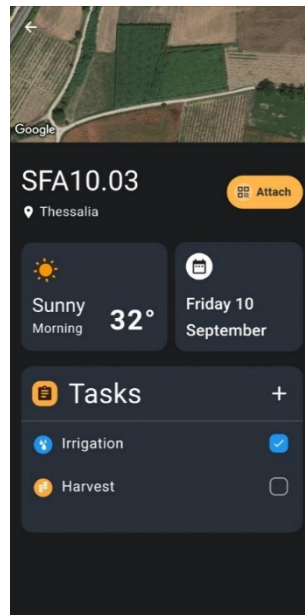
Figure 35 Details of the farm

For each task a screen with details of this task is provided to the user (Figure 36). In this screen information concerning the type of the task, its status, the starting and ending date and time is provided. A task can be completed by the user in this screen or in the previous one by checking the corresponding check box and after confirming this selection (Figure 37).

The user may also delete a task by selecting the bin on the top right of the task details screen. A confirmation is requested as well (Figure 38).
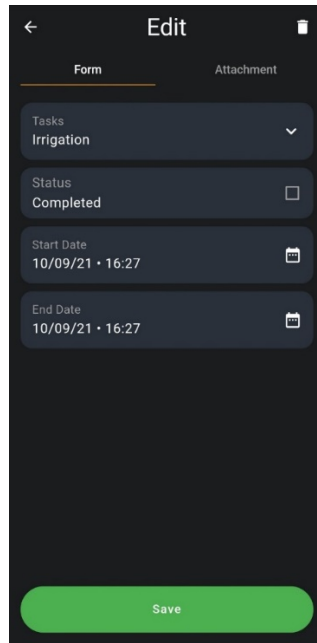
Figure 36 Details of tasks
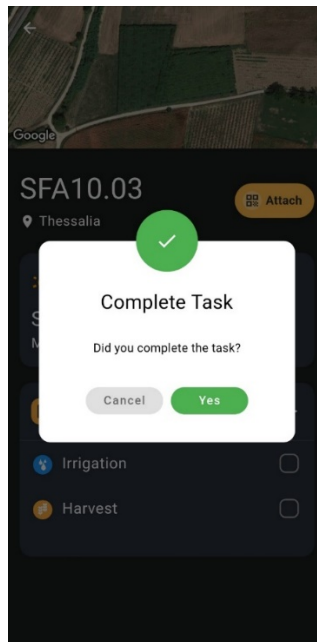
Figure 37 Confirmation of task completion
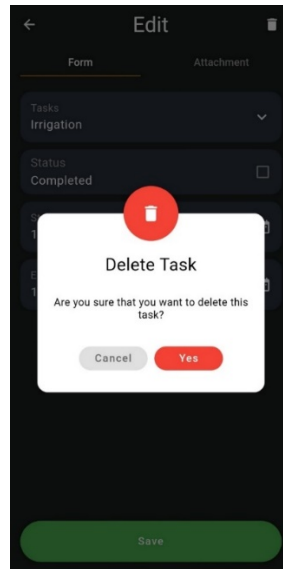
Figure 38 Confirmation of task deletion

A very useful process that the app offers to the users is the functionality to attach objects to each task. These objects may be machines, pesticides, fertilizers, workers, etc. The attached objects are shown under the tab "Attachment" (Figure 39).

The app supports the step-by-step procedure for attaching these objects by starting with the scanning of a QR code which is associated with an object. After scanning the QR code a confirmation message is shown to the user (Figure 40). If the user confirms the selection of the object to be attached, he/she then select the location of the object (Figure 41).

Finally, the user attaches the selected object to one or more tasks that have been already initiated in a farm (Figure 42).
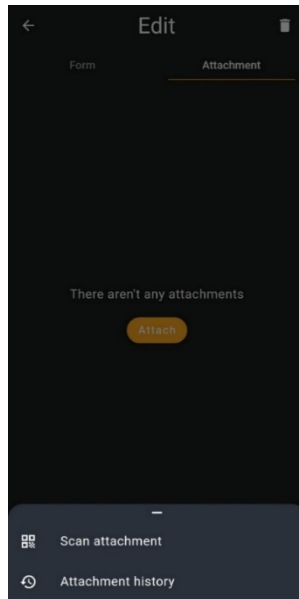
Figure 39 List of attachments per task
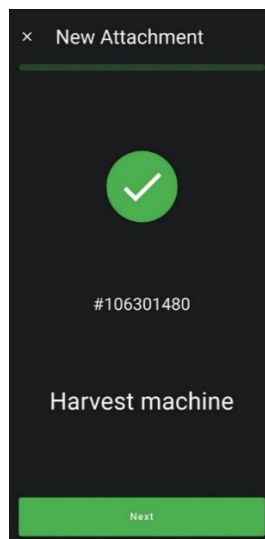
Figure 40 Adding attachments to a task
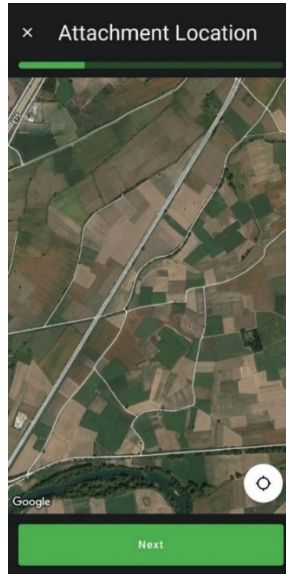
Figure 41 Definition of attachment location
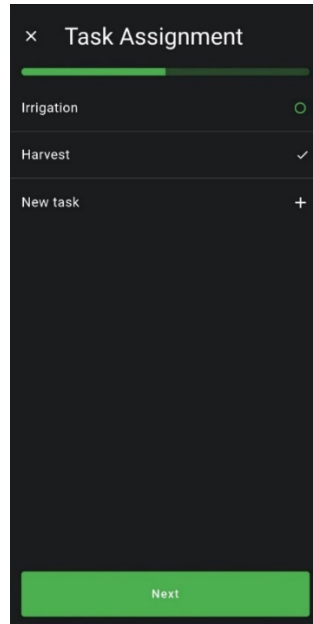
Figure 42 Task assignment

Finally, the user may attach one or more images to a task for providing more information to specific tasks (Figure 43). The images may be taken using the device or they can be chosen from the gallery.
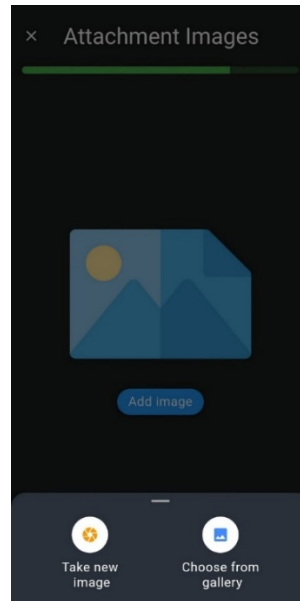
Figure 43 Attachment of photos to attachments

4.1.4 Quality Module

The quality module will enable producers, wholesalers and retailers to introduce their quality certifications and will enable consumers to verify the certifications. At the moment of writing, the Quality Module was being developed for the Alpha version.

The main aspects of the module are:

- The module will store credentials from the farmers who proved their compliance with Quality Certification programs;

- Should be linked to the product the final customer buys;

- Should enable the e-Platform to link products to the quality certifications.

4.1.5 Isotopic Profile Module

The isotopic profile module will enable product origin verification by any participant of the supply chain. At the moment of writing, the Isotopic Profile Module was being developed for the Alpha version. The main aspects of the module are:

- The module will store the Isotopic Profile of raw materials of products;

- It will enable the comparison of an isotopic profile sample numbers with the database to check the origin of the product.

4.1.6 DNA Markers Module

The DNA markers module will enable fresh and processed food molecular authentication. At the moment of writing, the DNA Markers Module was being developed for the Alpha version. The main aspects of the module are:

- Database with DNA Profile of meat, vegetables and fishery products.

- It will enable the search a DNA sequence, recurring to the BLAST algorithm at the National Center for Biotechnology Information (NCBI , http://www.ncbi.nlm.nih.gov)., within a DNA database, enabling the identification of the product's authenticity.

4.1.7 Nutritional Profile Module

The nutritional profile module will enable the extension of the nutritional profile, present in product's labels, covering more details concerning the nutrients and allergens. Consumers will be able to access this information through the Consumers app.

The Nutritional Profile Module is based on the Med Food TTHubs Nutritional Analysis process which is built on top of the European Food Safety Authority (EFSA) regulation - the nutrition and health claim messages of foods produced and marketed at the European level according to the composition of ingredients and nutritional content of macro and micronutrients per 100 g of product.

Figure 44 depicts the 3 steps that make up the process of extracting nutritional information of a food product based on EU legislation and EFSA guidance:

1. Nutritional database harmonization among the different TTHubs nutritional databases.

2. Algorithms and rules application for nutritional values, healthy food characteristics and food allergens extraction;

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3. Nutritional Profile digital labelling.
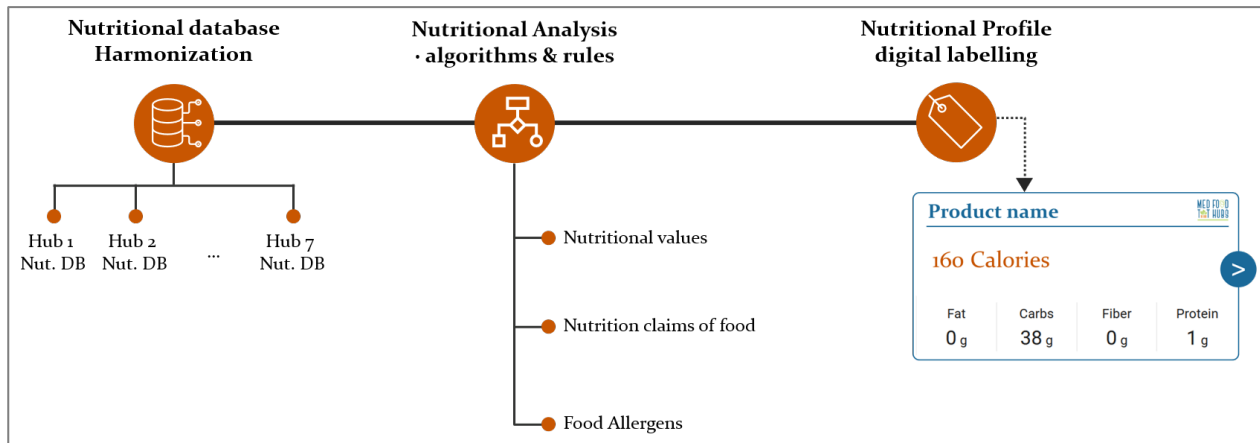
Figure 44 Nutritional Analysis Profile Processes

These specifications are going to be transformed and implemented in the Nutritional Profile Module providing the main nutritional characteristics of a food product.

Two types of users will use Nutritional Profile Module for data collection and data visualisation. These users are classified according to the role they represent in Med Food TT Hubs project and the responsibility that each of them has. The main classifications of the users are:

- **Account admin:** the administrator is the primary account and has all the necessary permissions to execute any available operation;

- **Account user:** Med Food TTHubs members, consumers, or any other user willing to populate the nutritional database as well as consult the nutritional profiles of the food products, should be added by the administrator and will have a specific account depending on the role of each one.
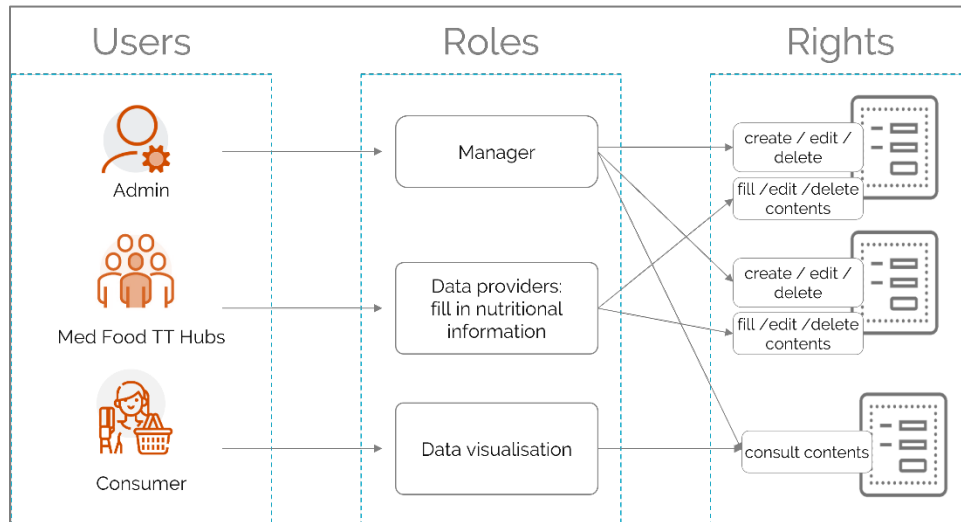
Figure 45 Nutritional Profile Module. Role-based access control

The administrator takes care of full management of Med Food TTHubs e-platform, and concretely the Nutritional Profile Module. Some of the administrator functions are:

- **Root access**: operation permissions to create, read update, and delete resources within various selected capabilities. These operations will be hardcoded into the platform.

- **User management**: can assign users to roles, determining the capabilities of all users. These operations will also be hardcoded into the platform.

- **General access**: can access to all the data in the database, with the option to view the data as would the other roles in order to modify and improve the way in which the information is displayed for the roles to make an efficient use of it.

- **Edit roles**: can modify the permissions that each role can access. These operations will be hardcoded into the platform as well.

Two types of users will interact with the Nutritional Profile Module as presented in Figure 46,

- Nutritional information is collected by authorised users that, in a first stage, are part of the Med Food TT Hubs project; they could be project partners, external stakeholders, Hubs participants, etc;

- The food products stored into the e-platform will include the nutritional information that will be presented to the consumers through the "Consumer app" as a *Nutritional Profile digital labelling* (see D3.1), which is a digital asset allowing to include a greater amount of relevant information for the consumer.
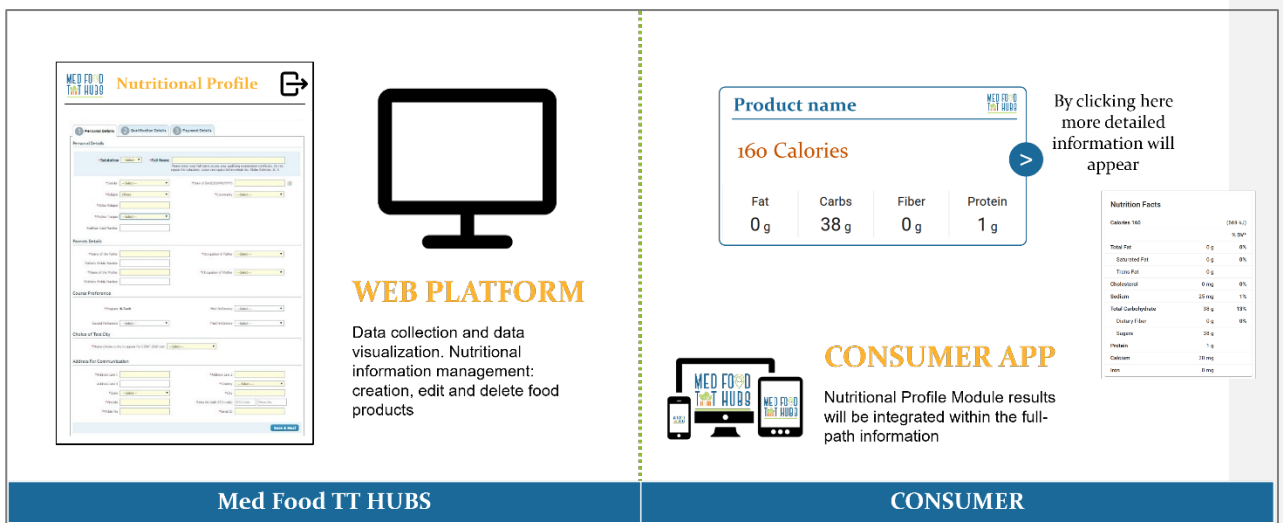
Figure 46 Nutritional Profile Module · roles actions

The Nutritional Profile Module is inspired in a healthy lifestyle tool already developed by LifeSTech (UPM), NutriEmotion. The menu "ingredients" is going to be adapted and enhanced to meet the specific needs of the project. Please note that the screenshots are in Spanish.

The main page depicted in **Error! Reference source not found.** integrates three actions: 1) create new product; 2) full list of products; 3) search functionality by name or properties.
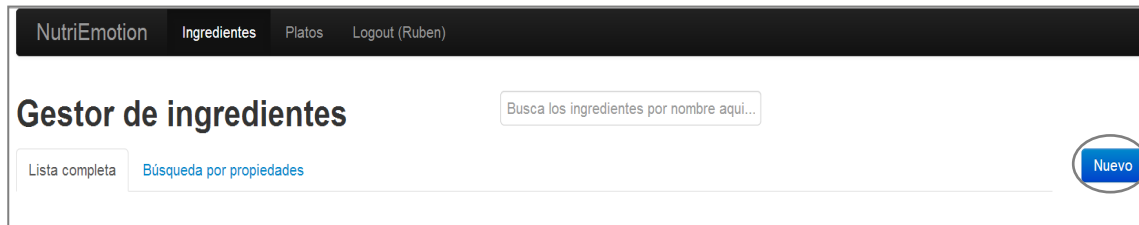
Figure 47 Main screen

4.1.7.1   New food product

To create a new ingredient/food product, the user will access from the main screen where a button "Nuevo" appears. This button displays a form in which we have to fill in all the fields of the database, as without all the data the classification algorithms would not work. It is a form with some of its field's mandatory -marked with "*" (Figure 48).

Figure 48 New product creation (I)

Once the fields *Category* and *Subcategory* are completed, an extended version of the form will be deployed allowing the user to fill in the full set of parameters (Figure 49). If all fields are filled in correctly, the system will save the new ingredient/food product in the database, otherwise it will create some alerts that help to complete the ingredient/food product creation data correctly.

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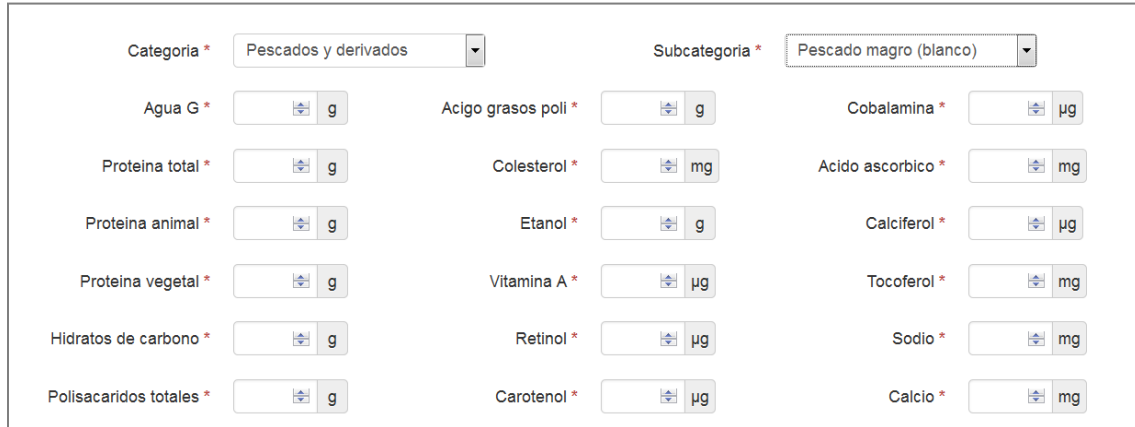
Figure 49 New product creation (II)

When all the required fields are filled in, you can finish creating the ingredient/food product by pressing the "Create ingredient" (Crear ingredient) button, as shown bellow (Figure 50).

Figure 50 New product creation (III)

At that moment the creation form will appear summarizing all the data of interest and with the options to duplicate, modify and delete the ingredient/food product with the same appearance as the visualization of an ingredient/food product already created.

4.1.7.2   Food product management

The main page shown in the first tab is the list of the entire database ordered by groups and subgroups (Figure 51).
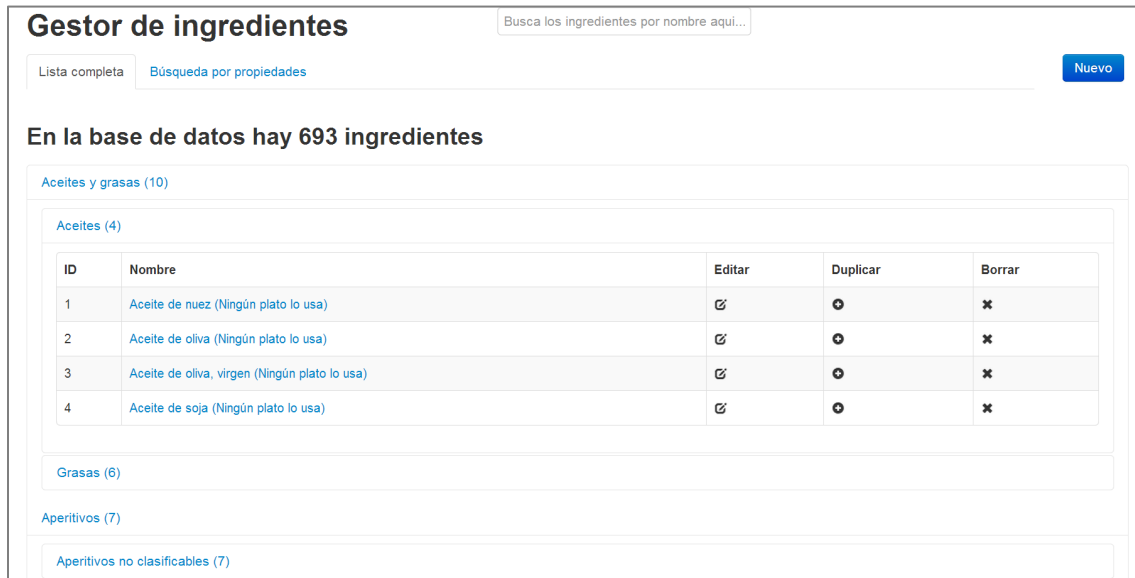
Figure 51 Food product management (I)

You can navigate through the categories until reach the ingredient, where we can do four actions: view the item by clicking directly on the name, edit, duplicate and delete (Figure 52).

Figure 52 Food product management (II)

In the case of wanting to delete it, a pop-up dialog will appear to confirm such deletion (Figure 53).

Figure 53 Food product management (III)

If we visualize the ingredient/food product we can also access directly from a button to edit, duplicate and delete (Figure 54).

Figure 54 Food product management (IV)

In this case, if we click on the "Delete" ("Elimina") button, it will be deleted directly without prior confirmation.

4.1.7.3   Search

The system provides a tool to search for ingredients/food products by name or by properties. By name is a field in which the user can write the name of what they are looking for and each time a letter is typed a filter is made (Figure 55).
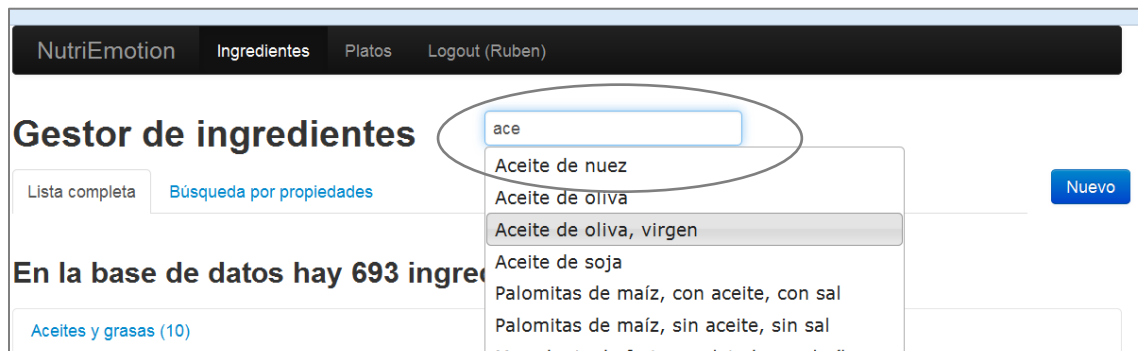
Figure 55 Food product search (I)

To search by properties, we have to go to the tab "Search by properties" (Busca por propiedades). In the form you can choose as many properties as you want and when we press the "Search" button, the ingredients that meet all those chosen are filtered by group and appear in a list with the same appearance as the list of all ingredients (Figure 56).

Figure 56 Food product search (II)

The result will be the number of items found and those items placed in the list.

4.1.8   Internal and External Tracing Module

The traceability module, described below, was designed, and implemented to collect information during the supply chain processes. The main objectives of the software solutions are to monitor the raw materials along the different phases of the supply chains and to provide innovative services to the different users (producers, carriers, vendors, common people) highlighting the safety and transparency of processes.

The internal and external traceability module is a tracing framework covering:

- External events, which covers all kinds of check-in, check-out events (departing, transporting, arriving) from point-to-point at the supply chain, supporting tracking and monitoring of conditions of each shipment in real-time;

- Internal events, which covers all kinds of products transformation recorded using GS1[5] global standards.

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[5] https://www.gs1.org/standards

The traceability platform provides basic services to ensure the delivery of content on enabled channels and manage interfacing with external systems. It allows the editing and organization of content in a simple and quick way, by a variety of users, organizations and different groups, while still guaranteeing access rights through application profiling based on roles. The platform manages the continuous flow of information among all parties involved in the supply chain processes so, it implements the following functionalities:

- Collection of data and information

- Extraction of the data and information collected, in order to identify those deemed useful for the subsequent production monitoring activity.

- Aggregation, integration and correlation of the useful information extracted, aimed at the generation, recognition and localization of events that could bring out situations of potential interest;

- Visualization of a set of information relating to the current situation, in order to allow better management of operational and decision-making processes;

The open architecture of the module, with connection User Interfaces (UI) for production lines, enables batch and label generation based on sorting and weighting.

The traceability process implemented by the platform follows the following steps (Figure 57):

1. Transport of raw milk to the production plant;

2. Transformation;

3. transport of the finished product to retailers;

4. Retail.
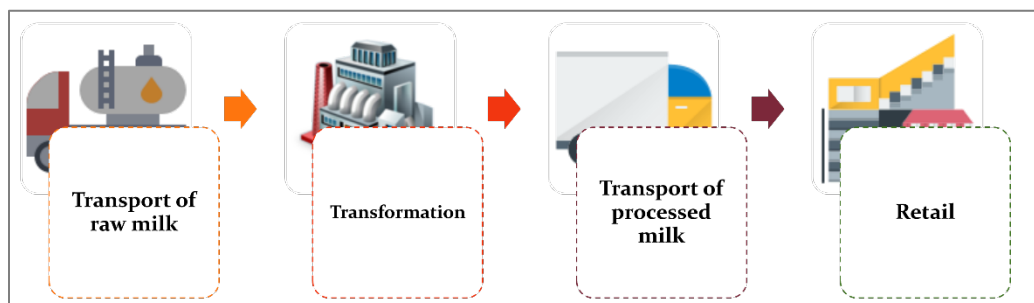
Figure 57 Traceability phases

To enable a continuous flow of information among parties along the supply chain, the traceability module covers the following features:

- Creation, acquisition, and recording of relevant traceability data along the entire supply chain. Data creation and acquisition operations are as automatic as possible, by using automatic identification and data capture devices, tools and technologies, even though non-automatic or manual data acquisition will be considered as well.

- Storage of traceability data in a central repository. That is, regardless how supply chain partners store traceability information (i.e. where, with which structure, etc.).

- Semantically-sound exchange and sharing of traceability information among parties (and then among their own information systems and ICT infrastructures) within "collaborative" supply chains, in which information flow anticipates or is parallel to the flow of goods. This is achieved by means of specialized data management services that provide several facilities to retrieve and synchronize traceability information;

- Exploitation, browsing and querying of traceability information, in order to provide users (e.g. food players, end consumers, and other external stakeholders) with relevant information about food flow, quality, transportation and storage conditions, etc. On the basis of such information, many applications and added-value services can be foreseen, ranging from querying traceability data to exploiting such data to manage crisis or assess risks related to traceability, to performing high-level data analysis or providing relevant information to regulators or auditors, for certifications, and so forth.

The Platform adopts the concept of event as the atomic information unit because of it well represents a phenomenon that occurs within the observed reality, providing the conditions for associating this phenomenon with information relating to the specific domain, to the time, place and context in which the phenomenon was observed. An event-based architecture also guarantees a high ability to adapt to different levels of abstraction, as you can refer to a generic event or even a more specific one and you can compose simple events to create more complex events. The events are described through the **Event Information Model** which illustrates the taxonomy and structure of the events in the agri-food chain of interest managed through the traceability portal. The term event represents the result of a sequence of operations that lead to the generation of consolidated information starting from the raw data extracted or generated from the information sources integrated into the platform. Events are divided into 2 categories: Internal Events and External Events.

The module also comes with the following applications:

- **Carrier App**: the carrier accessing the portal can record information related to the transport of raw milk from the farmers to the processor and the transport of fresh pasteurized milk from the processor to the seller. All the relevant information regarding fresh milk must be saved such as quantity, date, name of the producer and also batch code (Figure 58 and Figure 59**Error! Reference source not found.**). The same information must be recorded for pasteurized milk, so the carrier can insert origin and destination, quantity, date and quality.
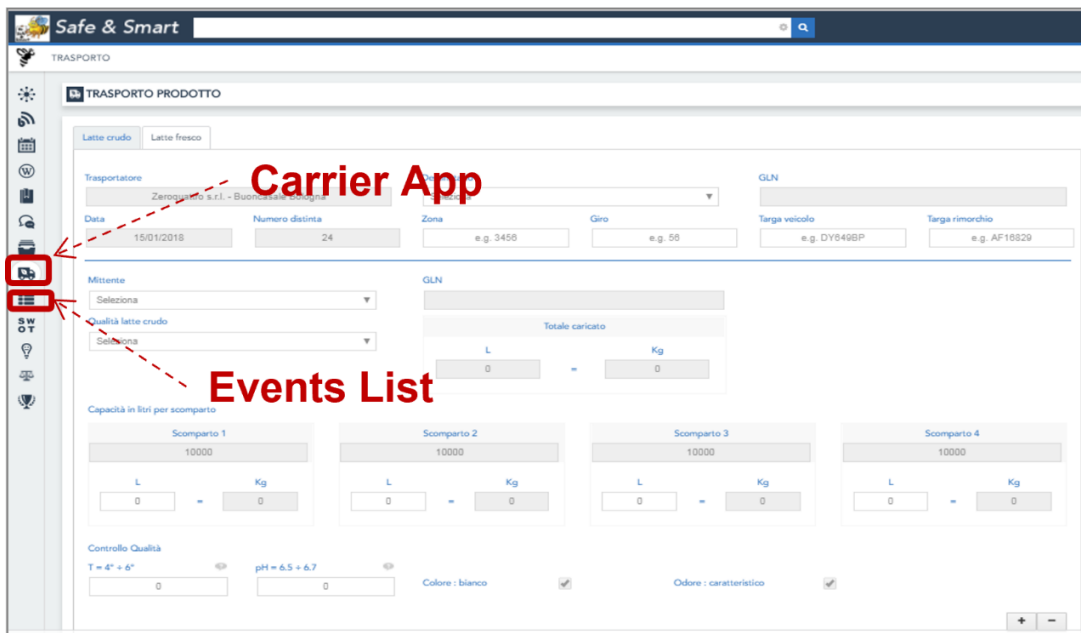
Figure 58 Carrier apps
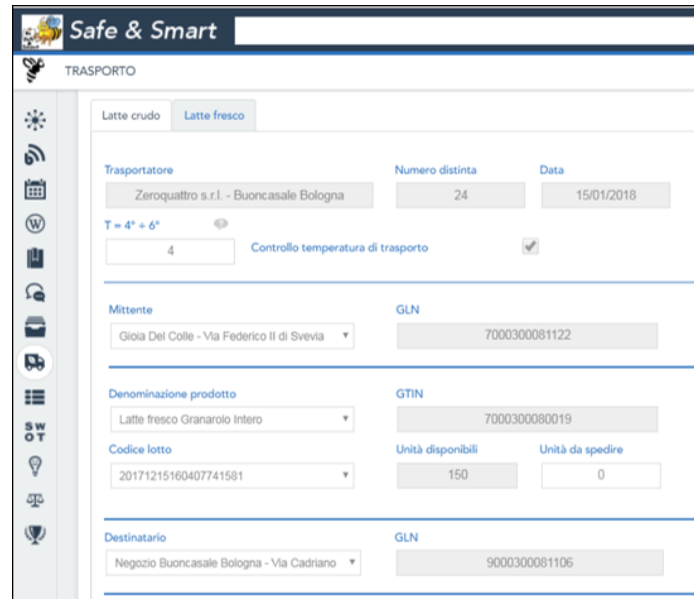
Figure 59 Carrier App: Transport of raw milk

- **Producer App:** through the Producer App (Figure 60 and Figure 61), the user keeps track of the raw material used in the transformation process and the finished product created. Moreover, the producer can certify the success of the quality control related to the finished product by uploading the file containing the results of the analysis performed.
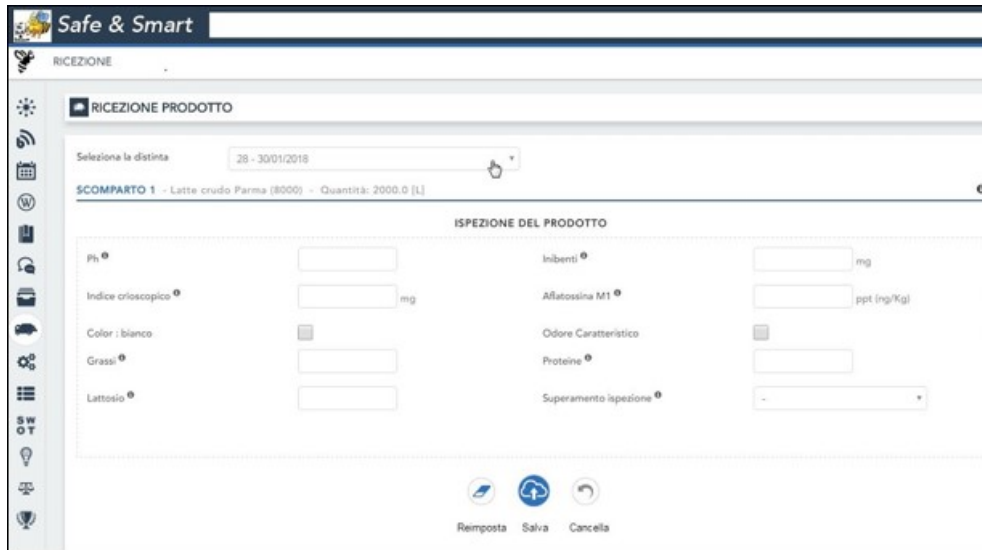
Figure 60 Producer app: Receiving raw milk
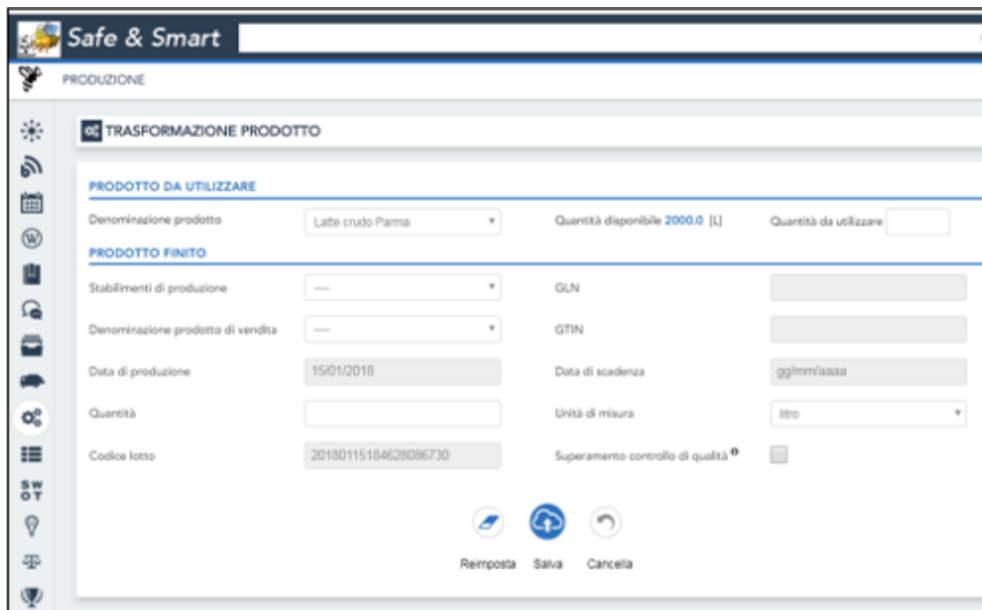
Figure 61 Producer App: production

- **Seller App:** through the Seller App (Figure 62) the retailer will be able to record all the information related to the operations of receiving the finished product such as the date of receipt, the GTIN Code, origin and quantity.
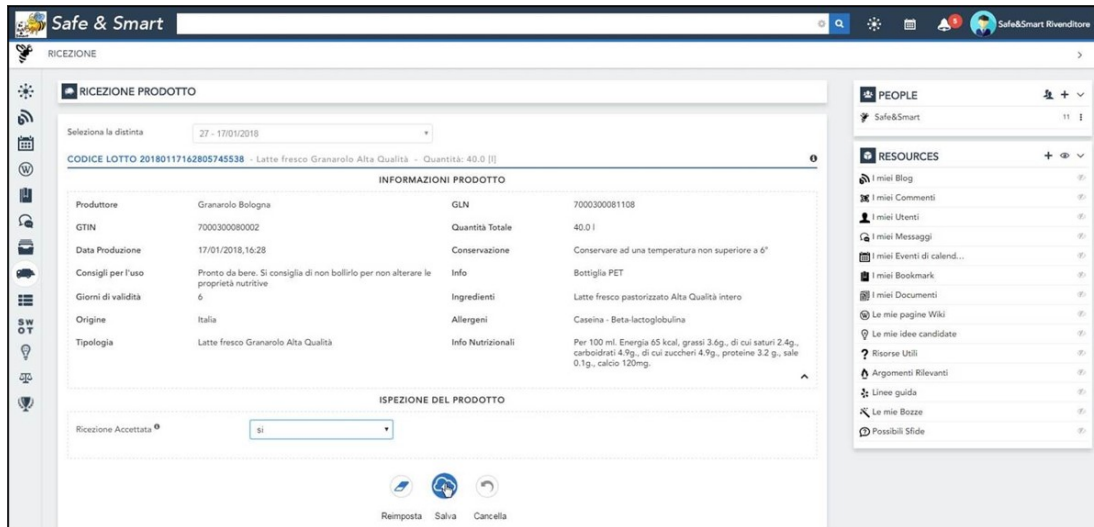
Figure 62 Seller app

- **End User App:** through an open and public web page (Figure 63), the final user inserting the batch code of the purchased product, can view all the related traceability information recorder by the system.
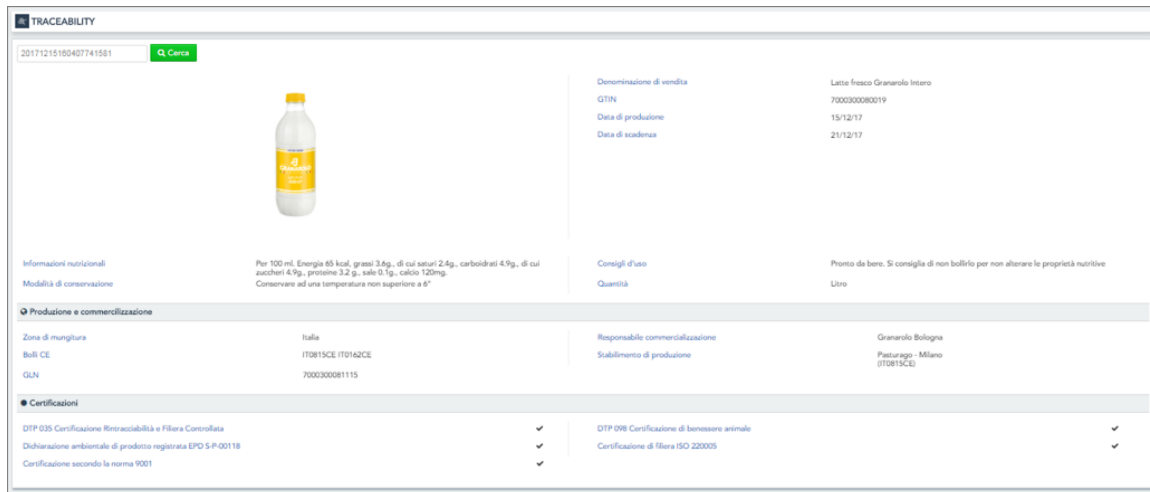
Figure 63 End User App

5 Software requirements

In this section, the business requirements from the DOA, D2.2 and D3.2, information security requirements and the alpha version state of the art were used to define the software requirements for the TT-Hubs e-Platform and modules in terms of stories and epics.

In Table 2 the requirements are written in terms of Epics and User Stories. The "Module/platform" column indicates to which module the requirements affect. The columns of "Administrator", "Farmer", "Producer", "Processor", "Logistic Providers", "Retailer", "Wholesaler" and "Customer" is used to indicates the main actors in the use story when marked with "x".

Table 2 Software architectural design requirements

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
Collect and store all product data relevant for authenticity and traceability purposes									
Setup farm location	farm App Module		x						
Must store references of products (e.g., GTIN, Lot number, date of event reporting)	e-Platform								
Must link product references to Internal/external tracing modules	e-Platform								
Must store events of products	Internal/external tracing module		x	x	x	x	x	x	
Via internal/external tracing module, information regarding changes to product can be inserted.	Internal/external tracing module		x	x	x	x	x	x	
The e-Platform must be able to connect to the internal/external tracing module to upload event information.	e-Platform								
The e-Platform must be able to connect to the internal/external tracing module to download event information.	e-Platform								

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
References of products must be linked to the nutritional profile module's correct data entries	e-Platform, Nutricional profile module								
References of products must be linked to the respective quality certifications presented in the Quality module.	e-Platform, Quality module								
References of products must be linked to the Respective DNA markers presented in the DNA Markers module.	e-Platform, DNA markers module								
References of products must be linked to the Respective isotope profile presented in the isotope profile module.	e-Platform, Isotope Profile Module								
The system administrator should be able to create product template to introduce attributes related to quality certifications.	Quality module	x							
The farmer should be able to assign quality certifications to their product (to the GTIN)	Quality module		x						
The producer should be able to assign quality certifications to their product (to the GTIN)	Quality module			x					
The system administrator should be able to create product template to introduce attributes related to isotope profile.	Isotope Profile module	x							
The farmer should be able to assign isotopic profiles to their products (to the GTINs)	Isotope Profile module		x						
The producer should be able to assign isotopic profiles to their products (to the GTINs)	Isotope Profile module			x					
The system administrator should be able to create product template to introduce attributes related to DNA markers.	DNA markers module	x							
The farmer should be able to assign DNA Markers profile to their products (to the GTINs)	DNA markers module		x						
The producer should be able to assign DNA Markers profile to their products (to the GTINs)	DNA markers module			x					

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
The system administrator should be able to create product template to introduce attributes related to nutritional profile.	Nutrticional profile module	x							
The farmer should be able to assign nutritional profile to their products (to the GTINs)	Nutrticional profile module		x						
The producer should be able to assign nutritional profile to their products (to the GTINs)	Nutrticional profile module			x					
The user, through the consumer app module, should be able confirm the certifications of a product with information presented in the product package (e.g., GTIN)	Quality module, consumer app module								x
The user should be able confirm the Isotope Profile of a product with information presented in the product package (e.g., GTIN)	Isotope Profile module, consumer app module								x
The user should be able confirm the DNA markers of a product with information presented in the product package (e.g., GTIN)	DNA markers module, consumer app module								x
The user should be able confirm the Nutritional profile of a product with information presented in the product package (e.g., GTIN)	Nutrticional profile module, consumer app module								x
Ensure data security through use of blockchain technology									
Access control and other encryption mechanisms should be in place to guarantee overall system security.	e-platform								

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
Mechanisms for data privacy should be used to protect information disclosure amongst parties not participating in the same supply chain (e.g., competitors). Information should be stored in the blockchain as follows: a cryptographic hash of the data and a pointer to off-chain data. This is the same as above with a pointer to the off-chain data source. Such an approach can enable the ledger to act as part of a discovery mechanism for parties who need to communicate and share data;	e-platform								
Only participating parties of the supply chain should have access to the data events of a supply chain (Data privacy - competitors)	e-platform								
In order to protect availability, the number of storage nodes should be carefully dimensioned.	e-platform								
In order to protect availability, there should exist an off-chain data management system that guarantees redundancies and correct data referencing	e-platform								
In order to protect confidentiality, private data should be stored in off-chain databases.	e-platform								
In order to protect confidentiality, Information stored in the blockchain should not be intelligible for unintended users.	e-platform								
Data in motion should be encrypted.	e-platform								
Data at rest should be encrypted.	e-platform								
Protection mechanisms in the modules									
The module should have an authentication mechanism.	All modules and e-Platform	x	x	x	x	x	x	x	x
All interconnection between modules should be done via an encrypted channel.	All modules and e-Platform	x	x	x	x	x	x	x	x
Install devices / assign to place-product									

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
User must be able to install and register sensor's devices to the module.	IoT Module	x	x	x	x	x	x	x	
User should be able to assign a device to a place or product.	IoT Module	x	x	x	x	x	x	x	
Monitor conditions									
User should be able to setup notifications for each device in the module.	IoT Module	x	x	x	x	x	x	x	
User should receive notifications from the module.	IoT Module	x	x	x	x	x	x	x	
Module should create events for specific notifications.	IoT Module								
Customer sign up and scan									
The user can select what information can be seen by consumers.	Consumer App module								x
The consumer can sign up to the module.	Consumer App module								x
The consumer should be able to find information regarding product story through a QR code scan or recurring to the TraceID of the product.	Consumer App module								x
The consumer should be able to find information regarding products nutritional profile through a QR code scan or recurring to the TraceID of the product.	Consumer App module								x
The consumer should be able to send product evaluation feedback to the supply chain stakeholders	Consumer App module								x
The supply chain stakeholders should be able to receive product evaluation feedback from the consumer.	Consumer App module								x
Keep records			x	x					
The producer should be able to define activities on the web version of the module.	farm App Module		x	x					
The producer should be able to keep track of the activities on their production sites via mobile app.	farm App Module		x	x					
The producer should be able to scan objects and attach them to the tracked activities via mobile app.	farm App Module		x	x					

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
Events should be communicated on the main platform (e-Platform)	farm App Module								
Events communicated on the main platform (e-Platform) should be communicated to the internal/external tracing module.	e-Platform, internal/external module								
Information from the IoT devices should be									
Check records	farm App Module								
The user should be able to check the events recorded by the farmer, through the e-Platform	farm App Module, e-Platform		x	x	x	x	x	x	x
Forward contracts process									
A seller should be able to create an offer of a product. He should be able to introduce detailed information regarding their products.	B2B app module		x	x	x				
A seller should be able to create a request for a product. He should be able to introduce detailed information regarding their products.	B2B app module		x	x	x				
The seller should be able to file a forward agreement to the trader.	B2B app module						x	x	
The trader and the seller should be able to approve, negotiate or decline the forward agreement of the seller.	B2B app module		x	x	x		x	x	
Selling contract process									
The seller must be able to create and delete an offer for a product.	B2B app module		x	x	x				
The seller must be able to define the products characteristics like production place, description of certifications, logistics details, recipients list and summary of offer.	B2B app module		x	x	x				
The trader must be able to see/search for offers on products.	B2B app module						x	x	
The trader must be able to create and delete a request for a product.	B2B app module						x	x	

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
The trader must be able to define the products characteristics like production place, description of certifications, logistics details, recipients list and summary of request.	B2B app module						x	x	
The seller must be able to see/search for request for products.	B2B app module		x	x	x				
The seller and the buyer must be able to negotiate the contract for products	B2B app module		x	x	x				
Monitoring transactions									
The dispatch transport and delivery of the products should be monitored by the B2B app. This implies some interconnectivity between this module and the internal and external traceability module.	B2B app module								
Define certifications									
The administrator must be able to create and enter details for the certification templates.	Quality module	x							
A user must be able to create and/or update their certifications.	Quality module		x	x	x		x	x	
Certifications Self-Evaluation									
The administrator must be able to create certification checklist that will enable farmers to perform gap analysis between their systems/processes and the certification requirements.	Quality module	x							
The user must be able to fill-in the certification checklist of the certification they want to test against	Quality module		x	x	x		x	x	
Quality Certification Checking Process									
the user must be able to submit a request for certification, providing information/proof of certification.	Quality module		x	x	x		x	x	
The administrator, upon certification requests, must check the validity of the certifications before accepting the certifications on the systems.	Quality module	x							

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
Isotope creation									
The administrator must be able to create a new isotopic profile	Isotope Profile module	x							
The administrator must be able to introduce isotopic profile values.	Isotope Profile module	x							
Isotopic profile validation process									
The user must be able to submit isotopic profile of a product for comparison and the result should be given to the user.	Isotope Profile module		x	x	x				
DNA profile creation									
The administrator must be able to create a new DNA profile	DNA markers module	x							
The administrator must be able to introduce DNA profile values.	DNA markers module	x							
DNA profile validation process									
The user must be able to submit DNA profile of a product for comparison and the result should be given to the user.	DNA markers module		x	x					
Nutritional profile creation									
The administrator must be able to create a new nutritional profile	Nutrticional profile module	x							
The administrator must be able to introduce/change nutritional profile values/parameters/portions.	Nutrticional profile module	x							
Nutritional profile checking process									
The user must be able to submit Nutritional profile of a product for comparison and the result should be given to the user.	Nutrticional profile module				x		x	x	x
Consumer Nutritional profile process									
The administrator must be able to introduce/change nutritional profile values/parameters/portions based on the consumer profile (e.g., customer with diabetes, other conditions)	Nutrticional profile module	x							

Requirements (Epics / user stories)	Module / platform	Administrator	Farmer	Producer	Processor	Logistic Providers	Retailer	wholesaler	Consumer
The consumer must be able to find personalized (based on conditions like diabetes, for example) nutritional profiles	Nutrticional profile module								x
Event capturing									
The user, via e-Platform, must be able to manually create/edit events (with timestamp, GLN, GTIN, Event type)	Internal/external tracing module		x	x	x	x	x	x	
Via the IoT module, the sensors must be able to create/edit events (with timestamp, GLN, GTIN, Event type)	Internal/external tracing module		x	x	x	x	x	x	
Events viewing									
The customer must be able to access to events pertaining to a product via the customer app module.	Internal/external tracing module								x
Connection between e-Platform and Internal/External tracing module									
Connection between the e-Platform and the external/internal tracing module must be authenticated.	Internal/external tracing module, e-Platform								
Information exchange between the e-Platform and the external/internal tracing module must be performed via GET/PUT/POST/DELETE functions.	Internal/external tracing module, e-Platform								

6 Software architectural design

The TT-Hubs e-Platform is composed of several interconnected modules. Even though the behaviours of the modules are captured in section 5, the interactions of the activities of stakeholders and the interactions between the modules requires a process flow approach.

In this section the workflow diagrams for the e-Platform and associated modules is presented. The workflow diagrams were produced following the UML and swim-lane approach.

The involved actors are the following:

- Administrator (of the system/particular module, when applicable);
- Producers;
- Processors (Sellers);
- Wholesalers;
- Retailers;
- Consumers.

6.1 e-Platform

The TT-Hubs e-Platform will act as a "one-stop-shop" for traceability and authenticity for Mediterranean food in each country. As such, the processes associated to the e-Platform will cover a wide range of activities like the introduction of new participants into the supply chain, creation of new products or logging of events associated to products and their environment. It also covers the activities concerning the purchasing and selling of products. The e-Platform will be used by all the participants of the supply chain.

In Figure 64, the workflow diagram shows the overall traceability process flow, from the producer to the final consumer. It details the following processes:

- **Creation of details for actors, places and products**: during this process, producers, processors, wholesalers and retailers introduce their facilities/farms/production site information. They also place/assign sensors' devices to monitor environment and products conditions. The insertion of information regarding the DNA, isotope and nutritional profiles are the responsibility of the producers and/or processors;

- **Cultivation/breeding, Forward Contracts and Order processes**: during this process the producers and processors monitor the products cultivation/breeding processes, estimate

production outputs and negotiate contracts for product ordering/selling. The Producer, Processor and the Wholesaler negotiate the order placing and contracts of products based on production estimations;

- **Packing/slaughtering process:** the producers record harvest information, like conditions of harvesting, location, date, treatments. The processor/wholesaler creates the lot for the products that will be packed, labelled with information such as the GTIN and lot number. The processor/wholesaler introduce the dispatch information for the products and assign a unique identification for the products (TradeID). The processor/wholesaler select what information to be available on the products labels and on the consumer app;

- **Distribution monitoring process**: the goods are transported along the supply chain with information being recorded by each stakeholder. The consumer will be able to give feedback about the product he bought, and through the TraceID he will be able to collect/access information regarding that particular product through the consumer app.
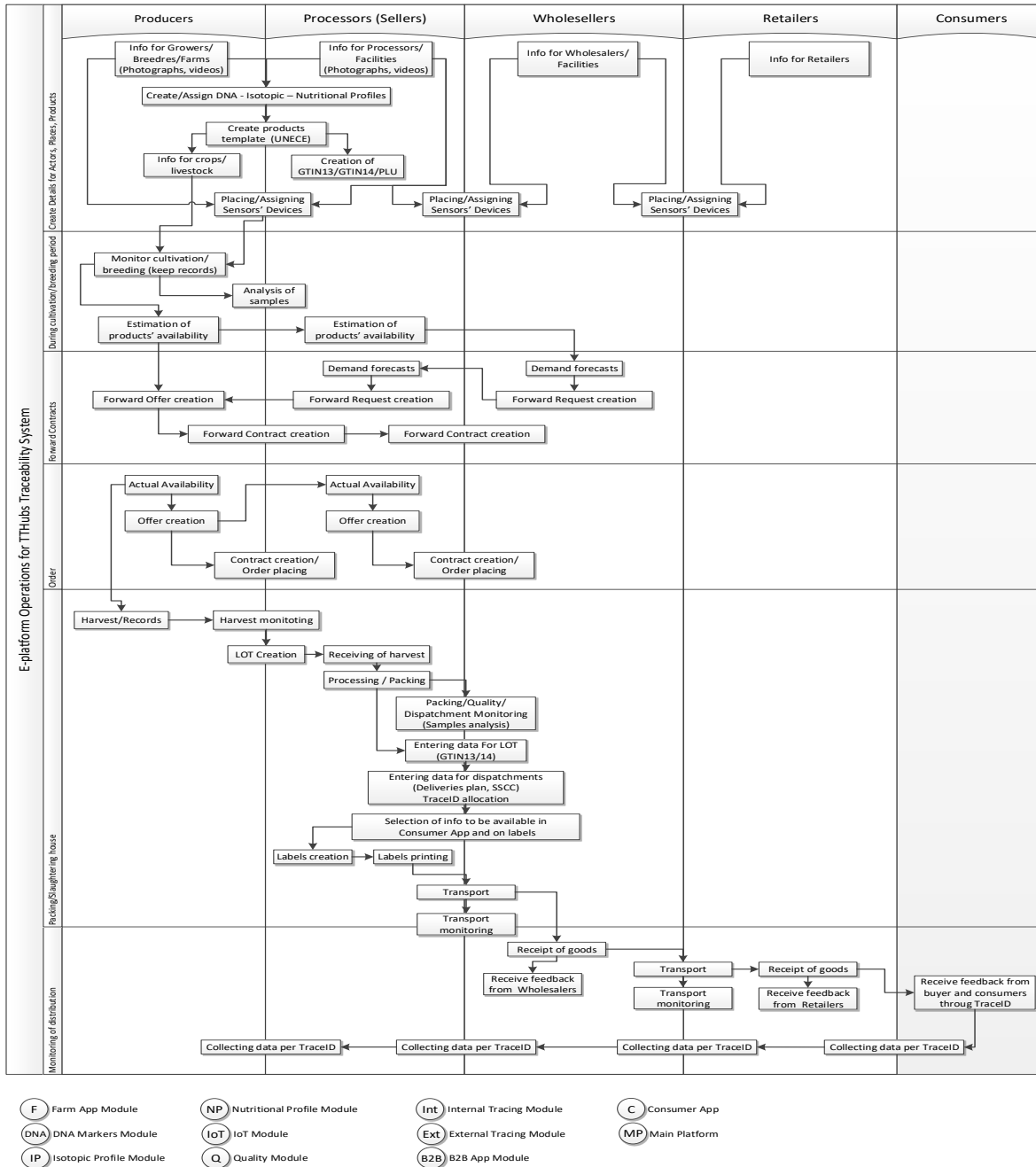
Figure 64 Overall e-Platform Traceability Process flow

6.2 B2B app module

The B2B app module will support business partners in managing product buying, selling and product monitoring. The main stakeholders involved in the buying and selling process are the producer and the wholesaler. The producer is involved in the processor's process of product availability predictions.

Figure 65 shows the overall B2B app module process flow with the following processes:

- **Forward contracts process**: The process starts with the producer's estimation of product availability which impacts the producer's estimations as well. The producer creates its products templates and creates forward contracts in accordance to the demand forecasts from the wholesaler, followed by a negotiation process between them;

- **Selling contracts process**: After the forward contract is created, the producer informs it' product availability, and this will impact the product availability from the processor's site. The producer creates its selling offer in accordance with the forward contract and the demand forecast from the wholesaler, followed by a negotiation process between them;

- **Monitoring of transactions**: The dispatchment process follows after the selling contract is settled and the data regarding the product's whereabouts and conditions are recorded in the internal and external tracing module during their transportation.

Figure 65 also presents the processes P01 through P06 which is further detailed and corresponds to:

- The Forward-offer creation process (P01) on Figure 66. In this process, the seller (Processor) creates a forward offer in one of the following ways: creates a brand new offer from scratch, creates an offer from an existing offer, creates an offer from an existing forward offer or creates a forward offer as an answer to a forward request from the buyer (wholesaler). In the forward offer, the characteristics information of the products is introduced, as well as the description of the production place, certifications, order details, recipient's list and the summary of the forward offer. A forward offer can be cancelled, suspended, edited and published. Once the forward offer is created, it is made available to the wholesaler;

- The Forward-request creation process (P02) on Figure 67. In this process, the trader (wholesaler) creates a forward request in one of the following ways: creates a brand new request from scratch, creates a request from an existing offer, creates request from an existing forward offer or creates a forward request from an existing forward-request. In the forward request, the characteristics information of the products is introduced, as well

as the description of the production place, certifications, order details, recipient's list and the summary of the forward offer. A forward-request can be cancelled, suspended, edited and published. Once the forward-request is created, it is made available to the seller (Processor);

- The Forward-agreement process (P03) on Figure 68. The forward agreement process starts with a forward-offer published by the seller. The trader either accepts the offer, declines it or negotiates/submits a counteroffer to the seller. If the trader accepts the offer, the forward contract is settled both parties move on to the selling contract process. If the trader declines the offer, the negotiation is terminated. If the trader submits a counteroffer, the seller can either accept it, or reject it. There is also the possibility to modifying the contract's conditions when the contract is accepted by both parties;

- The Offer creation process (P04) on Figure 69. In this process, the seller (Processor) creates an offer in one of the following ways: creates a brand new offer from scratch, creates an offer from an existing offer, creates an offer from an existing forward offer, create an offer as an answer to a request or creates an offer related to a forward contract. In the offer, the characteristics information of the products is introduced, as well as the description of the production place, certifications, order details, logistics details, recipient's list and the summary of the offer. An offer can be cancelled, suspended, edited and published. Once the offer is created, it is made available to the wholesaler;

- The Request creation process (P05) on Figure 70. In this process, the trader (wholesaler) creates a request in one of the following ways: creates a brand new request from scratch, creates request from an existing request, creates a request from an existing forward offer, create a request from an existing forward-request or creates a request offer related to a forward contract. In the request, the characteristics information of the products is introduced, as well as the description of the production place, certifications, order details, logistics details, recipient's list and the summary of the request. A request can be cancelled, suspended, edited and published. Once the request is created, it is made available to the seller (processor);

The Details of Agreement process (P06) on Figure 71. The contract agreement process starts with an offer published by the seller. The trader either accepts the offer, declines it or negotiates/submits a counteroffer to the seller. If the trader accepts the offer, the forward contract is settled both parties move on to the selling contract process. If the trader declines the offer, the negotiation is terminated. If the trader submits a counteroffer, the seller can either accept it, or reject it. There is also the possibility to modifying the contract's conditions when the contract is accepted by both parties.
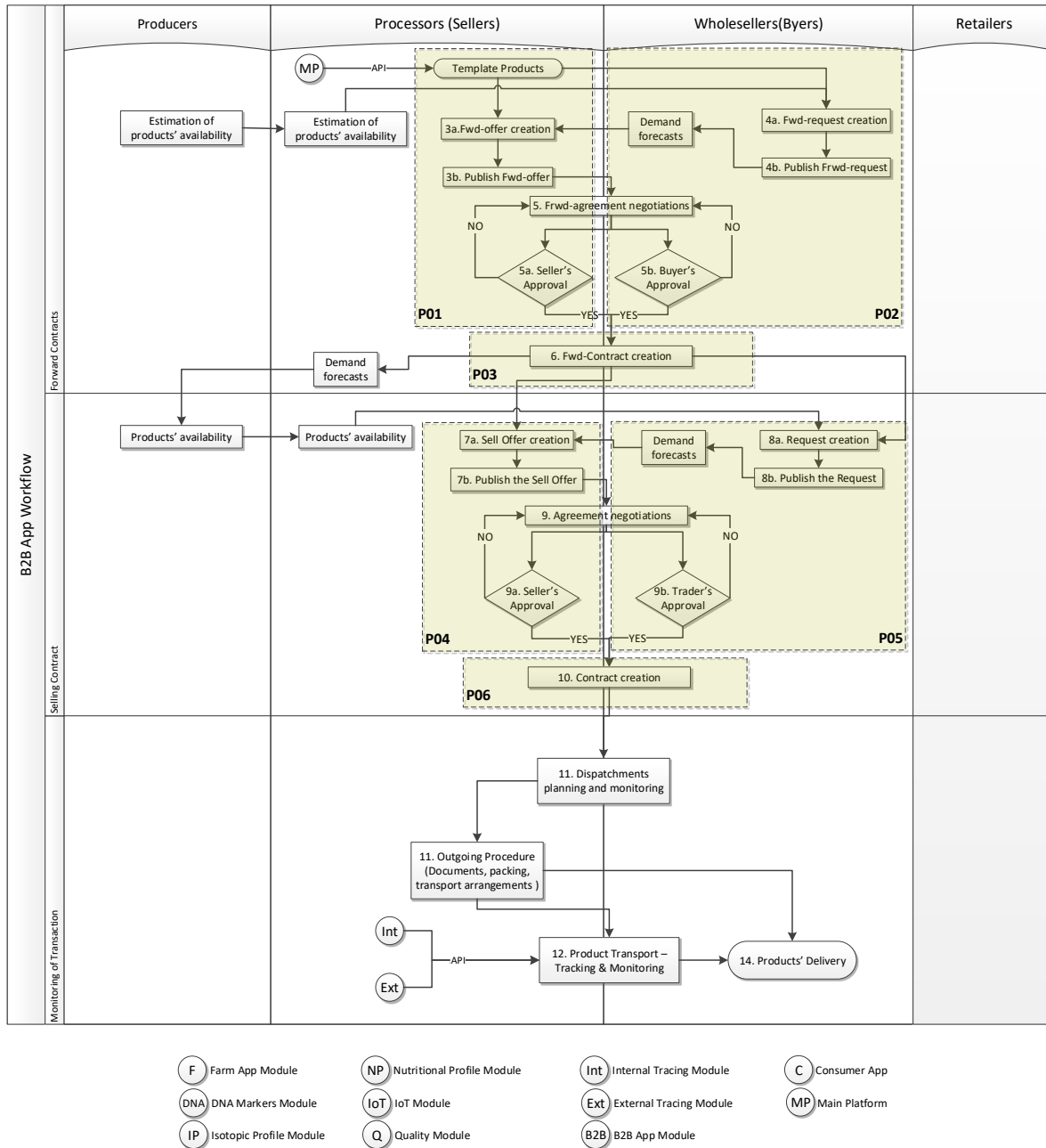
Figure 65 Overall B2B app workflow
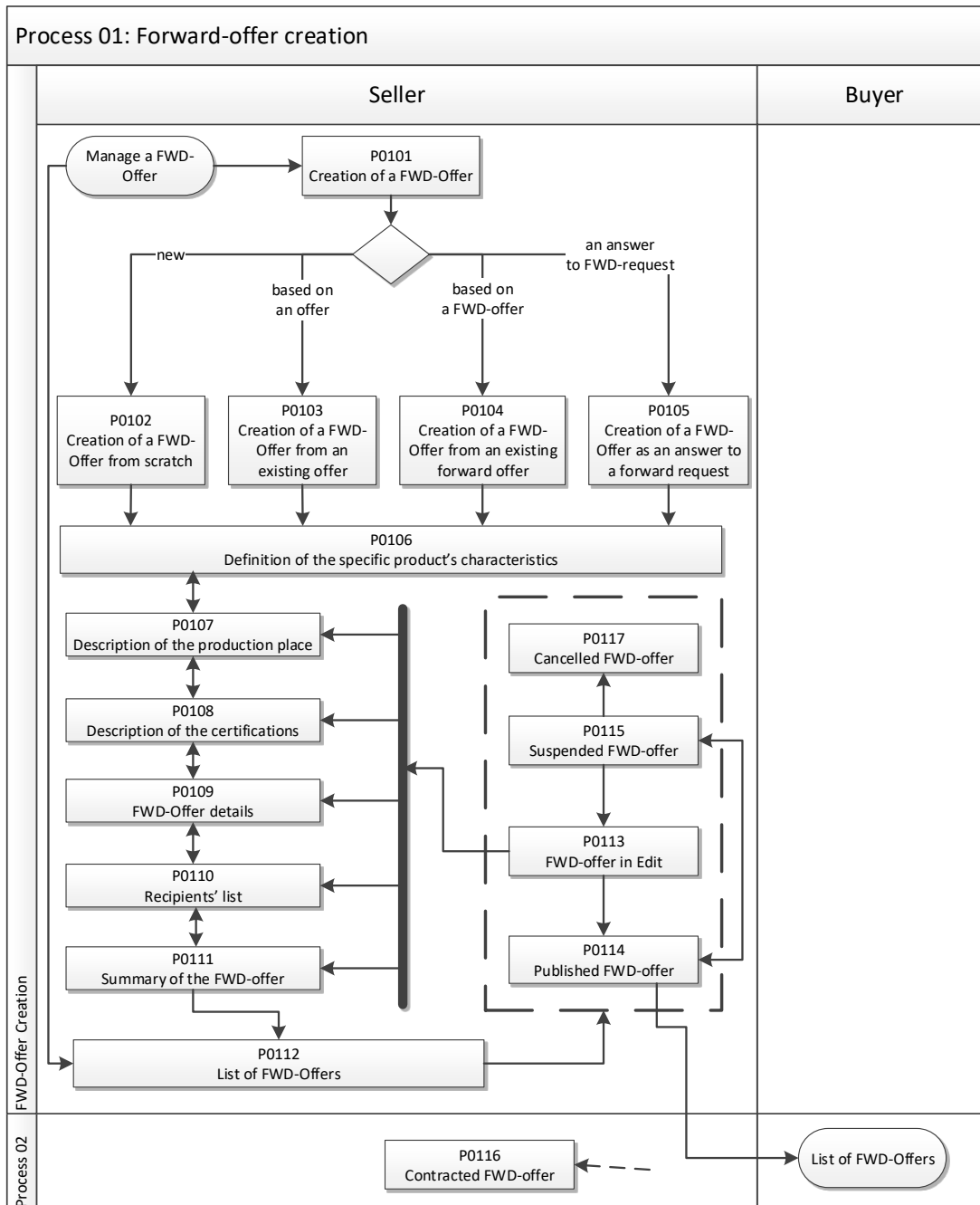
Figure 66 Details of Forward-offer creation process (P01 from overall B2B app workflow)
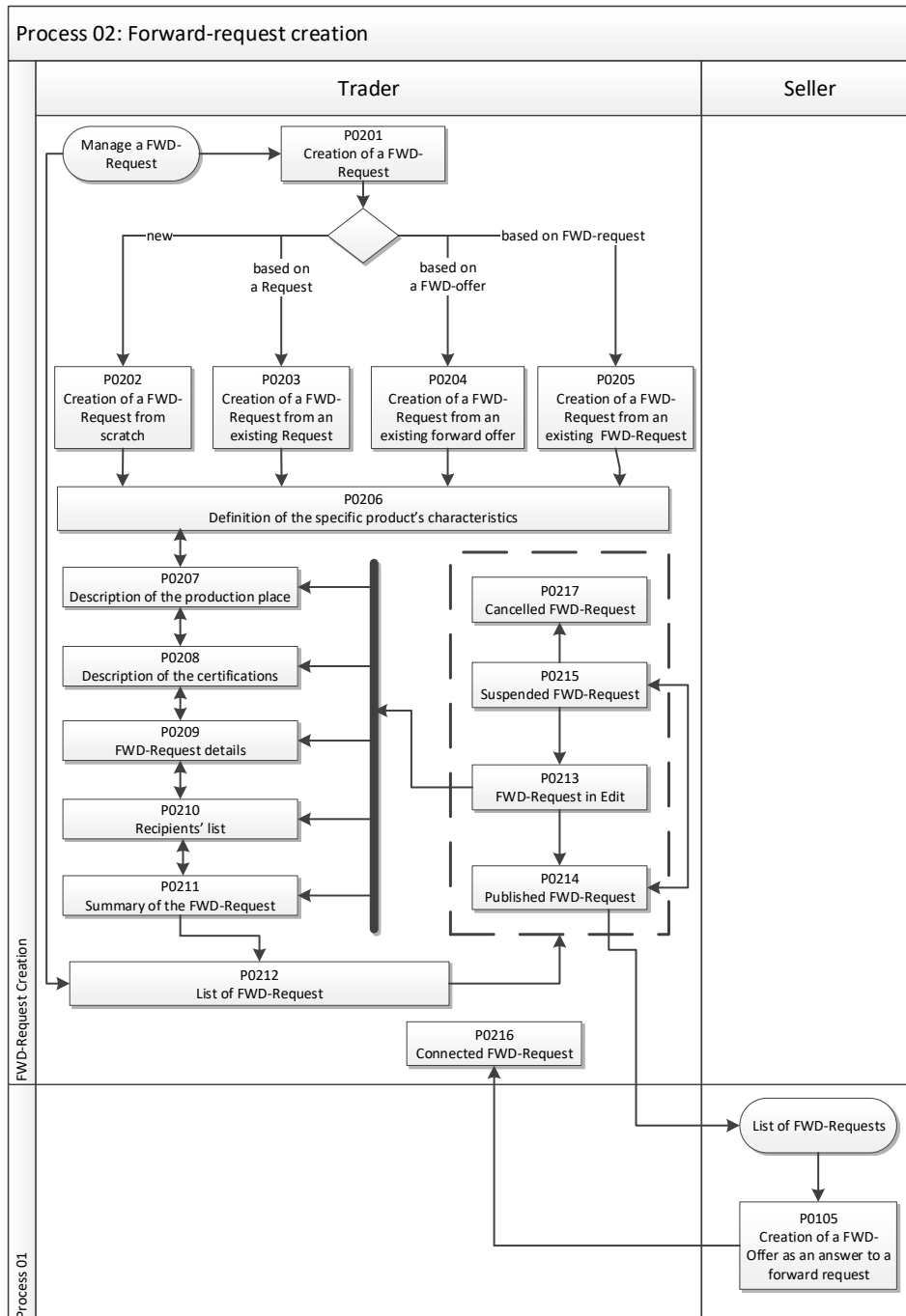
Figure 67 Details of Forward-request creation process (P02 from overall B2B app workflow)
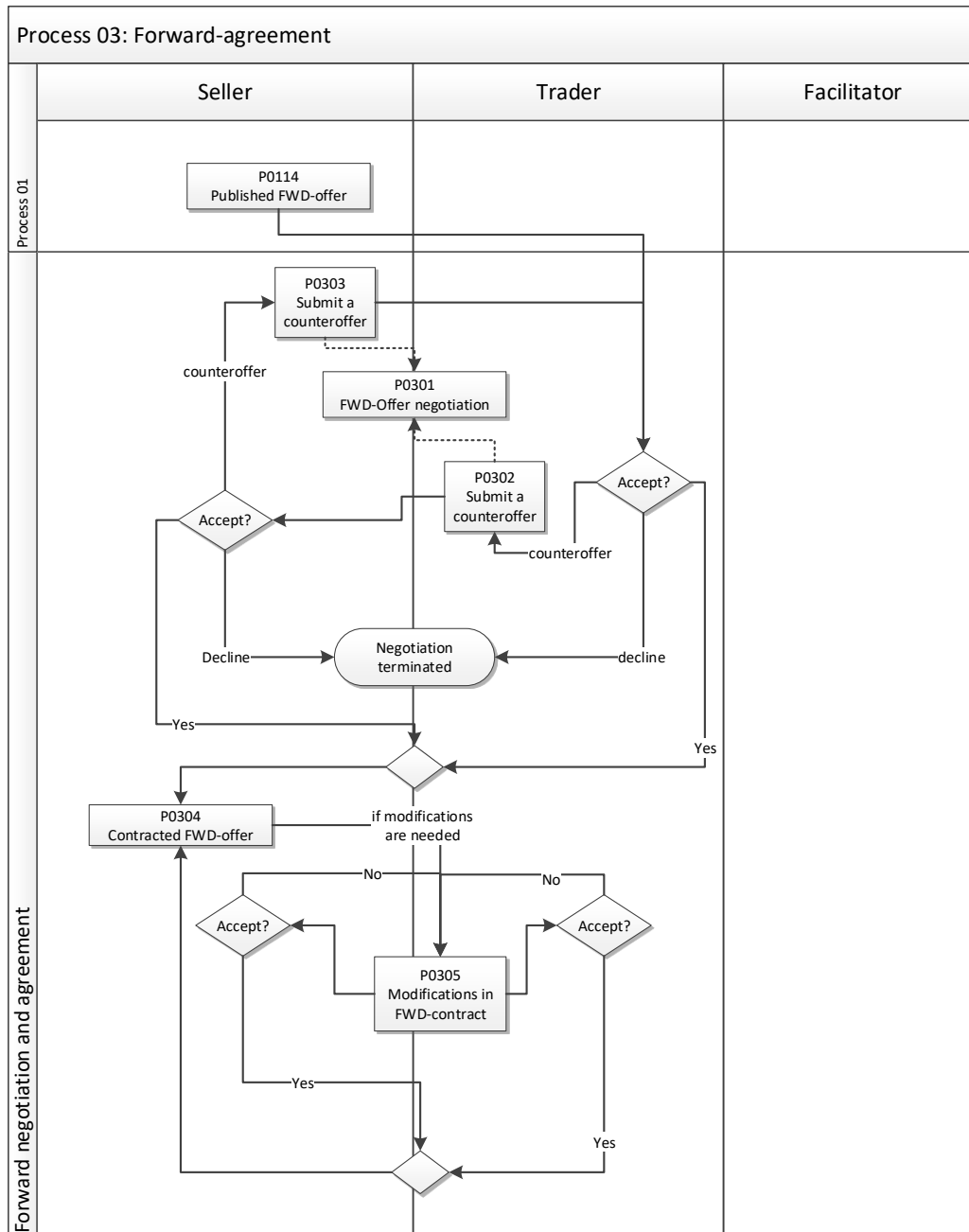
Figure 68 Details of Forward-agreement process (P03 from overall B2B app workflow)
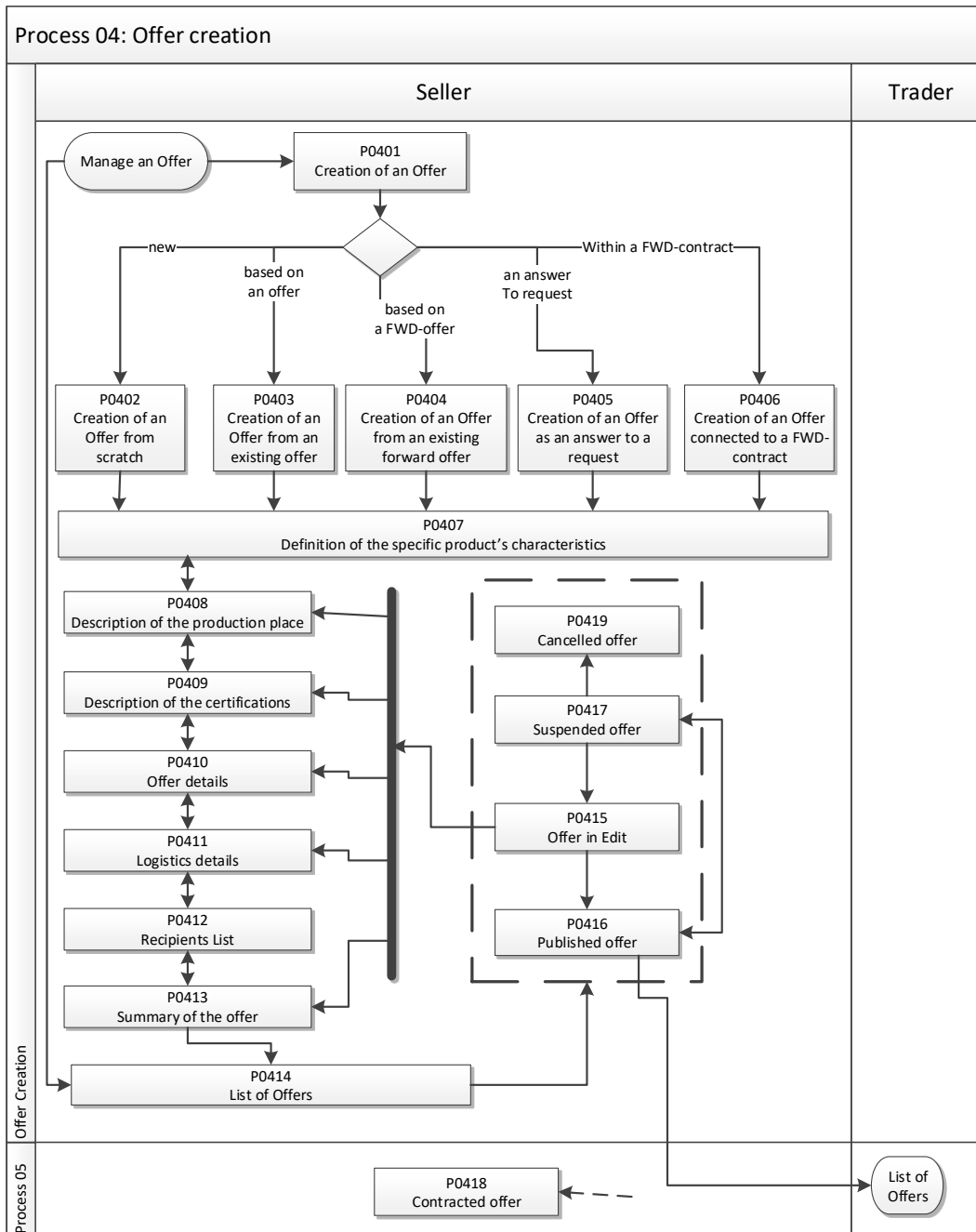
Figure 69 Details of Offer creation process (P04 from overall B2B app workflow)
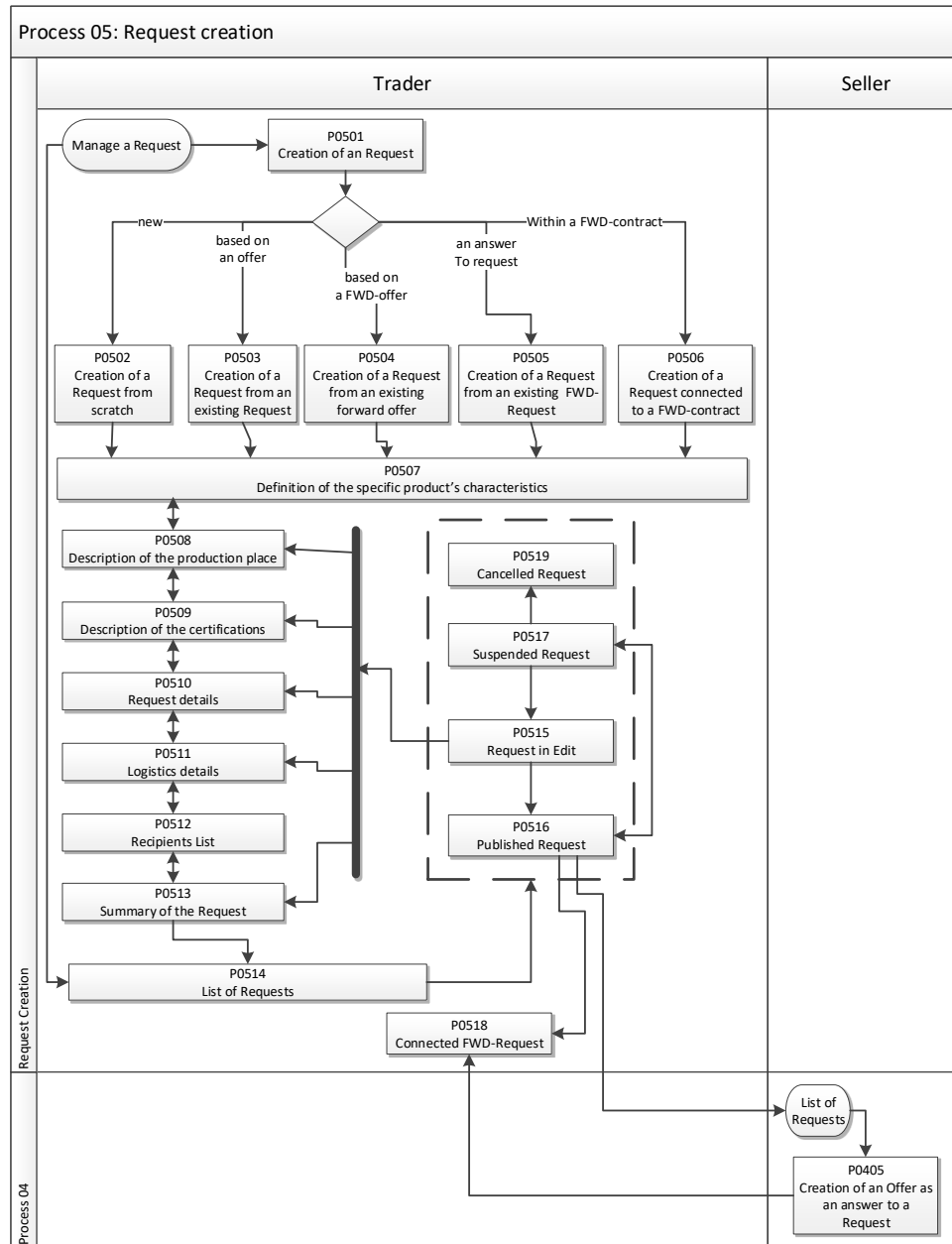
Figure 70 Details of Request creation process (P05 from overall B2B app workflow)
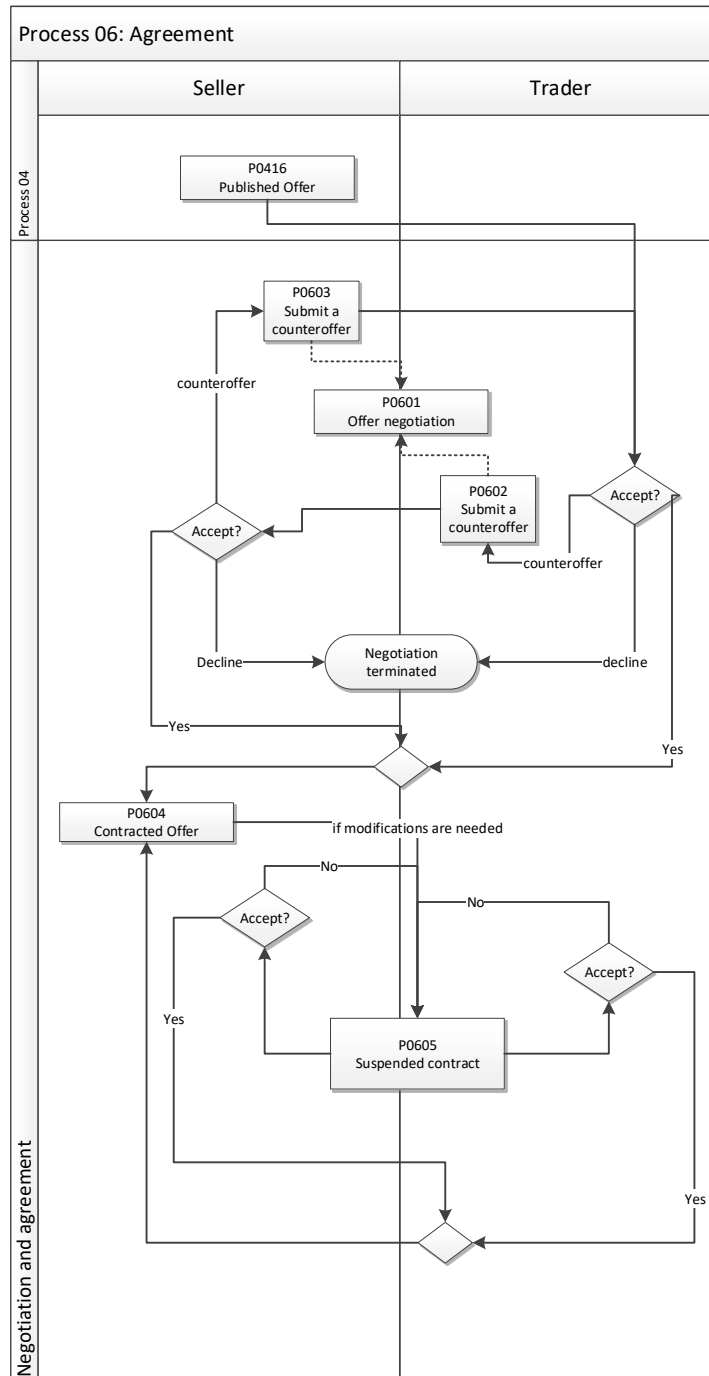
Figure 71 Details of Agreement process (P06 from overall B2B app workflow)

6.3 Consumer App Module

The consume app module will support the customer on finding products information regarding it's provenance and authenticity, journey and nutritional profile.

Figure 72 shows the overall consumer app module process flow with the following processes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The products templates must be synchronized with the information present in the Nutritional Profile Module. The producer/processor creates and manages the nutritional profiles and also assigns the GTIN of their product to the respective nutritional profile present in the Nutritional Profile Module;

- **Creation of product instance**: the producer/processor produces the product and assigns a lot number to identify the product instance;

- **Product selling**: Consumer buys the products. The journey of the products are recorded in the IoT, internal and external tracing modules;

- **Checking product story**: The consumer can access to the journey of the products he buys with the Consumer app.
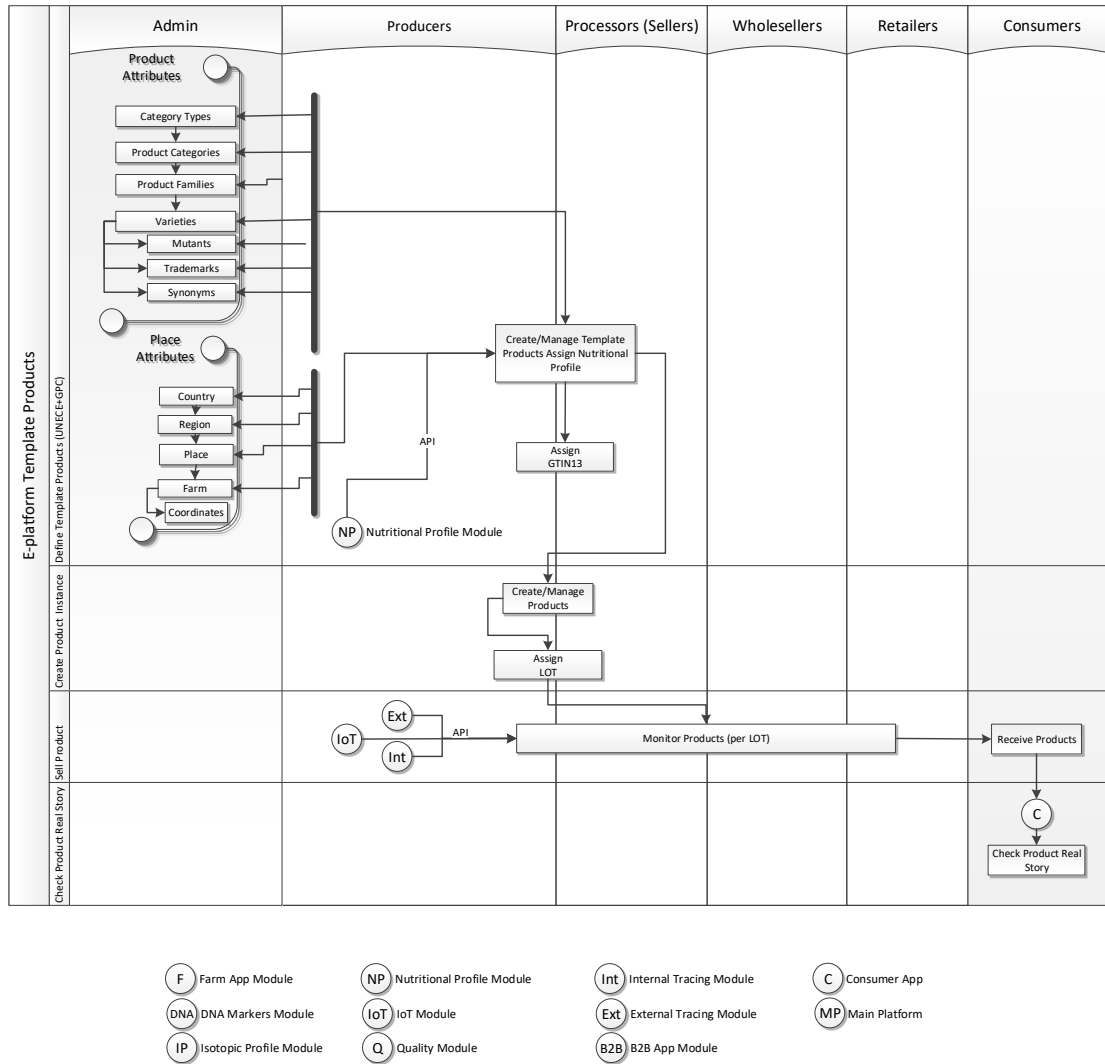
Figure 72 Process flow for the overall system, related to the consumer app module

Figure 73 shows the following processes of the consumer app module:

- **Consumer sign up and scan process**: to use the consumer app, the consumer must sign up. Upon receiving the products, the customer can scan the QR code presented on the label of the product or simply introduce the TradeID (also in the product label);

- **Product story checking process**: the consumer can check the information of the products for a specific lot number. He can also evaluate the products, giving feedback to the supply

chain stakeholders. These stakeholders controls the information they want to make available to the consumer;

- **Nutritional profile checking process**: the consumer can check the nutritional profile of the products he bought and also check for more adequate information to his nutritional needs/conditions.
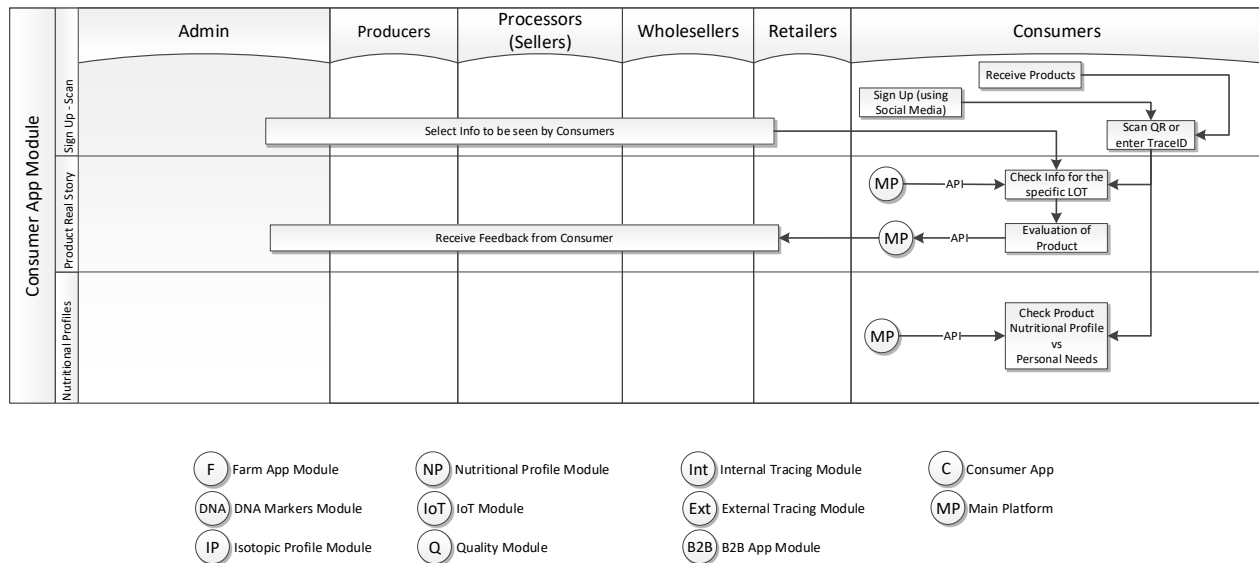
Figure 73 Consumer app module process flow

6.4 Farm App Module

The farm app module will assist the farmers in introducing the information regarding their products, keep track of and manage the activities on their farms.

Figure 74 shows the overall farm app module process flow with the following processes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The producer/processor creates and manages their products templates and also assigns the GTIN of their products to the respective product templates;

- **Creation of product instance**: the producer/processor produces and manages their crops/products.

- **Farm records keeping**: through the connection with the IoT module and the Farm app module, the Producer can monitor the cultivation/breeding. The respective products that are monitored The producers/consumers assigns the lot number to the product instances.
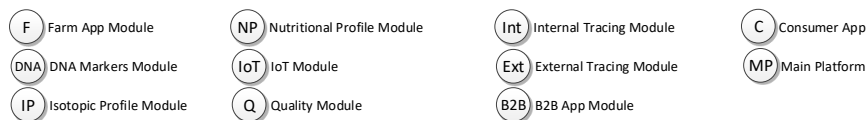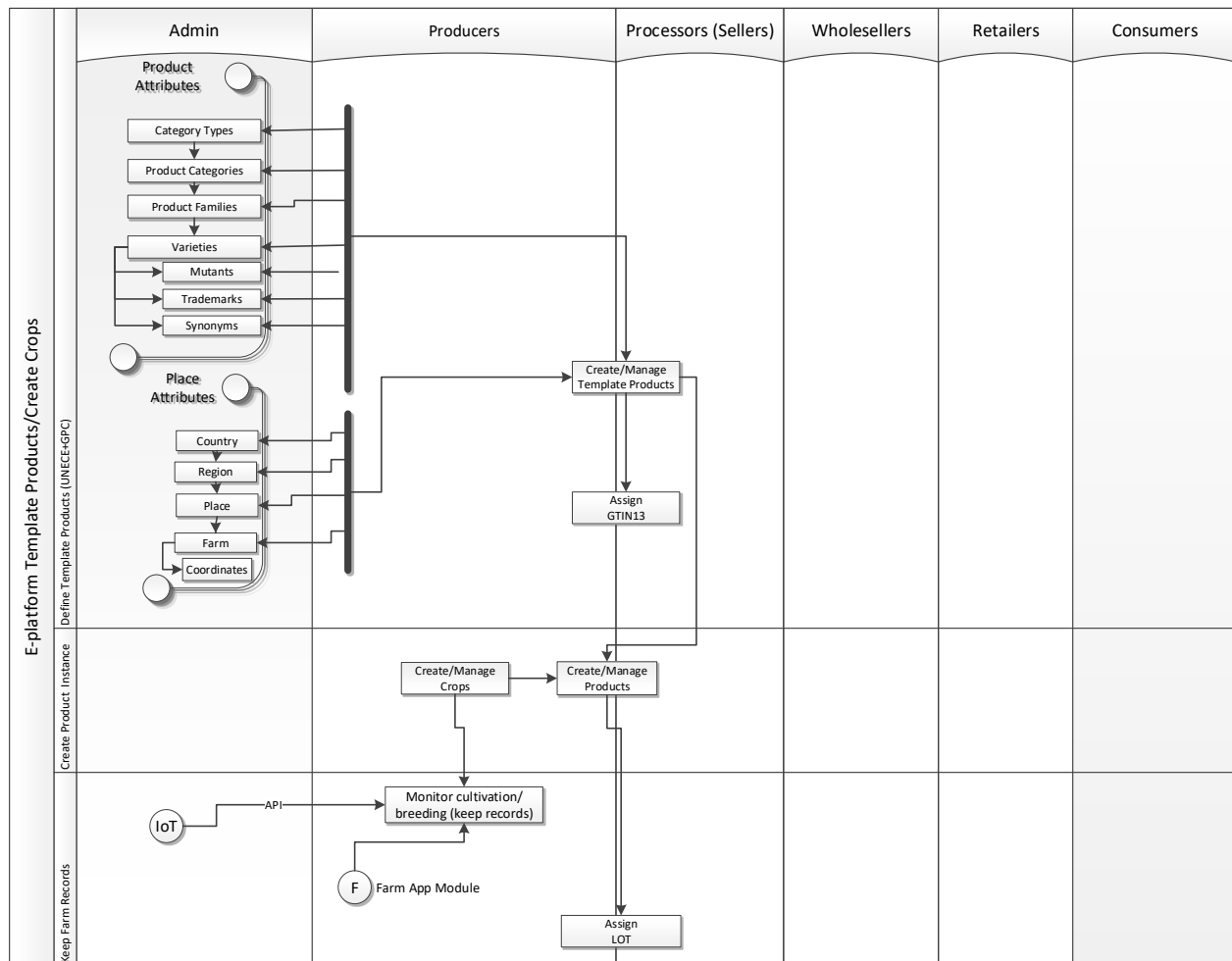
Figure 74 Process flow for the overall system, related to the farm app module

Figure 75 shows the records keeping and checking processes on the farm app module. It includes:

- **Records keeping through mobile device**: through the farm app module, the producer scans objects an attach them to activities, record geotagged activities and sends them to the e-Platform;

- **Details addition on site activities**: the producer can also add details to the activities on the web version of the farm app module;

- **Records/events checking process**: the farm IoT module is connected to the farm app module. Every registered activity, and the information from the IoT modules, can be checked by the farmer for correctness. This record/events checking process serves as a validation or correction of registered information. The Processors, wholesalers and retailers can check the events as well.
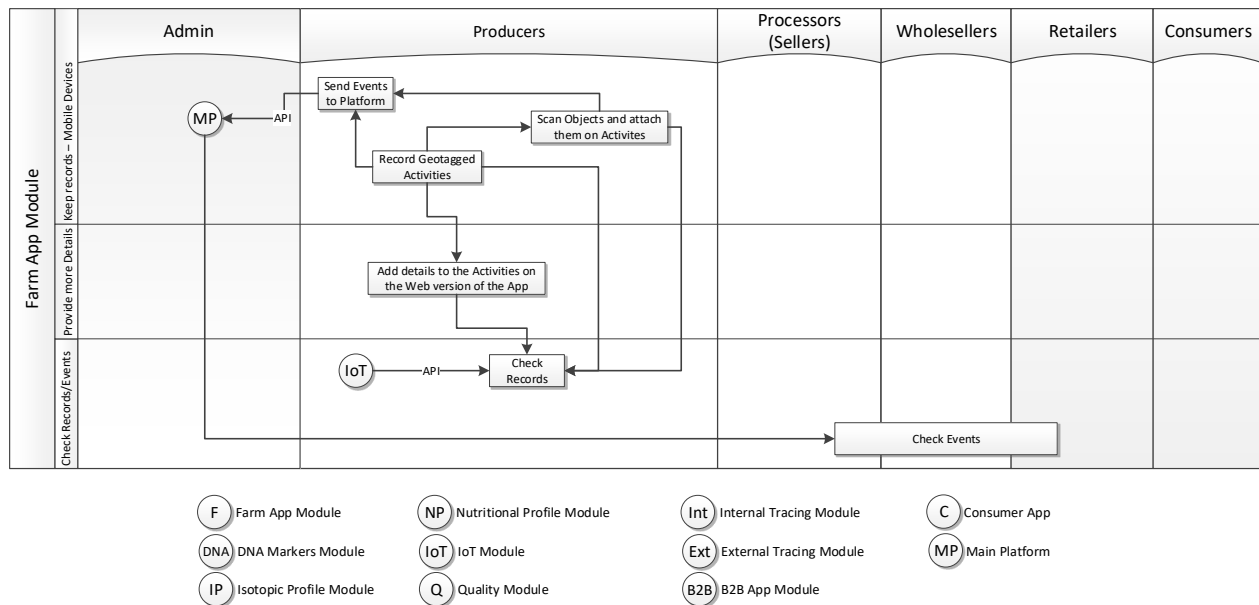
Figure 75 The farm app process flow

6.5 IoT Module

The IoT module will support the management of IoT devices placed by the supply chain stakeholders to monitor sites and products conditions.

Figure 76 shows the overall IoT module process flow with the following processes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The producer/processor creates and manages their products templates and also assigns the GTIN of their products to the respective product templates. The producers, processors, wholesalers and retailers pace/assign sensors' devices.

- **Place/product monitoring:** the producer/processor creates and manages their crops/products and assigns lot number to the products. The whole process is monitored for environmental conditions.
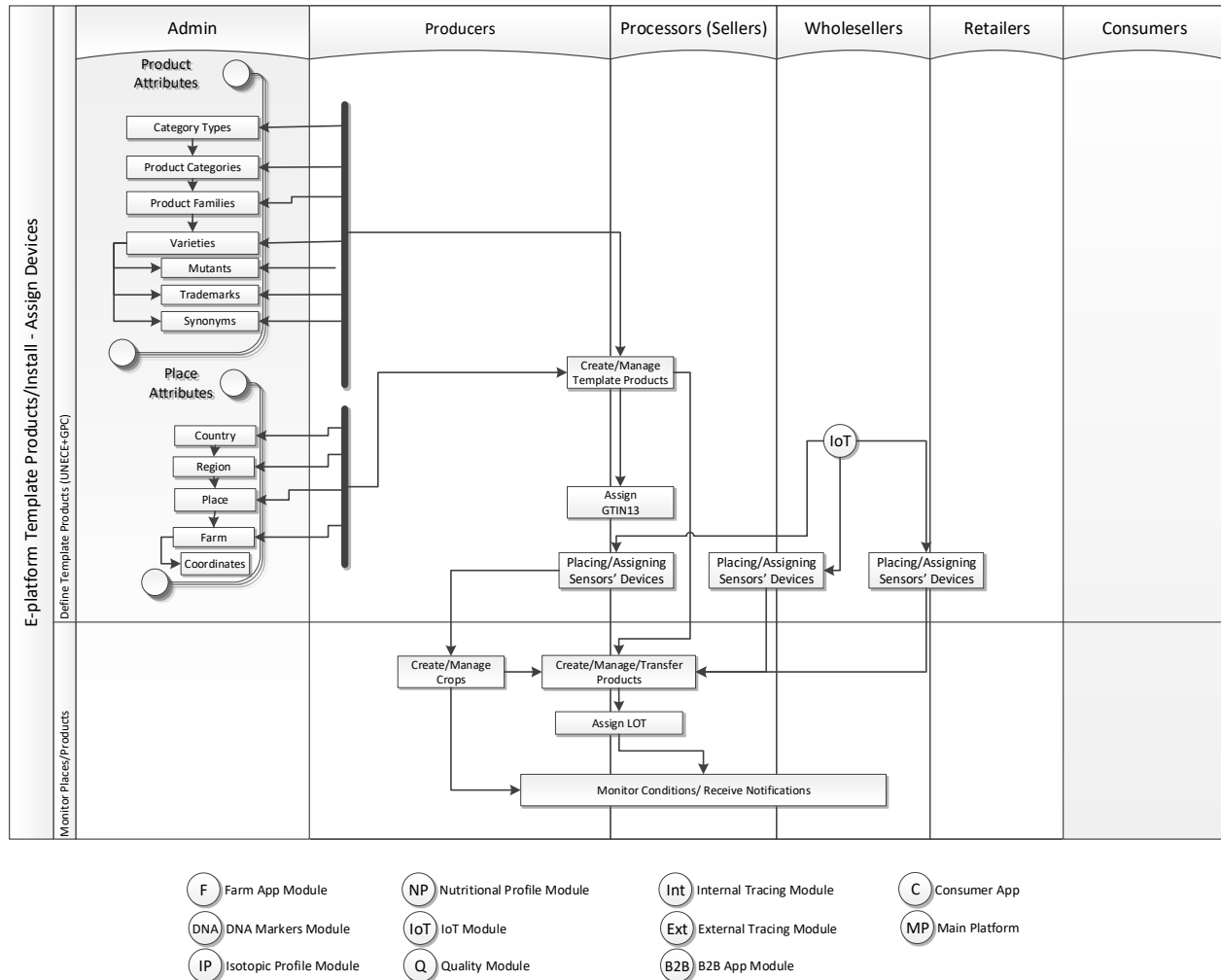
Figure 76 Process flow for the overall system, related to the IoT module

Figure 77 shows the processes, from device installation to condition monitoring with the IoT module. It includes:

- **Device installation**: during this process, producers, processors and wholesalers install and register their devices and assign them to places or products. The assignment of places and products is communicated to the e-Platform;

- **Notification setup process**: producers, processors and wholesalers setup the notifications for their devices;

- **Conditions monitoring process**: through the notifications from the devices, the producer, processor and wholesaler can check products or places conditions and create events for specific notifications that is further communicated to the e-Platform.
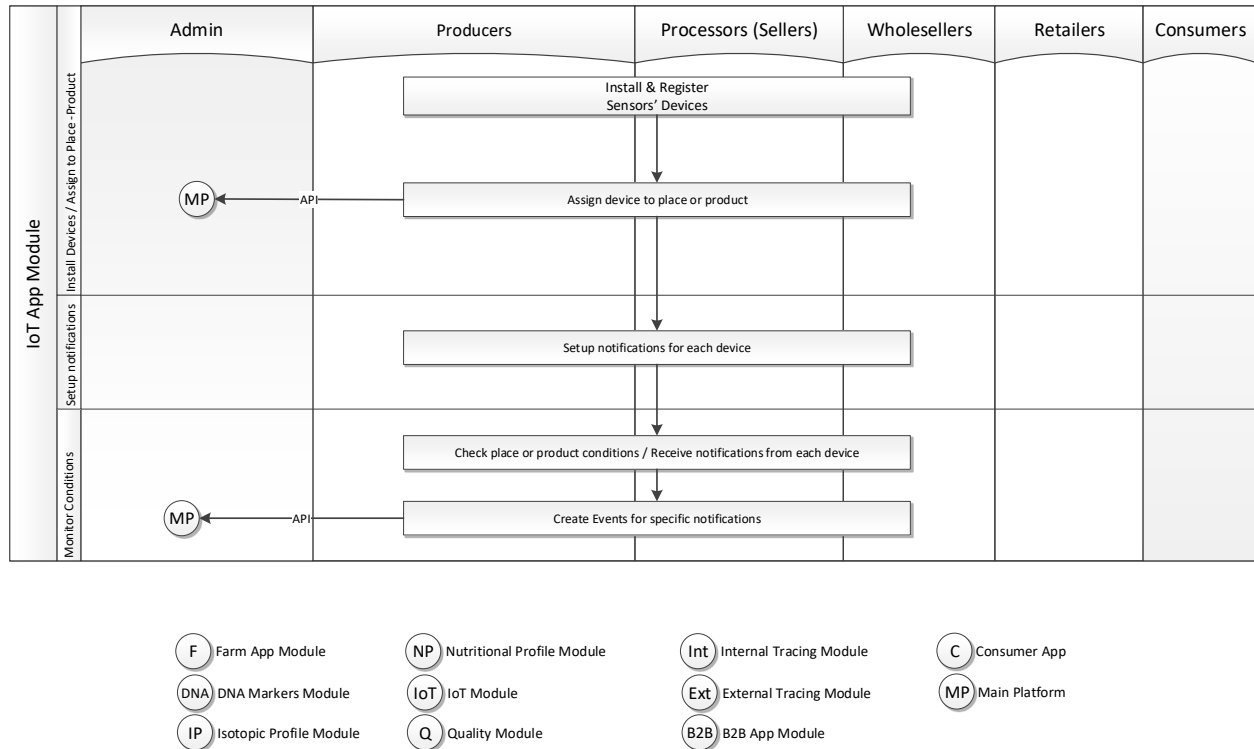
Figure 77 Process flow for the IoT module

6.6 Quality Module

The quality module will enable producers and processors to place their quality certifications concerning their products for any stakeholder of the supply chain to check.

Figure 78 shows the process behind the assignment and the verification of quality certifications of a particular GTIN. It includes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The products templates must be

synchronized with the information present in the Quality Module. The producer/processor creates and manages the quality certifications and also assigns the GTIN of their product to the respective certifications present in the Quality module;

- **Creation of product instance**: the producer/processor produces the product and assigns a lot number to identify the product instance;

- **Product selling**: Consumer buys the products;

- **Quality certifications checking process**: upon product reception, processors, wholesalers retailers and consumers can check the quality certifications present in the quality module.
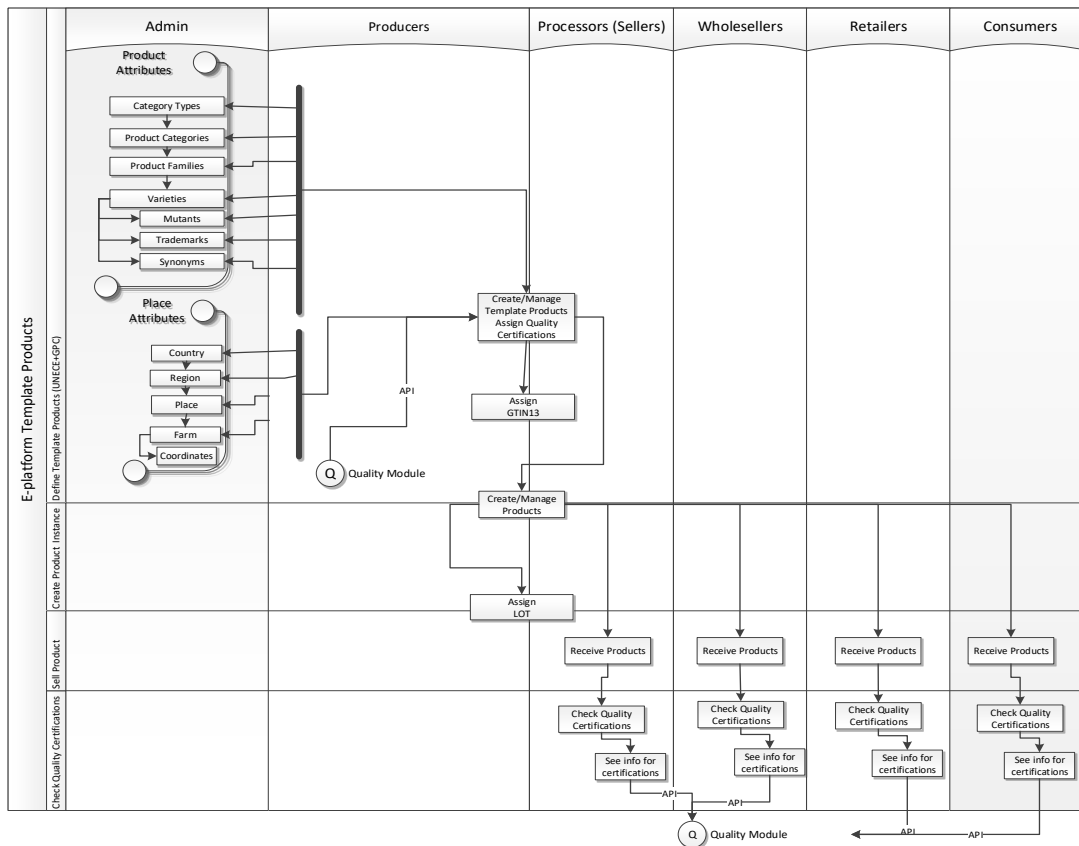
Figure 78 Process of creating, assigning and validating quality certification of a specific product GTIN

Figure 79 shows the certification evaluation process and the certification insertion into the Quality module. It includes:

- **Certifications definition process**: The administrator of the quality module creates the certification templates, their details and certification checklist for gap analysis. Producers, processors, wholesalers and retailer create/update their certification in the quality module.

- **Certifications self-evaluation:** producers, processors, wholesalers and retailers can fill-in certification checklist to perform a gap analysis;

- **Quality certification checking Process:** the processors, wholesalers, retailers and consumers can request certification information of a product recurring to the Quality module.
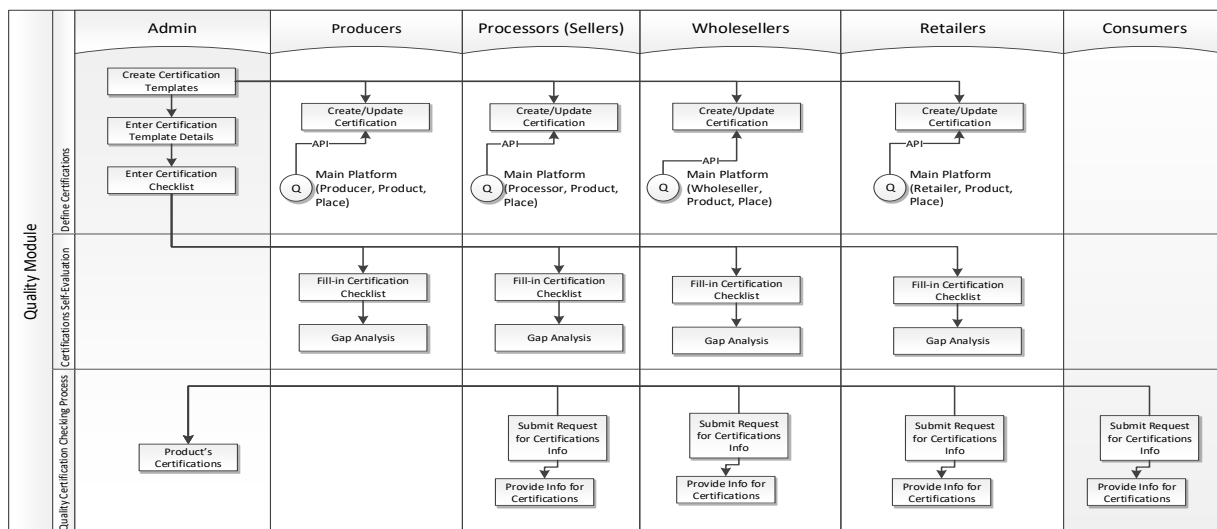
Figure 79 Quality Module process flow

6.7 Isotope Profile Module

The isotope profile module will enable any stakeholder of the supply chain to verify the origin of a product by comparing the isotope profile of a sample of the product with the isotope profile of a region stored on the module.

Figure 80 shows the process behind the assignment of the isotope profile to a particular GTIN. It includes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The products templates must be synchronized with the information present in the Isotopic Profile Module. The producer/processor creates and manages the isotopic profiles and also assigns the GTIN of their products to the respective profile present in the Isotope Profile module;

- **Creation of product instance**: the producer/processor produces the product and assigns a lot number to identify the product instance;

- **Product selling**: the processor wholesaler, retailer and consumer receive the product;

- **Isotope profile validation**: upon product reception, processors, wholesalers retailers and consumers can send samples of the product for analysis to the Isotopic Profile Module.
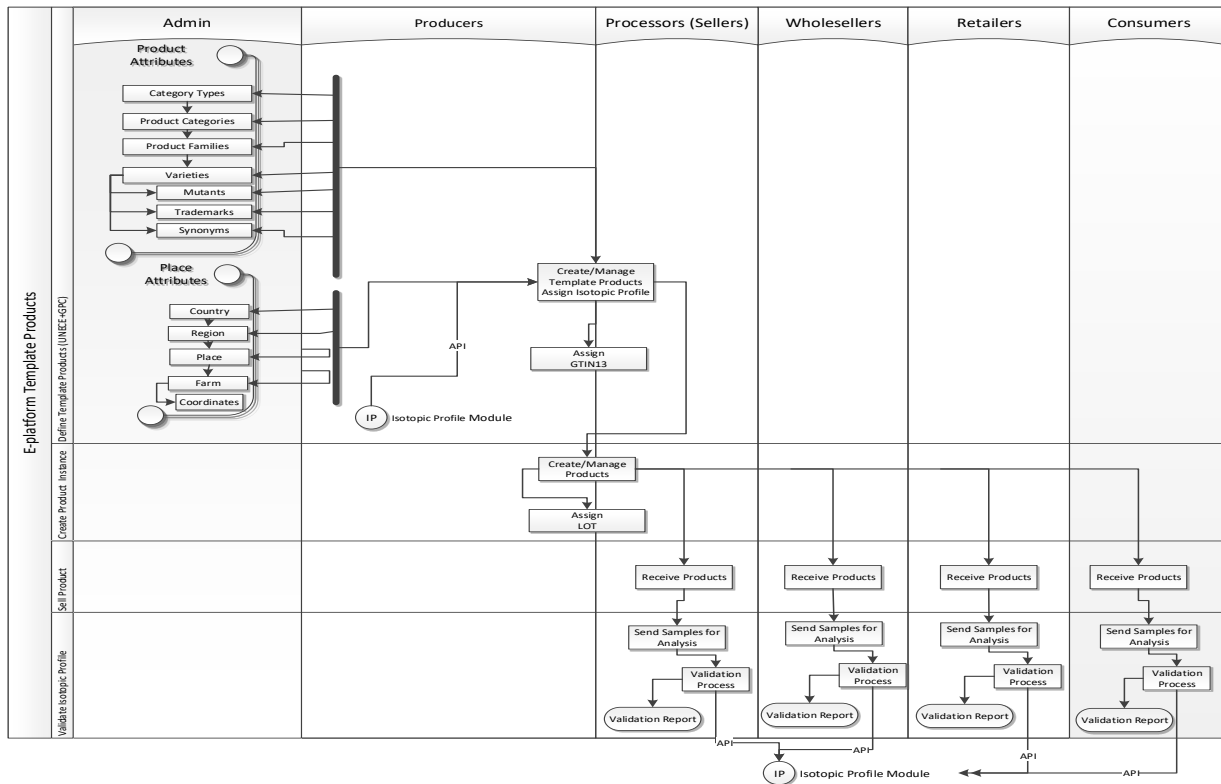
Figure 80 Process of creating, assigning and validating Isotope profile to a specific product GTIN

Figure 81 shows the process isotope creation and verification processes recurring to the Isotope profile module. It includes:

- **Isotope profile creation process**: the administrator of the Isotopic Profile Module creates the isotopic profile template and enters the isotopic profile values for the products. The administrator uses the product's specific attributes, as well as places attributes that are filled by the producers and processors and available through the e-Platform.

- **Isotope profile verification process:** the processors, wholesalers, retailers and consumers can submit isotopic profile for comparison to the respective profile stored in the module.
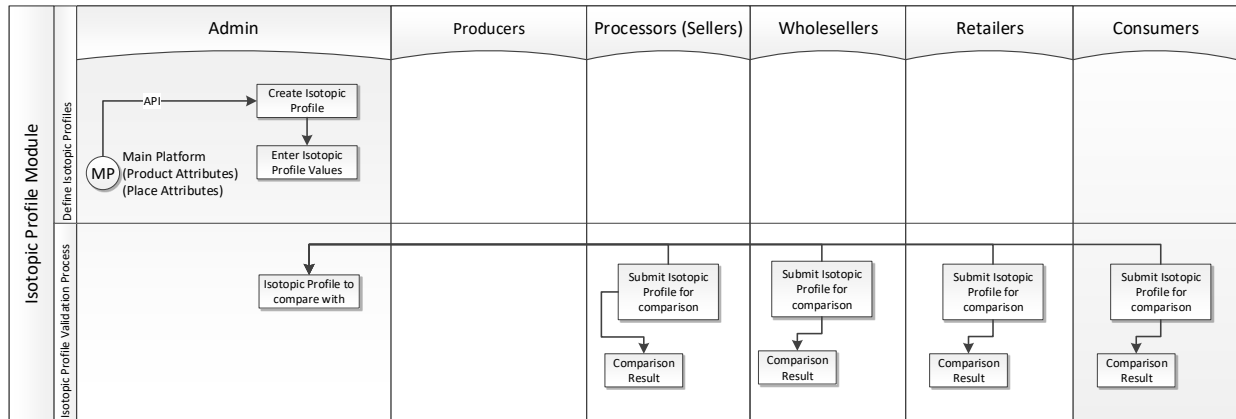
Figure 81 Isotope profile module process flow

6.8 DNA Marker Module

The DNA marker module will enable every participant of the supply chain to authenticate products by checking the DNA of a product sample with the DNA sample stored in the module.

Figure 82 shows the processes behind the assignment of a DNA profile to a particular GTIN and its validation. It includes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The products templates must be synchronized with the information present in the DNA Markers Module. The producer/processor creates and manages the DNA markers and also assigns the GTIN of their product to the respective profile present in the DNA Markers module;

- **Creation of product instance**: the producer/processor produces the product and assigns a lot number to identify the product instance;

- **Product selling**: the processor wholesaler, retailer and consumer receive the product;

- **DNA marker validation**: upon product reception, processors, wholesalers, retailers and consumers can send samples of the product for analysis validation/comparison of the DNA markers of the samples with the respective DNA markers present in the module.
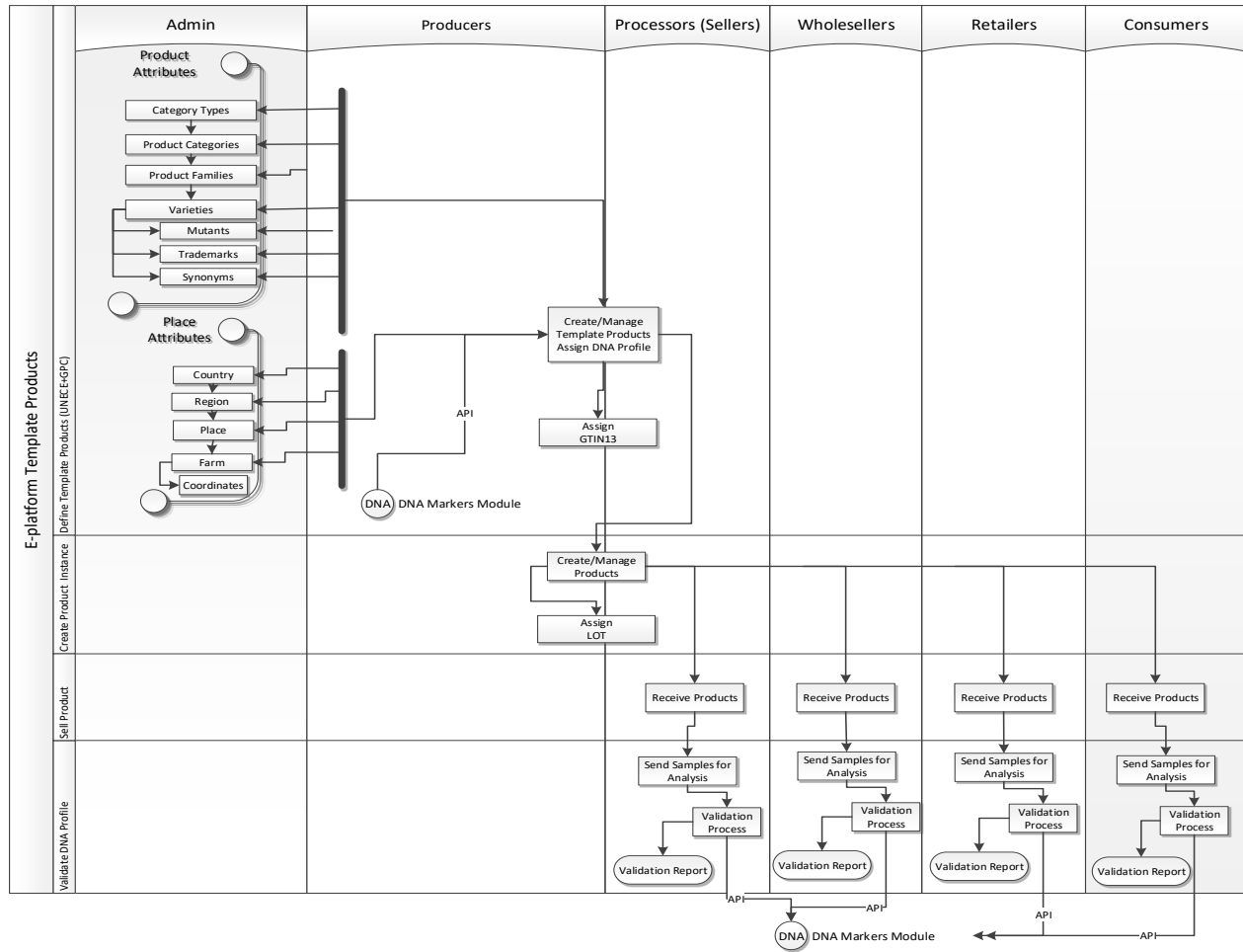
Figure 82 Processes of creation, assigning and verifying DNA profile to a specific product GTIN

Figure 83 shows the creation and comparison processes of the DNA markers module. It includes:

- **DNA profile creation process**: the administrator of the DNA Marker Module creates the DNA profile template and enters the DNA marker values for the products. The administrator uses the product's specific attributes that are filled by the producers and processors and available through the e-Platform.

- **DNA marker verification process:** the processors, wholesalers, retailers and consumers can submit DNA marker profile from product sample for comparison to the respective marker stored in the module.
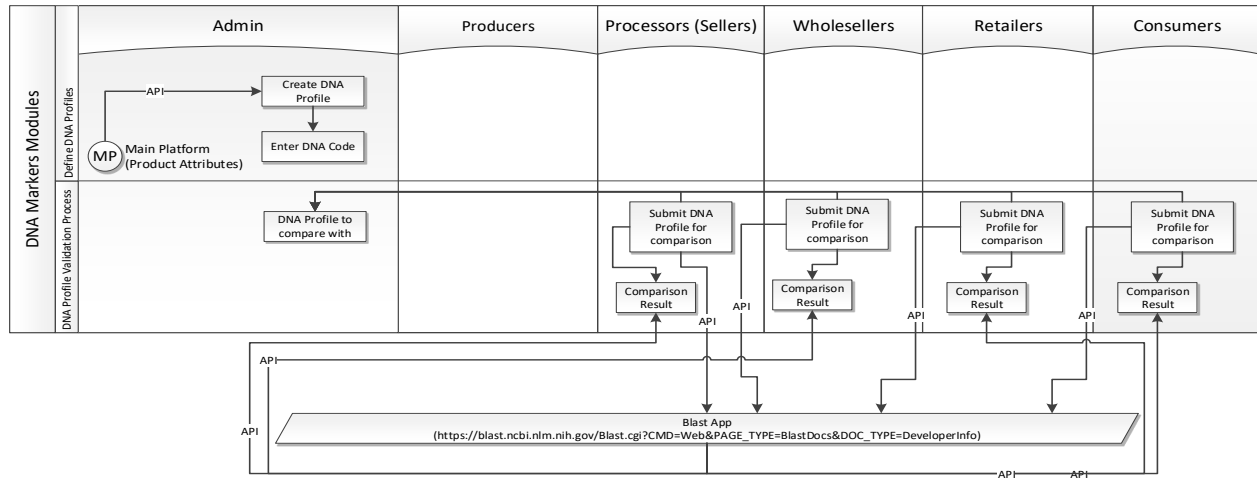
Figure 83 DNA Markers Module process flow

6.9 Nutritional Profile Module

The nutritional profile module will enable the consumer to more detailed nutritional information regarding the product, compared to the nutritional information present on the product labels.

Figure 84 shows the processes behind the assignment of a nutritional profile to a particular GTIN and its validation. It includes:

- **Definition of template product**: the system's administrator will create the product templates with attributes for the products (e.g., product categories/families, trademarks) and places (e.g., country/region, farm, coordinates). The products templates must be synchronized with the information present in the Nutritional Profile Module. The producer/processor creates and manages the Nutritional Profile and also assigns the GTIN of their product to the respective profile present in the module;

- **Creation of product instance**: the producer/processor produces the product and assigns a lot number to identify the product instance;

- **Product selling**: the consumer receives the product;

- **Nutritional Profile checking**: upon product reception the consumers can check the nutritional profile of the product, or find more information of the product specific to the customer's health conditions/diet.
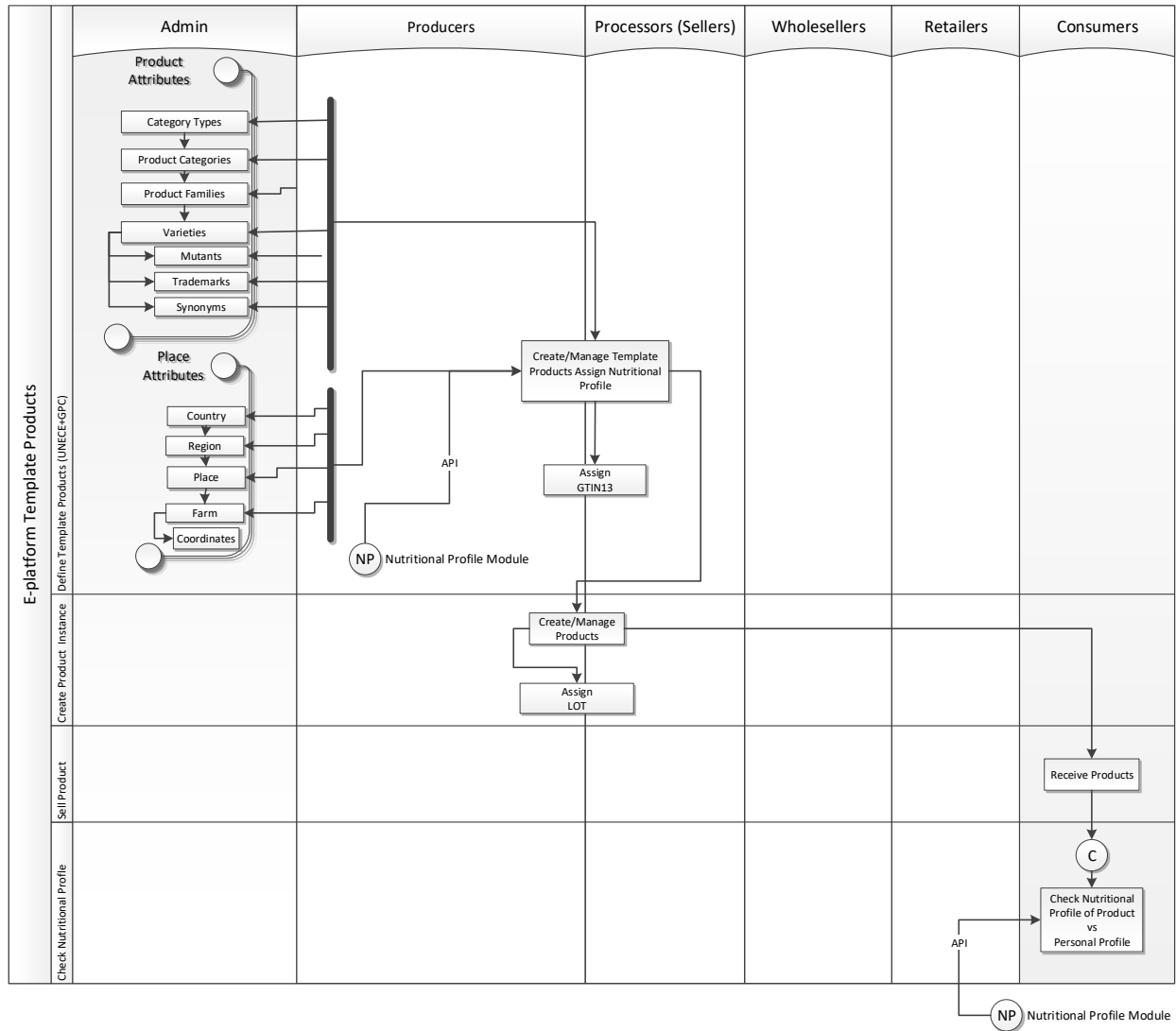
Figure 84 Processes of creating, assigning and checking nutritional profile of a specific product GTIN

Figure 85 shows the nutritional module process flow. It includes:

- **Nutritional profile definition process**: the administrator of the Nutritional Profile Module creates the nutritional profile template, adding parameters values for the products. The products profiles can be accessed and changed by the respective producers and processors in the e-Platform. The consumer can access the nutritional profile of a product recurring to the Consumer's App.

- **Consumer nutritional profile definition process:** the administrator of the Nutritional Profile Module creates the consumer nutritional profile related with specific diets of products and the consumer can visualize the nutritional profile adequate to his health conditions/diet.
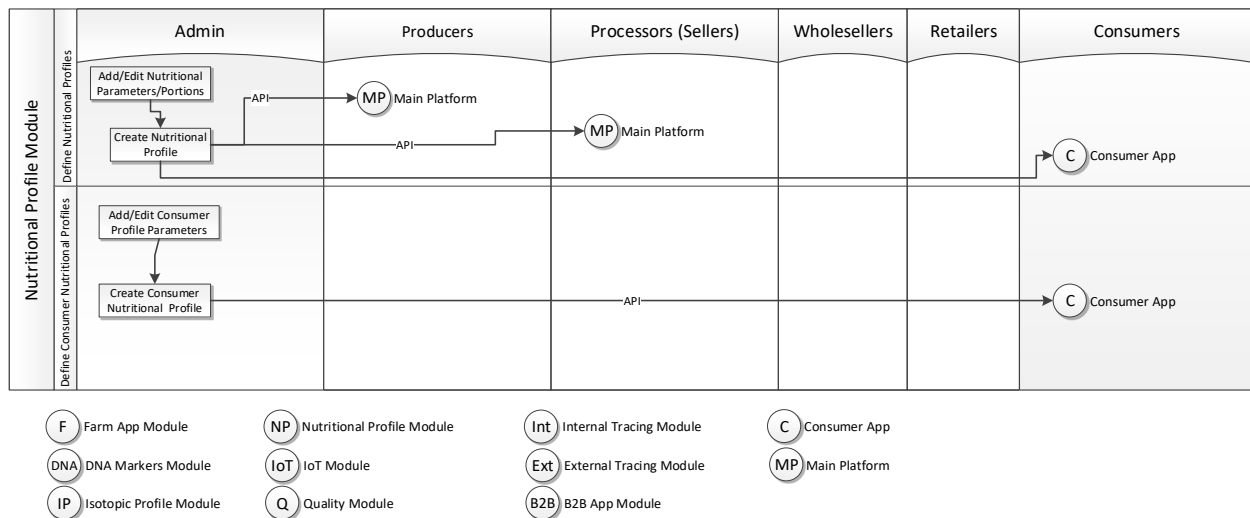
Figure 85 Nutritional profile module process flow

6.10 Internal/External tracing module

The internal/external tracing module will enable events logging concerning the products throughout the whole supply chain.

Figure 86 shows the overall Internal/external tracing module process flow evidencing data capture and viewing processes. Events in the supply chain can be created in two ways:

- Either by changing the manually introducing the information on the e-Platform;

- Or via the IoT generated events.

The stakeholders can view the events they created, as well as the events on the downstream and upstream of the products.

The events are captured in the following phases:

- During cultivation/breeding period;

- During transportation towards processing;

- During Packing/Slaughtering;

- During transportation towards market;

- During reception of products;

- Related to customer experience.
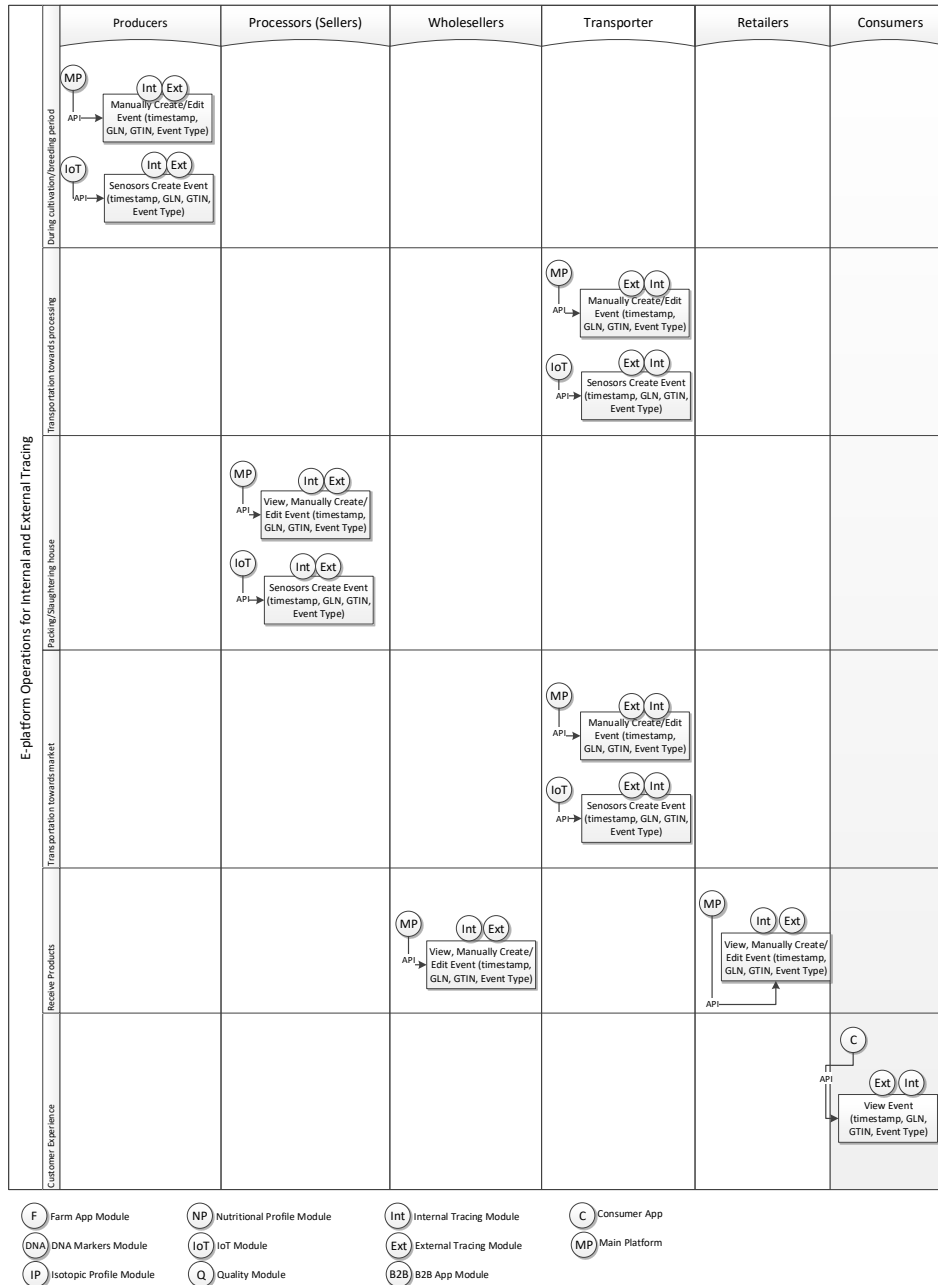
Figure 86 Process flow for the overall system, related to the external/internal tracing module

Figure 87 shows the authentication and the data exchange process between the e-Platform and the Internal/external tracing module.

- **Authentication Request process**: the e-Platform starts the authentication request process and the External-Internal Tracing Module either accepts it or rejects it. If it accepts it, the module will reply the e-Platform with the needed authentication information and the e-Platform can proceed with the data exchange process. If the authentication request is rejected, then the e-Platform will end the authentication process.

- **Data Exchange process**: the e-Platform uses the authentication information (sent by the External-Internal tracing Module) to send data and requests for operations to the External-Internal Tracing Module. The module validates the data exchange with the e-Platform.
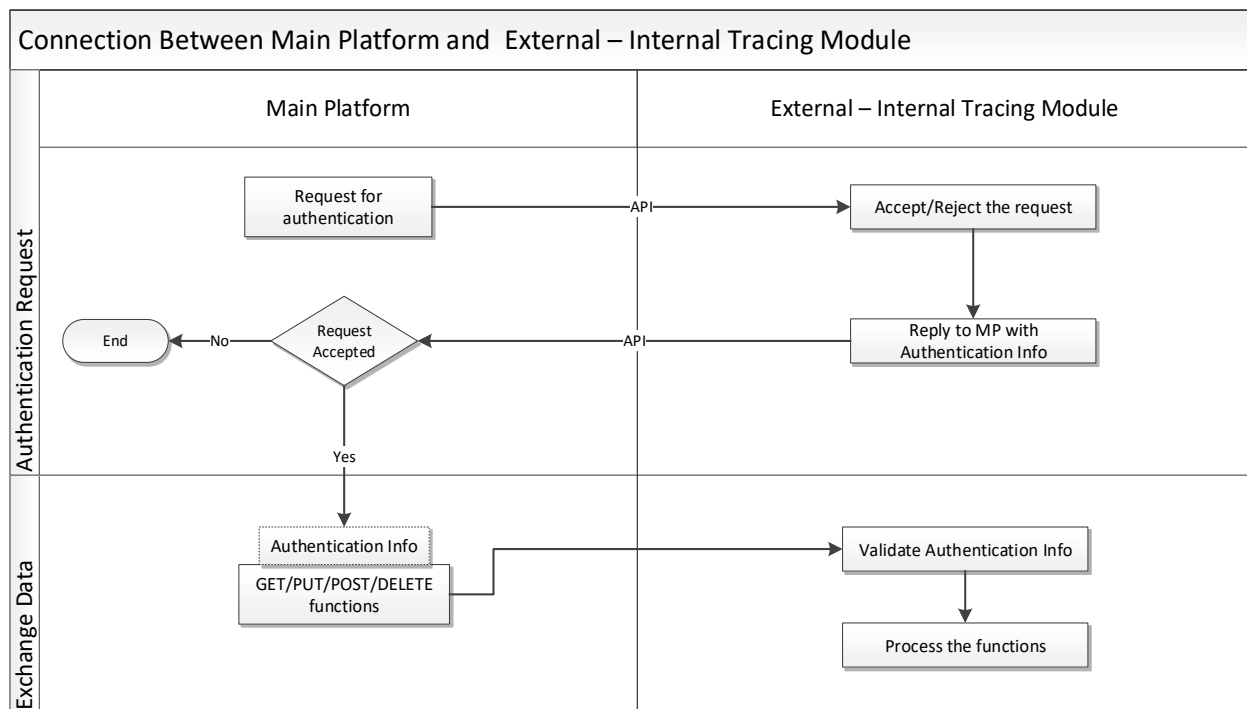
Figure 87 External/internal tracing module process flow

7 Software detailed design

In the last two sections, the behaviour and the process flow of the TT-Hubs e-platform and supporting modules were documented. In order to have a full vision of the platform and its supporting modules, the software detailed design covering the description of the detailed logical structure of each module and the logical structure of database using ERDs and details concerning the database fields should be documented as well.

The software detailed design for the Beta version of the TT-hubs e-platform and modules are constrained by the interoperability with other European Commission projects regarding food safety and authenticity.

7.1 Interoperability with other projects

It is predicted on the DOA that TT-Hubs will act as a hub of existing infrastructures, in particular laboratories and database platforms. In order to avoid informational conflicts with related database platform and to ease possible integrations with laboratories systems, the data schemas will be published and also a data mapping layer will be included in the e-Platform in order to facilitate interoperability.

The DOA also predicts a close collaboration with the ESFRI Project METROFOOD-RI Research Infrastructure, an infrastructure for promoting Metrology in Food and Nutrition. As of the conclusion of this document, the METROFOOD Research Infrastructure were being implemented (starting at 2021 and ending at 2024), and the deliverables of this initiatives were not available.

A communication plan with the contact points of the METROFOOD Research Infrastructure will be developed in order to align the level of integration and connections that should be performed between the METROFOOD-RI infrastructure and the Med Food TT Hubs platform. Due to this alignment, the details regarding the logical structure of each module, as well as the logical structure of databases are going to be designed and adapted during the development of the Beta Version and they are shown in Appendix 1.

7.2 Steps for the implementation of the e—Platform and the modules

The implementation of the modules will follow the Agile approach described on deliverable D1.2, "Scientific and Innovation Roadmap", section 3.2.3, "Agile development". More specifically, the "Scrum" and "Test-Driven Development" agile methodologies will be followed.

As this deliverable was being written, the Alpha version was being developed with close collaboration between the responsible teams.

Once the Alpha version of the e-Platform and modules is completed and are integrated, it will be evaluated by the partners of the project. The evaluation report, as well as the requirements of this deliverable, will serve as input to the implementation of the Beta version of the e-Platform and modules. Changes and/or improvements to the requirements presented in this document are expected.

The Beta version will be tested in real world cases scenarios by parties operating in the food supply chain and outside of the consortium, and a detailed report covering the results and conclusions will be documented. The final version of the Platform and modules will follow from the adjustments of the Beta version.

8 Conclusions

This document described the implementation status of the Alpha version of the Med Food TTHubs e-Platform and the specifications for the Beta version of the platform.

The e-Platform, IoT module, farm app module B2B app module, the consumer app module and the Internal and External tracing module were the most developed modules, with functioning parts and already deployed or tested, at the moment of writing. At the same time, the DNA markers module, the nutritional profile module, the isotope profile module and the quality module were conceptually developed but under development for the Alpha version.

The Kalathos platform, the precursor of the main TTHubs platform, was implemented on Microsoft Azure platform and it was designed and developed in such a way in order to be ready to include in its processes the Microsoft Azure Blockchain Service. During the elaboration of this document, Microsoft had announced that it would terminate the blockchain service provided on Microsoft Azure by September 2021. Other alternative providers were analyzed. As a result, the Kaleido blockchain service provider was selected to proceed with the development of the TTHubs e-Platform.

The development of the pilot version of the TTHubs platform follows an agile approach. As such, this deliverable is intended to be a live document. It specifies the requirements of the Beta version of the TTHubs platform, but will evolve as the platform development progresses. The alpha version of the TT-Hubs platform will be evaluated by the partners of the project, and the resulting report will be integrated in the design of the Beta version. The Beta version will be tested in real world cases scenarios by parties operating in the food supply chain and outside of the consortium, and a detailed report covering the results and conclusions will be documented. The final version of the Platform and modules will follow from the adjustments of the Beta version.

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Appendices

Appendix 1

This appendix is dedicated to the following topics:

I. Description of the logical structure of e-platform and each module by showing the connection through APIs;

II. The detailed logical structure of database using ERDs

III. Details concerning the database fields;

Appendix 1.I: APIs Connections

Appendix 1.II: APIs Connections ERDs

Part 1 - Consumer App

AGR_CertificationProducts

PK	ID
FK	AGR_Certifications.ID
FK	AGR_Products.ID

AGR_ConsumerProfiles

PK	ID
FK	AGR_NutritionalProfiles.ID

AGR_ConsumerRatings

PK	ID
FK	AGR_Products.ID
FK	AGR_Lots.ID
FK	AGR_ConsumerProfiles.ID

AGR_CertificationChecklists

PK	ID
FK	AGR_CertificationTypes.ID

AGR_CertificationChecks

PK	ID
FK	AGR_Certifications.ID
FK	AGR_CertificationChecklists.ID

AGR_CertificationTypes

PK	ID

AGR_CertificationAuthorities

PK	ID

AGR_Certifications

PK	ID
FK	AGR_CertificationTypes.ID
FK	AGR_CertificationAuthorities.ID
FK	AGR_Transactors.ID

Part 2 →

Part 2 - Nutritional Profile

AGR_NutritionalElements

PK	ID
FK	AGR_IoTDevices.ID
FK	AGR_IoTDataFactors.ID

AGR_NutritionalProfilePortions

PK	ID
FK	AGR_NutritionalProfiles.ID

AGR_NutritionalProfiles

PK	ID
FK	AGR_ProductFamilies.ID
FK	AGR_Varieties.ID

AGR_NutritionalConsumerProfiles

PK	ID
FK	AGR_ConsumerProfiles.ID
FK	AGR_NutritionalElements.ID

AGR_NutritionalProfileInfos

PK	ID
FK	AGR_NutritionalProfilePortions.ID
FK	AGR_NutritionalElements.ID

AGR_NutritionalProducts

PK	ID
FK	AGR_Products.ID
FK	AGR_NutritionalProfiles.ID

Part 1   Part 3

Part 3 - IoT

AGR_IoTDevices

PK	ID

AGR_IoTDataFactors

PK	ID
FK	AGR_IoTDevices.ID

AGR_IoTData

PK	ID
FK	AGR_IoTDevices.ID
FK	AGR_IoTDataFactors.ID

AGR_IoTInstallations

PK	ID
FK	AGR_IoTDevices.ID

AGR_IoTDevicesToFarms

PK	ID
FK	AGR_Places.ID

Part 4 - e-Platform

Part 5 - e-Platform

Part 6 - e-Platform

Part 7 - e-Platform

Part 8 - e-Platform

AGR_Places

PK	ID

AGR_Classes

PK	ID

AGR_Coordinates

PK	ID
FK	AGR_Places.ID

AGR_Events

PK	ID	
FK	AGR_Transactors.ID	
FK	AGR_Places.ID	Read Point
FK	AGR_Places.ID	Business Location
FK	AGR_Places.ID	Purchase Order
FK	AGR_Places.ID	Invoice
FK	AGR_Places.ID	Source List
FK	AGR_Places.ID	Destination List
	BlockChain	

AGR_Packs

PK	ID
FK	AGR_Packages.ID
FK	AGR_Subpackages.ID
FK	AGR_MeasurmentUnits.ID

AGR_Packs_From_Packs

PK	ID
FK	AGR_Packs.ID_1
FK	AGR_Packs.ID_2

AGR_Lots_From_Lots

PK	ID
FK	AGR_Lots.ID_1
FK	AGR_Lots.ID_2

AGR_DispatchmentLots

PK	ID
FK	AGR_Dispatchments.ID
FK	AGR_Lots.ID

AGR_Lots

PK	ID
FK	AGR_FarmCrops.ID
FK	AGR_Classes.ID

Part 7

Part 9

Part 9 - Farm App

Part 9 - B2B App

Part 11 - Consumer App

AGR_ConsumerProfiles	
PK	ID

AGR_ConsumerRatings	
PK	ID
FK	AGR_Products.ID
FK	AGR_Lots.ID
FK	AGR_ConsumerProfiles.ID

Part 10

Part 12

Part 12 - DNA Markers

AGR_DNAProfiles

PK	ID	
FK	AGR_ProductFamilies.ID	
FK	AGR_Varieties.ID	

AGR_DNAProfileProducts

PK	ID	
FK	AGR_Products.ID	
FK	AGR_DNAProfiles.ID	
FK	AGR_Transactors.ID	

AGR_DNAProfileChekcs

PK	ID	
FK	AGR_Lots.ID	
FK	AGR_DNAProfileProducts.ID	
FK	AGR_Transactors.ID	

Part 11   Part 13

Part 13 - Isotopic Profile

Part 14 - Inrernal /External Tracing

AGR_TransportEvents	
PK	ID
FK	AGR_Products.ID
FK	AGR_Transactors.ID Sender
FK	AGR_Transactors.ID Recipient
FK	AGR_Places.ID From Place
FK	AGR_Places.ID To Place
FK	AGR_MeasurmentUnits.ID

AGR_TransformationEvents	
PK	ID
FK	AGR_Transactors.ID
FK	AGR_Places.ID
FK	AGR_Products.ID From Product
FK	AGR_Products.ID New Product
FK	AGR_MeasurmentUnits.ID
FK	AGR_Products.ID New Product
FK	AGR_MeasurmentUnits.ID

AGR_EventFactorLimits	
PK	ID
FK	AGR_IoTDataFactors.ID
FK	AGR_TransportEvents.ID
FK	AGR_TransformationEvents.ID
FK	AGR_EventFactorLimits.ID

AGR_TransformationEventLots	
PK	ID
FK	AGR_TransportEvents.ID
FK	AGR_Lots.ID

Part 13

END

Appendix 1.III: Data Base Fields with details

e-Platform

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Docs	ID		int	4	NULL	NO
AGR_Docs	COM_Object_Name		nvarchar	30	NULL	NO
AGR_Docs	COM_Object_Name.ID		int	4	NULL	NO
AGR_Docs	DocName_EN	Doc Name	nvarchar	200	NULL	YES
AGR_Docs	DocDescription_EN	Description	nvarchar	400	NULL	YES
AGR_Docs	DocFile_FID		int	4	NULL	NO
AGR_Docs	IssuedDT	Issued Date	datetime	8	NULL	YES
AGR_Docs	IssuedBy_EN	Issued By	nvarchar	200	NULL	YES
AGR_Docs	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Docs	Ordering	Order	int	4	NULL	YES
AGR_Media	ID		int	4	NULL	NO
AGR_Media	COM_Object_Name		nvarchar	30	NULL	NO
AGR_Media	COM_Object_Name.ID		int	4	NULL	NO
AGR_Media	MediaType	Type	tinyint	1	NULL	NO
AGR_Media	MediaName_EN	Doc Name	nvarchar	200	NULL	YES
AGR_Media	MediaDescription_EN	Description	nvarchar	400	NULL	YES
AGR_Media	MediaFile_FID		int	4	NULL	NO
AGR_Media	CreatedDT	Created Date	datetime	8	NULL	YES
AGR_Media	CreatedBy_EN	Created By	nvarchar	200	NULL	YES
AGR_Media	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Media	Ordering	Order	int	4	NULL	YES
AGR_Telephones	ID		int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Telephones	COM_Object_Name		nvarchar	30	NULL	NO
AGR_Telephones	COM_Object_Name.ID		int	4	NULL	NO
AGR_Telephones	TelephoneType_LOV	Telephone Type	tinyint	1	NULL	NO
AGR_Telephones	TelCountryCode	Country Call Code	varchar	20	NULL	NO
AGR_Telephones	Number	Telephone	varchar	20	NULL	NO
AGR_Telephones	Ordering	Order	int	4	NULL	YES
AGR_Emails	ID		int	4	NULL	NO
AGR_Emails	COM_Object_Name		nvarchar	30	NULL	NO
AGR_Emails	COM_Object_Name.ID		int	4	NULL	NO
AGR_Emails	Email	Email	varchar	100	NULL	NO
AGR_Emails	Ordering	Order	int	4	NULL	YES
SYS_Countries	ID		int	4	NULL	NO
SYS_Countries	CountryCode		varchar	3	NULL	NO
SYS_Countries	ShortTitle_EN	Country	nvarchar	200	NULL	NO
SYS_Countries	IsActive	Active	bit	1	((1))	NO
SYS_Districts	ID		int	4	NULL	NO
SYS_Districts	SYS_Countries.ID		int	4	NULL	NO
SYS_Districts	ShortTitle_EN	District	nvarchar	200	NULL	NO
SYS_Districts	IsActive	Active	bit	1	((1))	NO
AGR_Mutants	ID		int	4	NULL	NO
AGR_Mutants	AGR_Varieties.ID	Variety	int	4	NULL	NO
AGR_Mutants	ShortTitle_EN	Mutant	nvarchar	200	NULL	NO
AGR_Mutants	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Mutants	IsActive	Active	bit	1	((1))	NO
AGR_ProductCategories	ID		int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ProductCategories	AGR_CategoryTypes.ID	Category Type	tinyint	1	NULL	NO
AGR_ProductCategories	ShortTitle_EN	Product Category	nvarchar	200	NULL	NO
AGR_ProductCategories	IsActive	Active	bit	1	((1))	NO
AGR_ProductFamilies	ID		int	4	NULL	NO
AGR_ProductFamilies	AGR_ProductCategories.ID	Product Category	int	4	NULL	NO
AGR_ProductFamilies	ShortTitle_EN	Product	nvarchar	200	NULL	NO
AGR_ProductFamilies	About_EN	About	nvarchar	-1	NULL	YES
AGR_ProductFamilies	Tips_EN	Tips	nvarchar	-1	NULL	YES
AGR_ProductFamilies	IsActive	Active	bit	1	((1))	NO
AGR_Products	ID		int	4	NULL	NO
AGR_Products	AGR_Varieties.ID	Variety	int	4	NULL	NO
AGR_Products	AGR_Mutants.ID	Mutant	int	4	NULL	YES
AGR_Products	AGR_Synonyms.ID	Synonym	int	4	NULL	YES
AGR_Products	AGR_Trademarks.ID	Trademark	int	4	NULL	YES
AGR_Products	UserFriendlyName_EN		nvarchar	600	NULL	NO
AGR_Products	AGR_CodeCN8s.ID	CN8 Code	int	4	NULL	YES
AGR_Products	Description	Description	nvarchar	-1	NULL	YES
AGR_Products	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Products	IsActive	Active	bit	1	((1))	NO
AGR_CodeCN8s	ID		int	4	NULL	NO
AGR_CodeCN8s	CodeCN8	CN8 Code	varchar	50	NULL	NO
AGR_CodeCN8s	ShortTitle_EN		nvarchar	-1	NULL	NO
AGR_CodeCN8s	IsActive	Active	bit	1	((1))	NO
AGR_Synonyms	ID		int	4	NULL	NO
AGR_Synonyms	AGR_Varieties.ID	Variety	int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Synonyms	AGR_Mutants.ID	Mutant	int	4	NULL	YES
AGR_Synonyms	ShortTitle_EN	Synonym	nvarchar	200	NULL	NO
AGR_Synonyms	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Synonyms	IsActive	Active	bit	1	((1))	NO
AGR_Trademarks	ID		int	4	NULL	NO
AGR_Trademarks	AGR_Varieties.ID	Variety	int	4	NULL	NO
AGR_Trademarks	AGR_Mutants.ID	Mutant	int	4	NULL	YES
AGR_Trademarks	ShortTitle_EN	Trademark	nvarchar	200	NULL	NO
AGR_Trademarks	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Trademarks	IsActive	Active	bit	1	((1))	NO
AGR_Varieties	ID		int	4	NULL	NO
AGR_Varieties	AGR_ProductFamilies.ID	Product Family	int	4	NULL	NO
AGR_Varieties	ShortTitle_EN	Variety	nvarchar	200	NULL	NO
AGR_Varieties	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Varieties	About_EN	About	nvarchar	-1	NULL	YES
AGR_Varieties	Tips_EN	Tips	nvarchar	-1	NULL	YES
AGR_Varieties	IsActive	Active	bit	1	((1))	NO
AGR_Transactors	ID		int	4	NULL	NO
AGR_Transactors	TransactorType_LOV	Transactor Type	tinyint	1	NULL	NO
AGR_Transactors	LegalEntityType_LOV	Legal Entity	tinyint	1	NULL	NO
AGR_Transactors	AFM		varchar	20	NULL	NO
AGR_Transactors	FullName	Full Name	nvarchar	200	NULL	NO
AGR_Transactors	DisplayName	Display Name	nvarchar	200	NULL	NO
AGR_Transactors	Place	Place	varchar	100	NULL	YES
AGR_Transactors	Address	Address	nvarchar	200	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Transactors	TelephoneType_LOV	Telephone Type	tinyint	1	NULL	YES
AGR_Transactors	TelCountryCode	Telephone Country Code	varchar	20	NULL	YES
AGR_Transactors	BasicTel	Main Telephone	varchar	20	NULL	YES
AGR_Transactors	Email	Email	varchar	100	NULL	YES
AGR_Transactors	URL	URL	varchar	100	NULL	YES
AGR_Transactors	Description	Description	html		NULL	YES
AGR_Transactors	RegistryNumber	Registry Number	varchar	20	NULL	YES
AGR_Transactors	GGN	GGN	varchar	20	NULL	YES
AGR_Transactors	CreationDate	Creation Date	datetime	8	NULL	NO
AGR_Transactors	Comments	Comments	nvarchar	-1	NULL	YES
AGR_Transactors	IsActive	Active	bit	1	NULL	NO
AGR_TransactorsCountries	ID		int	4	NULL	NO
AGR_TransactorsCountries	AGR_Transactors.ID	Transactor	int	4	NULL	NO
AGR_TransactorsCountries	SYS_Countries.ID	Country	int	4	NULL	NO
AGR_TransactorsCountries	Comments	Comments	nvarchar	-1	NULL	YES
AGR_TransactorsCountries	IsActive	Active	bit	1	((1))	NO
AGR_TransactorsProductFamilies	ID		int	4	NULL	NO
AGR_TransactorsProductFamilies	AGR_Transactors.ID	Transactor	int	4	NULL	NO
AGR_TransactorsProductFamilies	AGR_ProductFamilies.ID	Product Family	int	4	NULL	NO
AGR_TransactorsProductFamilies	Comments	Comments	nvarchar	-1	NULL	YES
AGR_TransactorsProductFamilies	IsActive	Active	bit	1	((1))	NO
AGR_GPC_AttributeTypes	ID		int	4	NULL	NO
AGR_GPC_AttributeTypes	GPC_AttributeTypeCode	GPC Attribute Type Code	nvarchar	16	NULL	NO
AGR_GPC_AttributeTypes	Description	Description	nvarchar	200	NULL	NO
AGR_GPC_AttributeTypes	IsActive	Active	bit	1	((1))	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_GPC_AttributeTypeValues	ID		int	4	NULL	NO
AGR_GPC_AttributeTypeValues	AGR_GPC_AttributeTypes.ID	GPC Attribute Type Code	int	4	NULL	NO
AGR_GPC_AttributeTypeValues	AGR_GPC_AttributeValues.ID	Select Value	int	4	NULL	NO
AGR_GPC_AttributeTypeValues	IsActive	Active	bit	1	((1))	NO
AGR_GPC_AttributeValues	ID		int	4	NULL	NO
AGR_GPC_AttributeValues	GPC_AttributeValueCode	GPC Attribute Value Code	nvarchar	16	NULL	NO
AGR_GPC_AttributeValues	Description	Description	nvarchar	200	NULL	NO
AGR_GPC_AttributeValues	IsActive	Active	bit	1	((1))	NO
AGR_GPC_BrickAttributeTypes	ID		int	4	NULL	NO
AGR_GPC_BrickAttributeTypes	AGR_GPC_Bricks.ID	GPC Brick	int	4	NULL	NO
AGR_GPC_BrickAttributeTypes	AGR_GPC_AttributeTypes.ID	GPC Attribute Type	int	4	NULL	NO
AGR_GPC_BrickAttributeTypes	IsActive	Active	bit	1	((1))	NO
AGR_GPC_Bricks	ID		int	4	NULL	NO
AGR_GPC_Bricks	AGR_GPC_Classes.ID	GPC Class	int	4	NULL	NO
AGR_GPC_Bricks	GPC_BrickCode	GPC Brick Code	nvarchar	16	NULL	NO
AGR_GPC_Bricks	Description	Description	nvarchar	200	NULL	NO
AGR_GPC_Bricks	IsActive	Active	bit	1	((1))	NO
AGR_GPC_Classes	ID		int	4	NULL	NO
AGR_GPC_Classes	AGR_GPC_Families.ID	GPC Family	int	4	NULL	NO
AGR_GPC_Classes	GPC_ClassCode	GPC Class Code	nvarchar	16	NULL	NO
AGR_GPC_Classes	Description	Description	nvarchar	200	NULL	NO
AGR_GPC_Classes	IsActive	Active	bit	1	((1))	NO
AGR_GPC_Families	ID		int	4	NULL	NO
AGR_GPC_Families	GPC_FamilyCode	GPC Family Code	nvarchar	16	NULL	NO
AGR_GPC_Families	Description	Description	nvarchar	200	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_GPC_Families	IsActive	Active	bit	1	((1))	NO
AGR_GTIN13s	ID		int	4	NULL	NO
AGR_GTIN13s	GTIN13	GTIN13	nchar	26	NULL	NO
AGR_GTIN13s	IsUsed	In Use?	bit	1	((1))	NO
AGR_GTIN13s	IsActive	Active	bit	1	((1))	NO
AGR_GTIN14s	ID		int	4	NULL	NO
AGR_GTIN14s	AGR_GTIN13s.ID		int	4	NULL	NO
AGR_GTIN14s	GTIN14	GTIN14	nchar	28	NULL	NO
AGR_GTIN14s	IsUsed	In Use?	bit	1	((1))	NO
AGR_GTIN14s	IsActive	Active	bit	1	((1))	NO
AGR_PLUs	ID		int	4	NULL	NO
AGR_PLUs	PLU	PLU	nchar	8	NULL	NO
AGR_PLUs	IsActive	Active	bit	1	((1))	NO
AGR_SSCCs	ID		int	4	NULL	NO
AGR_SSCCs	SSCC	SSCC	nchar	36	NULL	NO
AGR_SSCCs	IsUsed	In Use?	bit	1	((1))	NO
AGR_SSCCs	IsActive	Active	bit	1	((1))	NO
AGR_Product_GTIN13s	ID		int	4	NULL	NO
AGR_Product_GTIN13s	AGR_GTIN13s.ID	GTIN13	int	4	NULL	NO
AGR_Product_GTIN13s	AGR_Products.ID	Product	int	4	NULL	NO
AGR_Product_GTIN13s	SYS_Countries.ID	Country	int	4	NULL	NO
AGR_Product_GTIN13s	AGR_Subpackages.ID	Subpackage	int	4	NULL	YES
AGR_Product_GTIN13s	WeightPerSubpackage	Weight Per Subpackage	decimal	9	NULL	YES
AGR_Product_GTIN13s	NumberOfItemsPerSubpackage	Number Of Items Per Subpackage	int	4	NULL	YES
AGR_Product_GTIN13s	AGR_DiameterSizeUnits.ID	Diameter Unit	int	4	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Product_GTIN13s	DiameterSizeMin	Min Diameter	decimal	9	NULL	YES
AGR_Product_GTIN13s	DiameterSizeMax	Max Diameter	decimal	9	NULL	YES
AGR_Product_GTIN13s	AGR_LengthSizeUnits.ID	Length Unit	int	4	NULL	YES
AGR_Product_GTIN13s	LengthSizeMax	Min Length	decimal	9	NULL	YES
AGR_Product_GTIN13s	LengthSizeMin	Max Length	decimal	9	NULL	YES
AGR_Product_GTIN13s	AGR_CircumferenceSizeUnits.ID	Circumference Unit	int	4	NULL	YES
AGR_Product_GTIN13s	CircumferenceSizeMin	Min Circumference	decimal	9	NULL	YES
AGR_Product_GTIN13s	CircumferenceSizeMax	Max Circumference	decimal	9	NULL	YES
AGR_Product_GTIN13s	AGR_WeightSizeUnits.ID	Weight Unit	int	4	NULL	YES
AGR_Product_GTIN13s	WeightSizeMin	Min Weight	decimal	9	NULL	YES
AGR_Product_GTIN13s	WeightSizeMax	Max Weight	decimal	9	NULL	YES
AGR_Product_GTIN13s	AGR_SizeCodes.ID	Size Code	int	4	NULL	YES
AGR_Product_GTIN13s	AGR_ColorGroups.ID	Colour Code	int	4	NULL	YES
AGR_Product_GTIN13s	Colour_EN	Color	nvarchar	400	NULL	YES
AGR_Product_GTIN13s	FleshColour_EN	Flesh Colour	nvarchar	400	NULL	YES
AGR_Product_GTIN13s	PostHarvest_EN	Post Harvest	nvarchar	400	NULL	YES
AGR_Product_GTIN13s	FirstDeliveryDT	Date of First Delivery	datetime	8	NULL	YES
AGR_Product_GTIN13s	AGR_GPC_Families.ID	GPC Family	int	4	NULL	YES
AGR_Product_GTIN13s	AGR_GPC_Classes.ID	GPC Class	int	4	NULL	YES
AGR_Product_GTIN13s	AGR_GPC_Bricks.ID	GPC Brick	int	4	NULL	YES
AGR_Product_GTIN13s	AGR_PLUs.ID	PLU	int	4	NULL	YES
AGR_Product_GTIN13s	IsActive	Active	bit	1	((1))	NO
AGR_Product_GTIN14s	ID		int	4	NULL	NO
AGR_Product_GTIN14s	AGR_Product_GTIN13s.ID	FGTIN 13 Product	int	4	NULL	NO
AGR_Product_GTIN14s	AGR_GTIN14s.ID	GTIN14	int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Product_GTIN14s	AGR_Packages.ID	Package	int	4	NULL	YES
AGR_Product_GTIN14s	WeightPerPackage	Weight Per Package	decimal	9	NULL	YES
AGR_Product_GTIN14s	SubpackagesPerPackage	Subpackages Per Package	int	4	NULL	YES
AGR_Product_GTIN14s	FirstDeliveryDT	Date of First Delivery	datetime	8	NULL	YES
AGR_Product_GTIN14s	IsActive	Active	bit	1	((1))	NO
AGR_CircumferenceSizeUnits	ID		int	4	NULL	NO
AGR_CircumferenceSizeUnits	ShortTitle_EN	Circumference Size Unit	nvarchar	200	NULL	NO
AGR_CircumferenceSizeUnits	IsActive	Active	bit	1	((1))	NO
AGR_DiameterSizeUnits	ID		int	4	NULL	NO
AGR_DiameterSizeUnits	ShortTitle_EN	Diameter Size Unit	nvarchar	200	NULL	NO
AGR_DiameterSizeUnits	IsActive	Active	bit	1	((1))	NO
AGR_LengthSizeUnits	ID		int	4	NULL	NO
AGR_LengthSizeUnits	ShortTitle_EN	Length Size Unit	nvarchar	200	NULL	NO
AGR_LengthSizeUnits	IsActive	Active	bit	1	((1))	NO
AGR_MeasurmentUnits	ID		int	4	NULL	NO
AGR_MeasurmentUnits	ShortTitle_EN	Measurment Unit	nvarchar	200	NULL	NO
AGR_MeasurmentUnits	IsActive	Active	bit	1	((1))	NO
AGR_SizeCodes	ID		int	4	NULL	NO
AGR_SizeCodes	AGR_ProductFamilies.ID		int	4	NULL	NO
AGR_SizeCodes	ShortTitle_EN	Size Code	nvarchar	200	NULL	NO
AGR_SizeCodes	IsActive	Active	bit	1	((1))	NO
AGR_WeightSizeUnits	ID		int	4	NULL	NO
AGR_WeightSizeUnits	ShortTitle_EN	Weight Unit	nvarchar	200	NULL	NO
AGR_WeightSizeUnits	IsActive	Active	bit	1	((1))	NO
AGR_WeightSizeUnits	ID		int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ColorGroups	AGR_ProductFamilies.ID	Product Family	int	4	NULL	NO
AGR_ColorGroups	ShortTitle_EN	Colour Group	nvarchar	200	NULL	NO
AGR_ColorGroups	IsActive	Active	bit	1	((1))	NO
AGR_Classes	ID		int	4	NULL	NO
AGR_Classes	ShortTitle_EN	Quality Class	nvarchar	200	NULL	NO
AGR_Classes	IsActive	Active	bit	1	((1))	NO
AGR_Packages	ID		int	4	NULL	NO
AGR_Packages	ShortTitle_EN	Package	nvarchar	200	NULL	NO
AGR_Packages	Height	Height	decimal	9	NULL	YES
AGR_Packages	Width	Width	decimal	9	NULL	YES
AGR_Packages	Depth	Depth	decimal	9	NULL	YES
AGR_Packages	Volume	Volume	decimal	9	NULL	YES
AGR_Packages	IsActive	Active	bit	1	((1))	NO
AGR_Packs	ID		int	4	NULL	NO
AGR_Packs	AGR_Packages.ID	Package	int	4	NULL	NO
AGR_Packs	AGR_Subpackages.ID	Subpackage	int	4	NULL	YES
AGR_Packs	NoOfPackages	Number of Packages	decimal	9	NULL	YES
AGR_Packs	NoOfSubpackages	Number of Subpackages	decimal	9	NULL	YES
AGR_Packs	SubpackagesPerPackage	Subpackages Per Package	decimal	9	NULL	YES
AGR_Packs	AGR_MeasurmentUnits.ID	Measurment Unit	int	4	NULL	YES
AGR_Packs	Quantity	Quantity	decimal	9	NULL	YES
AGR_Packs	CreationDate	Date of First Delivery	datetime	8	NULL	YES
AGR_Packs	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Packs	IsActive	Active	bit	1	((1))	NO
AGR_Packs_From_Packs	ID		int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Packs_From_Packs	AGR_Packs.ID_1	Parent Pack	int	4	NULL	NO
AGR_Packs_From_Packs	AGR_Packs.ID_2	Chlid Pack	int	4	NULL	NO
AGR_Packs_From_Packs	IsActive	Active	bit	1	((1))	NO
AGR_Subpackages	ID		int	4	NULL	NO
AGR_Subpackages	ShortTitle_EN	Subpackage	nvarchar	200	NULL	NO
AGR_Subpackages	Height	Height	decimal	9	NULL	YES
AGR_Subpackages	Width	Width	decimal	9	NULL	YES
AGR_Subpackages	Depth	Depth	decimal	9	NULL	YES
AGR_Subpackages	Volume	Volume	decimal	9	NULL	YES
AGR_Subpackages	IsActive	Active	bit	1	((1))	NO
AGR_Lots	ID		int	4	NULL	NO
AGR_Lots	Lot	LOT	nvarchar	60	NULL	NO
AGR_Lots	AGR_FarmCrops.ID	Farm Crop	int	4	NULL	YES
AGR_Lots	AGR_Classes	Quality Class	int	4	NULL	YES
AGR_Lots	Quantity	Quantity	decimal	9	NULL	NO
AGR_Lots	Volume	Volume	decimal	9	NULL	YES
AGR_Lots	AGR_PackageID	Package	int	4	NULL	YES
AGR_Lots	NumberOfPackages	Number of Packages	int	4	NULL	YES
AGR_Lots	WeightPerPackage	Weight Per Package	decimal	9	NULL	YES
AGR_Lots	AGR_SubpackageID	Subpackage	int	4	NULL	YES
AGR_Lots	SubpackagesPerPackage	Subpackages Per Package	int	4	NULL	YES
AGR_Lots	WeightPerSubpackage	Weight Per Subpackage	decimal	9	NULL	YES
AGR_Lots	HarvestingDT	Harvesting Date	datetime	8	NULL	YES
AGR_Lots	AGR_Transactors.ID	Delivered By	int	4	NULL	YES
AGR_Lots	Comments	Comments	nvarchar	-1	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Lots	IsActive	Active	bit	1	((1))	NO
AGR_Lots_From_Lots	ID		int	4	NULL	NO
AGR_Lots_From_Lots	AGR_Lots.ID_1	Main LOT	int	4	NULL	NO
AGR_Lots_From_Lots	AGR_Lots.ID_2	Included LOT	int	4	NULL	NO
AGR_Lots_From_Lots	IsActive	Active	bit	1	((1))	NO
AGR_DispatchmentLots	ID		int	4	NULL	NO
AGR_DispatchmentLots	AGR_Dispatchments.ID	Dispatchment	int	4	NULL	NO
AGR_DispatchmentLots	AGR_Lots.ID	LOT	int	4	NULL	NO
AGR_DispatchmentLots	Quantity	Quantity	decimal	9	NULL	NO
AGR_DispatchmentLots	Volume	Volume	decimal	9	NULL	NO
AGR_DispatchmentLots	NumberOfPackages	Number Of Packages	int	4	NULL	NO
AGR_DispatchmentLots	IsActive	Active	bit	1	((1))	NO
AGR_Dispatchments	ID		int	4	NULL	NO
AGR_Dispatchments	Title	Dispatchment	nvarchar	60	NULL	NO
AGR_Dispatchments	Volume	Volume	decimal	9	NULL	YES
AGR_Dispatchments	Comments	Comments	nvarchar	-1	NULL	YES
AGR_Dispatchments	IsActive	Active	bit	1	((1))	NO
AGR_DispatchmentSSCCs	ID		int	4	NULL	NO
AGR_DispatchmentSSCCs	AGR_Dispatchments.ID	Dispatchment	int	4	NULL	NO
AGR_DispatchmentSSCCs	AGR_SSCCs.ID	SSCC	int	4	NULL	NO
AGR_DispatchmentSSCCs	Quantity	Quantity	decimal	9	NULL	NO
AGR_DispatchmentSSCCs	Volume	Volume	decimal	9	NULL	NO
AGR_DispatchmentSSCCs	IsActive	Active	bit	1	((1))	NO
AGR_Places	ID		int	4	NULL	NO
AGR_Places	PlaceType_LOV	Type	tinyint	1	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Places	COM_CountryID	Country	int	4	NULL	NO
AGR_Places	COM_DistrictID	District	int	4	NULL	NO
AGR_Places	Place	Place	varchar	100	NULL	YES
AGR_Places	Description	Description	nvarchar	200	NULL	YES
AGR_Places	X_EGSA87	X_EGSA87	char	13	NULL	YES
AGR_Places	Y_EGSA87	Y_EGSA87	char	13	NULL	YES
AGR_Places	Latitude	DD_Latitude	decimal	9	NULL	YES
AGR_Places	Longitude	DD_Longitude	decimal	9	NULL	YES
AGR_Places	SizeHectares	Hectares	decimal	9	NULL	YES
AGR_Places	GLN	GLN	char	13	NULL	YES
AGR_Places	LPIS	LPIS	char	13	NULL	YES
AGR_Places	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_Places	IsActive	Active	bit	1	NULL	NO
AGR_Coordinates	ID		int	4	NULL	NO
AGR_Coordinates	AGR_Places.ID		int	4	NULL	NO
AGR_Coordinates	X_EGSA87	X EGSA 87	char	13	NULL	YES
AGR_Coordinates	Y_EGSA87	Y EGSA 87	char	13	NULL	YES
AGR_Coordinates	Latitude	Latitude	int	4	NULL	NO
AGR_Coordinates	Longitude	Longitude	int	4	NULL	NO
AGR_Coordinates	Ordering	Point	int	4	NULL	NO
AGR_Coordinates	IsActive	Active	bit	1	NULL	NO
AGR_FarmCrops	ID		int	4	NULL	NO
AGR_FarmCrops	AGR_Places.ID	Farm	int	4	NULL	NO
AGR_FarmCrops	Products.ID	Product	int	4	NULL	NO
AGR_FarmCrops	CropSizeHectares	Crop Size	decimal	9	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_FarmCrops	YearOfInstallation	Year Of Installation	int	4	NULL	NO
AGR_FarmCrops	CurrentCropStart	Current Crop Start	datetime	8	NULL	YES
AGR_FarmCrops	CurrentCropEnd	Current Crop End	datetime	8	NULL	YES
AGR_FarmCrops	TotalEstimatedYield	Total Estimated Yield	decimal	9	NULL	YES
AGR_FarmCrops	EstimatedYieldPerHectare	Estimated Yield Per Hectare	decimal	9	NULL	YES
AGR_FarmCrops	EstimatedHarvestStart	Estimated Harvest Start	datetime	8	NULL	YES
AGR_FarmCrops	EstimatedHarvestStartWeek	Week	tinyint	1	NULL	YES
AGR_FarmCrops	EstimatedHarvestEnd	Estimated Harvest End	datetime	8	NULL	YES
AGR_FarmCrops	EstimatedHarvestEndWeek	Week	tinyint	1	NULL	YES
AGR_FarmCrops	EstimatedYieldInOfferInEdit	Estimated Yield In Offer In Edit	decimal	9	NULL	YES
AGR_FarmCrops	EstimatedYieldInOfferPublished	Estimated Yield In Offer Published	decimal	9	NULL	YES
AGR_FarmCrops	EstimatedYieldInOfferSuspended	Estimated Yield In Offer Suspended	decimal	9	NULL	YES
AGR_FarmCrops	EstimatedYieldInOfferContracted	Estimated Yield In Offer Contracted	decimal	9	NULL	YES
AGR_FarmCrops	EstimatedYieldInOfferWithdrawn	Estimated Yield In Offer Withdrawn	decimal	9	NULL	YES
AGR_FarmCrops	AvailableEstimatedYield	Available Estimated Yield	decimal	9	NULL	YES
AGR_FarmCrops	TotalActualYield	Total Actual Yield	decimal	9	NULL	YES
AGR_FarmCrops	ActualYieldPerHectare	Actual Yield Per Hectare	decimal	9	NULL	YES
AGR_FarmCrops	ActualHarvestStart	Actual Harvest Start	datetime	8	NULL	YES
AGR_FarmCrops	ActualHarvestStartWeek	Week	tinyint	1	NULL	YES
AGR_FarmCrops	ActualHarvestEnd	Actual Harvest End	datetime	8	NULL	YES
AGR_FarmCrops	ActualHarvestEndWeek	Week	tinyint	1	NULL	YES
AGR_FarmCrops	ReleaseDate	ReleaseDate	datetime	8	NULL	YES
AGR_FarmCrops	FarmRecordsReport	Farm Records Report	varchar	100	NULL	YES
AGR_FarmCrops	Comments	Comments	nvarchar	-1	NULL	YES
AGR_FarmCrops	IsActive	Active	bit	1	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_Events	ID		int	4	NULL	NO
AGR_Events	AGR_Transactors.ID	By Whom	int	4	NULL	NO
AGR_Events	EPCIS_Event_Types_LOV	Event Type	tinyint	1	NULL	NO
AGR_Events	EPCIS_Action_LOV	Action	tinyint	1	NULL	NO
AGR_Events	AGR_Products.ID	What	int	4	NULL	NO
AGR_Events	EventDateStart	When	datetime	8	NULL	NO
AGR_Events	AGR_Places.ID	Read Point	int	4	NULL	NO
AGR_Events	AGR_Places.ID	Business Location	int	4	NULL	NO
AGR_Events	EPCIS_Step_LOV	Business Step	tinyint	1	NULL	NO
AGR_Events	EPCIS_Disposition_LOV	Disposition	tinyint	1	NULL	NO
AGR_Events	AGR_Places.ID	Purchase Order	int	4	NULL	NO
AGR_Events	AGR_Places.ID	Invoice	int	4	NULL	NO
AGR_Events	AGR_Places.ID	Source List	int	4	NULL	NO
AGR_Events	AGR_Places.ID	Destination List	int	4	NULL	NO
AGR_Events	BlockChain	In Blockchain?	bit	1	((1))	NO
AGR_Events	Comments	Comments	nvarchar	-1	NULL	YES
AGR_Events	IsActive	Active	bit	1	((1))	NO

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Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ProductOffers	ID		int	4	NULL	NO
AGR_ProductOffers	Request	Request?	bit	1	NULL	NO
AGR_ProductOffers	Forward	Forward?	bit	1	NULL	NO
AGR_ProductOffers	AGR_Products.ID		int	4	NULL	NO
AGR_ProductOffers	AGR_Transactors.ID		int	4	NULL	NO
AGR_ProductOffers	CommentsOnPlace_EN	Comments	nvarchar	-1	NULL	YES
AGR_ProductOffers	AGR_Packages.ID	Packages	int	4	NULL	YES
AGR_ProductOffers	AGR_Subpackages.ID	Subpackages Per Package	int	4	NULL	YES
AGR_ProductOffers	WeightPerPackage	Weight Per Package	decimal	9	NULL	YES
AGR_ProductOffers	WeightPerSubpackage	Weight Per Subpackage	decimal	9	NULL	YES
AGR_ProductOffers	SubpackagesPerPackage	Subpackages Per Package	int	4	NULL	YES
AGR_ProductOffers	AGR_MeasurmentUnits.ID	Measurment Unit	int	4	NULL	YES
AGR_ProductOffers	AGR_DiameterSizeUnits.ID	Diameter Size Unit	int	4	NULL	YES
AGR_ProductOffers	DiameterSizeMax	Max Diameter	decimal	9	NULL	YES
AGR_ProductOffers	DiameterSizeMin	Min Diameter	decimal	9	NULL	YES
AGR_ProductOffers	AGR_LengthSizeUnits.ID	Length Size Unit	int	4	NULL	YES
AGR_ProductOffers	LengthSizeMax	Max Length	decimal	9	NULL	YES
AGR_ProductOffers	LengthSizeMin	Min Length	decimal	9	NULL	YES
AGR_ProductOffers	AGR_CircumferenceSizeUnits.ID	Circumference Size Unit	int	4	NULL	YES
AGR_ProductOffers	CircumferenceSizeMax	Max Circumference	decimal	9	NULL	YES
AGR_ProductOffers	CircumferenceSizeMin	Min Circumference	decimal	9	NULL	YES
AGR_ProductOffers	AGR_WeightSizeUnits.ID	Weight Unit	int	4	NULL	YES
AGR_ProductOffers	WeightSizeMax	Max Weight	decimal	9	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ProductOffers	WeightSizeMin	Min Weight	decimal	9	NULL	YES
AGR_ProductOffers	AGR_SizeCodes.ID	Size Codes	int	4	NULL	YES
AGR_ProductOffers	CommentsOnSize_EN	Comments on size	nvarchar	-1	NULL	YES
AGR_ProductOffers	AGR_Classes.ID	Quality Classes	int	4	NULL	YES
AGR_ProductOffers	AGR_ColorGroups.ID	Colour Groups	int	4	NULL	YES
AGR_ProductOffers	Color_EN		nvarchar	200	NULL	YES
AGR_ProductOffers	CommentsOnColor_EN	Comments on colour	nvarchar	-1	NULL	YES
AGR_ProductOffers	CommentsOnCertification_EN	Comments on cetrification	nvarchar	-1	NULL	YES
AGR_ProductOffers	AvailabilityDateStart	Availability Date Start	datetime	8	NULL	YES
AGR_ProductOffers	AvailabilityDateEnd	Availability Date End	datetime	8	NULL	YES
AGR_ProductOffers	QuantityOfferedMax	Quantity Offered Max	decimal	9	NULL	YES
AGR_ProductOffers	QuantityOfferedMin	Quantity Offered Min	decimal	9	NULL	YES
AGR_ProductOffers	COM_CurrencyID	Currency	int	4	NULL	YES
AGR_ProductOffers	NetPrice	Net Price	decimal	9	NULL	YES
AGR_ProductOffers	PackingCosts	Packing Costs	decimal	9	NULL	YES
AGR_ProductOffers	TransportationCosts	Transportation Costs	decimal	9	NULL	YES
AGR_ProductOffers	AdminCosts	Admin Costs	decimal	9	NULL	YES
AGR_ProductOffers	OtherCosts	Other Costs	decimal	9	NULL	YES
AGR_ProductOffers	OfferPrice	Offer Price	decimal	9	NULL	YES
AGR_ProductOffers	OfferPriceDate	Offer Price Date	datetime	8	NULL	YES
AGR_ProductOffers	AgreementDeadline	Agreement Deadline	datetime	8	NULL	YES
AGR_ProductOffers	PaymentsTerms_EN	Payments Terms	nvarchar	-1	NULL	YES
AGR_ProductOffers	AGR_Places.ID	Loading Point	int	4	NULL	NO
AGR_ProductOffers	LoadingPointComments	Comments on Loading Point	nvarchar	-1	NULL	YES
AGR_ProductOffers	ShipingInfo_EN	Shiping Info	nvarchar	-1	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ProductOffers	AGR_Places.ID	Delivery Point	int	4	NULL	NO
AGR_ProductOffers	DeliveryPointComments	Comments on Delivery Point	nvarchar	-1	NULL	YES
AGR_ProductOffers	Incoterm_LOV	INCOTERM	tinyint	1	NULL	YES
AGR_ProductOffers	CreationDate	Creation Date	datetime	8	NULL	YES
AGR_ProductOffers	Comments_EN	Comments	nvarchar	-1	NULL	YES
AGR_ProductOffers	OfferStatus_LOV	Offer Status	tinyint	1	NULL	NO
AGR_ProductOffers	IsActive	Active	bit	1	NULL	NO
AGR_ProductOfferFarmCrops	ID		int	4	NULL	NO
AGR_ProductOfferFarmCrops	AGR_ProductOffers.ID	Offer	int	4	NULL	NO
AGR_ProductOfferFarmCrops	AGR_FarmCrops.ID	Farm Crop	int	4	NULL	NO
AGR_ProductOfferFarmCrops	AGR_MeasurmentUnits.ID	Measurment Unit	int	4	NULL	NO
AGR_ProductOfferFarmCrops	QuantityOffered	Quantity	decimal	9	NULL	NO
AGR_ProductOfferFarmCrops	Comments	Comments	nvarchar	-1	NULL	YES
AGR_ProductOfferFarmCrops	IsActive	Active	bit	1	((1))	NO
AGR_ProductOffersToRequests	ID		int	4	NULL	NO
AGR_ProductOffersToRequests	AGR_ProductOffers.ID(1)	Offer	int	4	NULL	NO
AGR_ProductOffersToRequests	AGR_ProductOffers.ID(2)	Request	int	4	NULL	NO
AGR_ProductOffersToRequests	IsActive	Active	bit	1	NULL	NO
AGR_ProductOffersToFWDOffers	ID		int	4	NULL	NO
AGR_ProductOffersToFWDOffers	AGR_ProductOffers.ID(1)	Offer	int	4	NULL	NO
AGR_ProductOffersToFWDOffers	AGR_ProductOffers.ID(2)	Forward Offer	int	4	NULL	NO
AGR_ProductOffersToFWDOffers	IsActive	Active	bit	1	NULL	NO
AGR_ProductOfferRecipients	ID		int	4	NULL	NO
AGR_ProductOfferRecipients	AGR_ProductOffers.ID	Offer	int	4	NULL	NO
AGR_ProductOfferRecipients	AGR_Transactors.ID	Recipient	int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ProductOffersToRequests	IsActive	Active	bit	1	NULL	NO
AGR_ProductOfferPositions	ID		int	4	NULL	NO
AGR_ProductOfferPositions	AGR_ProductOffers.ID	Offer	int	4	NULL	NO
AGR_ProductOfferPositions	AGR_Transactors.ID(1)	Seller	int	4	NULL	NO
AGR_ProductOfferPositions	AGR_Transactors.ID(2)	Buyer	int	4	NULL	NO
AGR_ProductOfferPositions	IsBuyPosition	Is Buy Position?	bit	1	((0))	NO
AGR_ProductOfferPositions	PositionDate	Date	datetime	8	NULL	NO
AGR_ProductOfferPositions	AGR_Packages.ID	Package	int	4	NULL	YES
AGR_ProductOfferPositions	AGR_Subpackages.ID	Subpackage	int	4	NULL	YES
AGR_ProductOfferPositions	SubpackagesPerPackage	Subpackages Per Package	int	4	NULL	YES
AGR_ProductOfferPositions	QuantityOrdered	Quantity Ordered	decimal	9	NULL	YES
AGR_ProductOfferPositions	NoOfPackages	No Of Packages	int	4	NULL	YES
AGR_ProductOfferPositions	NoOfSubpackages	No Of Subpackages	int	4	NULL	YES
AGR_ProductOfferPositions	COM_CurrencyID	Currency	int	4	NULL	YES
AGR_ProductOfferPositions	PositionPrice	Price	decimal	9	NULL	YES
AGR_ProductOfferPositions	PositionPriceDate	Date of Price	datetime	8	NULL	YES
AGR_ProductOfferPositions	PaymentsTerms	Payments Terms	nvarchar	-1	NULL	YES
AGR_ProductOfferPositions	AGR_Places.ID	Loading Point	int	4	NULL	NO
AGR_ProductOfferPositions	LoadingPointComments	Commnets on Loading Point	nvarchar	-1	NULL	YES
AGR_ProductOfferPositions	ShipingInfo	Shiping Info	nvarchar	-1	NULL	YES
AGR_ProductOfferPositions	AGR_Places.ID	Delivery Point	int	4	NULL	NO
AGR_ProductOfferPositions	DeliveryPointComments	Comments on Delivery Point	nvarchar	-1	NULL	YES
AGR_ProductOfferPositions	Incoterm_LOV	INCOTERM	tinyint	1	NULL	YES
AGR_ProductOfferPositions	Comments	Comments	nvarchar	-1	NULL	YES
AGR_ProductOfferPositions	PositionStatus_LOV	Status	tinyint	1	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ProductOfferPositions	IsActive	Active	bit	1	NULL	NO
AGR_ProductOfferContracts	ID		int	4	NULL	NO
AGR_ProductOfferContracts	AGR_ProductOfferPositions.ID	Offer Possition	int	4	NULL	NO
AGR_ProductOfferContracts	ContractCode	Contract Code	nvarchar	100	NULL	YES
AGR_ProductOfferContracts	ContractDate	Contract Date	datetime	8	NULL	YES
AGR_ProductOfferContracts	Comments	Comments	nvarchar	-1	NULL	YES
AGR_ProductOfferContracts	ContractStatus_LOV	Contract Status	tinyint	1	NULL	NO
AGR_ProductOfferContracts	IsActive	Active	bit	1	NULL	NO
AGR_Shipments	ID		int	4	NULL	NO
AGR_Shipments	AGR_ProductOfferContracts.ID	Contract	int	4	NULL	NO
AGR_Shipments	ShipmentStartDate	Shipment Start Date	datetime	8	NULL	YES
AGR_Shipments	AGR_Places.ID	Loading Point	int	4	NULL	NO
AGR_Shipments	LoadingPointComments	Commnets on Loading Point	nvarchar	-1	NULL	YES
AGR_Shipments	ShipingInfo	Shiping Info	nvarchar	-1	NULL	YES
AGR_Shipments	ShipmentEndDate	Shipment End Date	datetime	8	NULL	YES
AGR_Shipments	AGR_Places.ID	Delivery Point	int	4	NULL	NO
AGR_Shipments	DeliveryPointComments	Comments on Delivery Point	nvarchar	-1	NULL	YES
AGR_Shipments	ShipmentStatus_LOV	Status	nvarchar	-1	NULL	YES
AGR_Shipments	IsActive	Active	bit	1	NULL	NO
AGR_CheckPoints	ID		int	4	NULL	NO
AGR_CheckPoints	AGR_Shipments.ID	Shipment	int	4	NULL	NO
AGR_CheckPoints	ArriveDate	Arrive Date	datetime	8	NULL	NO
AGR_CheckPoints	LeaveDate	Leave Date	datetime	8	NULL	YES
AGR_CheckPoints	AGR_Places.ID	Check Point	int	4	NULL	YES
AGR_CheckPoints	Latitude	Latitude	decimal	9	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_CheckPoints	Longitude	Longitude	decimal	9	NULL	YES
AGR_Shipments	IsActive	Active	bit	1	NULL	NO

Consumer App Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_ConsumerProfiles	ID		int	4	NULL	NO
AGR_ConsumerProfiles	Category_EN	Category	nvarchar	60	NULL	YES
AGR_ConsumerProfiles	Details_EN	Details	nvarchar	100	NULL	YES
AGR_ConsumerProfiles	Special_EN	Special	nvarchar	60	NULL	YES
AGR_ConsumerProfiles	AgeFrom	From Age	decimal	9	NULL	YES
AGR_ConsumerProfiles	AgeTo	To Age	decimal	9	NULL	YES
AGR_ConsumerProfiles	IsActive	Active	bit	1	((1))	NO
AGR_ConsumerRatings	ID		int	4	NULL	NO
AGR_ConsumerRatings	AGR_Products.ID	Product	nvarchar	60	NULL	NO
AGR_ConsumerRatings	AGR_Lots.ID	LOT	nvarchar	60	NULL	NO
AGR_ConsumerRatings	AGR_ConsumerProfiles.ID	Consumer Profiles	tinyint	1	NULL	NO
AGR_ConsumerRatings	RatingValue	Value	tinyint	1	NULL	NO
AGR_ConsumerRatings	RatingDT	Date	datetime	8	NULL	NO
AGR_ConsumerRatings	RatingIP	IP	nvarchar	40	NULL	YES
AGR_ConsumerRatings	Latitude	Latitude	decimal	9	NULL	YES
AGR_ConsumerRatings	Longitude	Longitude	decimal	9	NULL	YES
AGR_ConsumerRatings	Comments	Comments	nvarchar	-1	NULL	YES
AGR_ConsumerRatings	IsActive	Active	bit	1	((1))	NO

Farm App Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_FarmCropsRecords	ID		int	4	NULL	NO
AGR_FarmCropsRecords	ForeignID	Record Foreign ID	int	4	NULL	YES
AGR_FarmCropsRecords	AGR_FarmCrops.ID	Farm Crop	int	4	NULL	NO
AGR_FarmCropsRecords	AGR_FarmCropsRecordsActions.ID	Action	int	4	NULL	NO
AGR_FarmCropsRecords	AGR_FarmCropsRecordsInputTypes.ID	InputType	int	4	NULL	YES
AGR_FarmCropsRecords	AGR_FarmCropsRecordsWeather.ID	Weather Conditions	int	4	NULL	YES
AGR_FarmCropsRecords	StartTime	Start	datetime	8	NULL	NO
AGR_FarmCropsRecords	EndTime	Finish	datetime	8	NULL	NO
AGR_FarmCropsRecords	ByWhom	Actor	nvarchar	-1	NULL	NO
AGR_FarmCropsRecords	PHI	PHI	int	4	NULL	YES
AGR_FarmCropsRecords	ReleaseDate	ReleaseDate	datetime	8	NULL	YES
AGR_FarmCropsRecords	DosagePerArea	Dosage Per Area	int	4	NULL	YES
AGR_FarmCropsRecords	DosagePerAreaUnit	Dosage Per Area Unit	nvarchar	5	NULL	YES
AGR_FarmCropsRecords	DosagePer100Lt	Dosage Per 100Lt Water	int	4	NULL	YES
AGR_FarmCropsRecords	DosagePer100LtUnit	Dosage Per 100Lt Water Unit	nvarchar	5	NULL	YES
AGR_FarmCropsRecords	Comments	Comments	nvarchar	-1	NULL	YES
AGR_FarmCropsRecords	IsActive	Active	bit	1	NULL	NO
AGR_FarmCropsRecordsTypes	ID		int	4	NULL	YES
AGR_FarmCropsRecordsTypes	ForeignID	Type Code	int	4	NULL	YES
AGR_FarmCropsRecordsTypes	ShortTitle	Type	nvarchar	200	NULL	NO
AGR_FarmCropsRecordsTypes	Comments	Comments	nvarchar	-1	NULL	YES
AGR_FarmCropsRecordsTypes	IsActive	Active	bit	1	NULL	NO
AGR_FarmCropsRecordsActions	ID		int	4	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_FarmCropsRecordsActions	ForeignID	Action Code	int	4	NULL	YES
AGR_FarmCropsRecordsActions	AGR_FarmCropsRecordsTypes.ID	Type	int	4	NULL	YES
AGR_FarmCropsRecordsActions	ShortTitle	Action	nvarchar	200	NULL	NO
AGR_FarmCropsRecordsActions	Comments	Comments	nvarchar	-1	NULL	YES
AGR_FarmCropsRecordsActions	IsActive	Active	bit	1	NULL	NO
AGR_FarmCropsRecordsInputTypes	ID		int	4	NULL	YES
AGR_FarmCropsRecordsInputTypes	ForeignID	Input Type Code	int	4	NULL	YES
AGR_FarmCropsRecordsInputTypes	ShortTitle	InputType	nvarchar	200	NULL	NO
AGR_FarmCropsRecordsInputTypes	Comments	Comments	nvarchar	-1	NULL	YES
AGR_FarmCropsRecordsInputTypes	IsActive	Active	bit	1	NULL	NO
AGR_FarmCropsRecordsWeather	ID		int	4	NULL	YES
AGR_FarmCropsRecordsWeather	ShortTitle	Weather Conditions	nvarchar	200	NULL	NO
AGR_FarmCropsRecordsWeather	Comments	Comments	nvarchar	-1	NULL	YES
AGR_FarmCropsRecordsWeather	IsActive	Active	bit	1	NULL	NO

IoT Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_IoTDevices	ID		int	4	NULL	NO
AGR_IoTDevices	Title	Device	nvarchar	100	NULL	YES
AGR_IoTDevices	CreationDate	Creation Date	datetime	8	NULL	YES
AGR_IoTDevices	UpdatedAt	Updated At	datetime	8	NULL	YES
AGR_IoTDevices	LastDataDate	Last Data Date	datetime	8	NULL	YES
AGR_IoTDevices	LastGPS	Last GPS Date	datetime	8	NULL	YES
AGR_IoTDevices	ManualGPS	Manual GPS?	bit	1	NULL	NO
AGR_IoTDevices	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IoTDevices	Latitude	Latitude	decimal	9	NULL	YES
AGR_IoTDevices	Longitude	Longitude	decimal	9	NULL	YES
AGR_IoTDevices	IsActive	Active	bit	1	NULL	NO
AGR_IoTDataFactors	ID		int	4	NULL	NO
AGR_IoTDataFactors	AGR_IoTDevices.ID	Device	int	4	NULL	NO
AGR_IoTDataFactors	ShortTitle_EN	Factor	nvarchar	100	NULL	NO
AGR_IoTDataFactors	Unit	Unit	nvarchar	5	NULL	NO
AGR_IoTDataFactors	IsActive	Active	bit	1	((1))	NO
AGR_IoTData	ID		int	4	NULL	NO
AGR_IoTData	Date	Date	datetime	8	NULL	YES
AGR_IoTData	AGR_IoTDevices.ID	Device	int	4	NULL	NO
AGR_IoTData	AGR_IoTDataFactors.ID	Factor	int	4	NULL	NO
AGR_IoTData	Value	Value	decimal	9	NULL	NO
AGR_IoTData	IsActive	Active	bit	1	((1))	NO
AGR_IoTInstallations	ID		int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_IoTInstallations	AGR_IoTDevices.ID	Device	int	4	NULL	NO
AGR_IoTInstallations	StartDateOfIntsallation	Start Date Of Intsallation	datetime	8	NULL	NO
AGR_IoTInstallations	EndDateOfIntsallation	End Date Of Intsallation	datetime	8	NULL	YES
AGR_IoTInstallations	Latitude	Latitude	decimal	9	NULL	YES
AGR_IoTInstallations	Longitude	Longitude	decimal	9	NULL	YES
AGR_IoTInstallations	Cultivation	Cultivation	nvarchar	100	NULL	YES
AGR_IoTInstallations	Type_LOV	Type	tinyint	1	NULL	NO
AGR_IoTInstallations	Height	Height	decimal	9	NULL	YES
AGR_IoTInstallations	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IoTInstallations	IsActive	Active	bit	1	((1))	NO
AGR_IoTDevicesToFarms	ID		int	4	NULL	NO
AGR_IoTDevicesToFarms	AGR_Places.ID	Place	int	4	NULL	NO
AGR_IoTDevicesToFarms	StartDateOfConnection	Start Date Of Connection	datetime	8	NULL	NO
AGR_IoTDevicesToFarms	EndDateOfConnection	End Date Of Connection	datetime	8	NULL	YES
AGR_IoTDevicesToFarms	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IoTDevicesToFarms	IsActive	Active	bit	1	((1))	NO

Quality Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_CertificationTypes	ID		int	4	NULL	NO
AGR_CertificationTypes	ShortTitle_EN	Certification	nvarchar	200	NULL	NO
AGR_CertificationTypes	Comments	Comments	nvarchar	-1	NULL	YES
AGR_CertificationTypes	IsActive	Active	bit	1	((1))	NO
AGR_CertificationAuthorities	ID		int	4	NULL	NO
AGR_CertificationAuthorities	ShortTitle_EN	Certification Authority	nvarchar	200	NULL	NO
AGR_CertificationAuthorities	Comments	Comments	nvarchar	-1	NULL	YES
AGR_CertificationAuthorities	IsActive	Active	bit	1	((1))	NO
AGR_Certifications	ID		int	4	NULL	NO
AGR_Certifications	AGR_CertificationTypes.ID	Certification	int	4	NULL	NO
AGR_Certifications	AGR_CertificationAuthorities.ID	Certification Authority	int	4	NULL	NO
AGR_Certifications	AGR_Transactors.ID	Certification Owner	int	4	NULL	NO
AGR_Certifications	CertificationDate	Certification Date	datetime	8	NULL	NO
AGR_Certifications	CertificationValidUntil	Valid until	datetime	8	NULL	NO
AGR_Certifications	Comments	Comments	nvarchar	-1	NULL	YES
AGR_Certifications	IsActive	Active	bit	1	((1))	NO
AGR_CertificationProducts	ID		int	4	NULL	NO
AGR_CertificationProducts	AGR_Certifications.ID	Certification	int	4	NULL	NO
AGR_CertificationProducts	AGR_Products.ID	Product	int	4	NULL	NO
AGR_CertificationProducts	ShortTitle_EN	Title	nvarchar	200	NULL	YES
AGR_CertificationProducts	CertificationDate	Certification Date	datetime	8	NULL	NO
AGR_CertificationProducts	Comments	Comments	nvarchar	-1	NULL	YES
AGR_CertificationProducts	IsActive	Active	bit	1	((1))	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_CertificationChecklists	ID		int	4	NULL	NO
AGR_CertificationChecklists	AGR_CertificationTypes.ID	Certification	int	4	NULL	NO
AGR_CertificationChecklists	Parameter_EN	Parameter	nvarchar	200	NULL	NO
AGR_CertificationChecklists	Type_LOV	Type	tinyint	1	NULL	NO
AGR_CertificationChecklists	UpperValue	Upper Value	decimal	9	NULL	YES
AGR_CertificationChecklists	LowerValue	Lower Value	decimal	9	NULL	YES
AGR_CertificationChecklists	IsActive	Active	bit	1	((1))	NO
AGR_CertificationChecks	ID		int	4	NULL	NO
AGR_CertificationChecks	AGR_Certifications.ID	Certification	int	4	NULL	NO
AGR_CertificationChecks	AGR_CertificationChecklists.ID	Certification Check List	int	4	NULL	NO
AGR_CertificationChecks	Value		decimal	9	NULL	YES
AGR_CertificationChecks	AGR_Transactors.ID	Certification Checked By	int	4	NULL	NO
AGR_CertificationChecks	Comments	Comments	nvarchar	-1	NULL	YES
AGR_CertificationChecks	IsActive	Active	bit	1	((1))	NO

Isotopic Profile Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_IsotopicProfiles	ID		int	4	NULL	NO
AGR_IsotopicProfiles	AGR_ProductFamilies.ID	Product Family	int	4	NULL	NO
AGR_IsotopicProfiles	AGR_Varieties.ID	Variety	int	4	NULL	NO
AGR_IsotopicProfiles	Title	Isotopic Profile	nvarchar	200	NULL	NO
AGR_IsotopicProfiles	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IsotopicProfiles	IsActive	Active	bit	1	((1))	NO
AGR_IsotopicElements	ID		int	4	NULL	NO
AGR_IsotopicElements	Element	Isotopic Element	nvarchar	100	NULL	NO
AGR_IsotopicElements	Symbol	Symbol	nvarchar	8	NULL	NO
AGR_IsotopicElements	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IsotopicElements	IsActive	Active	bit	1	((1))	NO
AGR_IsotopicProfileElements	ID		int	4	NULL	NO
AGR_IsotopicProfileElements	AGR_IsotopicProfiles.ID	Isotopic Profile	int	4	NULL	NO
AGR_IsotopicProfileElements	AGR_IsotopicElements.ID	Isotopic Element	int	4	NULL	NO
AGR_IsotopicProfileElements	MidValue	Mid Value	decimal	9	NULL	YES
AGR_IsotopicProfileElements	MinValue	Min Value	decimal	9	NULL	YES
AGR_IsotopicProfileElements	MaxValue	Max Value	decimal	9	NULL	YES
AGR_IsotopicProfileElements	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IsotopicProfileElements	IsActive	Active	bit	1	((1))	NO
AGR_IsotopicProfileProducts	ID		int	4	NULL	NO
AGR_IsotopicProfileProducts	AGR_Products.ID	Product	int	4	NULL	NO
AGR_IsotopicProfileProducts	AGR_IsotopicProfiles.ID	Isotopic Profile	int	4	NULL	NO
AGR_IsotopicProfileProducts	DateOfAssignment	Date Of Assignment	datetime	8	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_IsotopicProfileProducts	AGR_Transactors.ID	Assigned By	int	4	NULL	NO
AGR_IsotopicProfileProducts	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IsotopicProfileProducts	IsActive	Active	bit	1	((1))	NO
AGR_IsotopicProfileChekcs	ID		int	4	NULL	NO
AGR_IsotopicProfileChekcs	AGR_Lots.ID	LOT	int	4	NULL	NO
AGR_IsotopicProfileChekcs	AGR_IsotopicProfileProducts.ID	Product Isotopic Profile	int	4	NULL	NO
AGR_IsotopicProfileChekcs	DateOfTest	Date Of Test	datetime	8	NULL	NO
AGR_IsotopicProfileChekcs	AGR_Transactors.ID	Tested By	int	4	NULL	NO
AGR_IsotopicProfileChekcs	Result	Result	decimal	9	NULL	YES
AGR_IsotopicProfileChekcs	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IsotopicProfileChekcs	IsActive	Active	bit	1	((1))	NO
AGR_IsotopicProfileChekcElements	ID		int	4	NULL	NO
AGR_IsotopicProfileChekcElements	AGR_IsotopicProfileChekcs.ID	Isotopic Check	int	4	NULL	NO
AGR_IsotopicProfileChekcElements	AGR_IsotopicProfileElements.ID	Isotopic Element	int	4	NULL	NO
AGR_IsotopicProfileChekcElements	Value	Value	decimal	9	NULL	YES
AGR_IsotopicProfileChekcElements	Comments	Comments	nvarchar	-1	NULL	YES
AGR_IsotopicProfileChekcElements	IsActive	Active	bit	1	((1))	NO

DNA Markers Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_DNAProfiles	ID		int	4	NULL	NO
AGR_DNAProfiles	DNAInfo	DNA Info	nvarchar	500	NULL	NO
AGR_DNAProfiles	AGR_ProductFamilies.ID	Product Family	int	4	NULL	NO
AGR_DNAProfiles	AGR_Varieties.ID	Varieties Family	int	4	NULL	NO
AGR_DNAProfiles	Title	DNA Profile	nvarchar	200	NULL	NO
AGR_DNAProfiles	Comments	Comments	nvarchar	-1	NULL	YES
AGR_DNAProfiles	IsActive	Active	bit	1	((1))	NO
AGR_DNAProfileProducts	ID		int	4	NULL	NO
AGR_DNAProfileProducts	AGR_Products.ID	Product	int	4	NULL	NO
AGR_DNAProfileProducts	AGR_DNAProfiles.ID	DNA Profile	int	4	NULL	NO
AGR_DNAProfileProducts	DateOfAssignment	Date Of Assignment	datetime	8	NULL	NO
AGR_DNAProfileProducts	AGR_Transactors.ID	Assigned By	int	4	NULL	NO
AGR_DNAProfileProducts	Comments	Comments	nvarchar	-1	NULL	YES
AGR_DNAProfileProducts	IsActive	Active	bit	1	((1))	NO
AGR_DNAProfileChekcs	ID		int	4	NULL	NO
AGR_DNAProfileChekcs	AGR_Lots.ID	LOT	int	4	NULL	NO
AGR_DNAProfileChekcs	AGR_DNAProfileProducts.ID	Product DNA Profile	int	4	NULL	NO
AGR_DNAProfileChekcs	DateOfTest	Date Of Test	datetime	8	NULL	NO
AGR_DNAProfileChekcs	AGR_Transactors.ID	Tested By	int	4	NULL	NO
AGR_DNAProfileChekcs	Result	Result	decimal	9	NULL	YES
AGR_DNAProfileChekcs	Comments	Comments	nvarchar	-1	NULL	YES
AGR_DNAProfileChekcs	IsActive	Active	bit	1	((1))	NO

Nutritional Profile Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_NutritionalElements	ID		int	4	NULL	NO
AGR_NutritionalElements	Element_EN	Element	nvarchar	100	NULL	NO
AGR_NutritionalElements	NutrientCategory_LOV	Nutrient Category	tinyint	1	NULL	NO
AGR_NutritionalElements	Unit	Unit	nvarchar	20	NULL	YES
AGR_NutritionalElements	IsActive	Active	bit	1	((1))	NO
AGR_NutritionalProfiles	ID		int	4	NULL	NO
AGR_NutritionalProfiles	AGR_ProductFamilies.ID	Product Family	int	4	NULL	NO
AGR_NutritionalProfiles	AGR_Varieties.ID	Variety	int	4	NULL	YES
AGR_NutritionalProfiles	Specific_EN	Specific	nvarchar	100	NULL	YES
AGR_NutritionalProfiles	UserFriendlyName_EN	Nutritional Profile Name	nvarchar	200	NULL	YES
AGR_NutritionalProfiles	IsActive	Active	bit	1	((1))	NO
AGR_NutritionalProfilePortions	ID		int	4	NULL	NO
AGR_NutritionalProfilePortions	AGR_NutritionalProfiles.ID	Nutritional Profile	int	4	NULL	NO
AGR_NutritionalProfilePortions	Label_EN	Portion	nvarchar	60	NULL	YES
AGR_NutritionalProfilePortions	IsActive	Active	bit	1	((1))	NO
AGR_NutritionalProfileInfos	ID		int	4	NULL	NO
AGR_NutritionalProfileInfos	AGR_NutritionalProfilePortions.ID	Portion	int	4	NULL	NO
AGR_NutritionalProfileInfos	AGR_NutritionalElements.ID	Nutritional Element	int	4	NULL	NO
AGR_NutritionalProfileInfos	InfoValue	Value	decimal	9	NULL	NO
AGR_NutritionalProfileInfos	IsNecessary	Is Necessary?	bit	1	((1))	NO
AGR_NutritionalProfileInfos	IsActive	Active	bit	1	((1))	NO
AGR_NutritionalConsumerProfiles	ID		int	4	NULL	NO
AGR_NutritionalConsumerProfiles	AGR_ConsumerProfiles.ID	Consumer Profile	int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_NutritionalConsumerProfiles	AGR_NutritionalElements.ID	Nutritional Element	int	4	NULL	NO
AGR_NutritionalConsumerProfiles	ElementValue	Value	decimal	9	NULL	NO
AGR_NutritionalConsumerProfiles	IsActive	Active	bit	1	((1))	NO
AGR_NutritionalProducts	ID		int	4	NULL	NO
AGR_NutritionalProducts	AGR_Products.ID	Product	int	4	NULL	NO
AGR_NutritionalProducts	AGR_NutritionalProfiles.ID	Nutritional Profile	int	4	NULL	NO
AGR_NutritionalProducts	IsActive	Active	bit	1	((1))	NO

Internal / External Tracing Module

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_TransportEvents	ID		int	4	NULL	NO
AGR_TransportEvents	EventDateStart	Start at	datetime	8	NULL	NO
AGR_TransportEvents	AGR_Products.ID	Product	int	4	NULL	NO
AGR_TransportEvents	AGR_Transactors.ID	Sender	int	4	NULL	NO
AGR_TransportEvents	AGR_Places.ID	From Place	int	4	NULL	NO
AGR_TransportEvents	AGR_Transactors.ID	Recipient	int	4	NULL	NO
AGR_TransportEvents	AGR_Places.ID	To Place	int	4	NULL	NO
AGR_TransportEvents	AGR_MeasurmentUnits.ID	Unit	int	4	NULL	NO
AGR_TransportEvents	Quantity	Quantity	decimal	9	NULL	YES
AGR_TransportEvents	NumberOfPallets	Number Of Pallets	decimal	9	NULL	YES
AGR_TransportEvents	EventDateEnd	End at	datetime	8	NULL	NO
AGR_TransportEvents	LicencePlate	Licence Plate	nvarchar	8	NULL	NO
AGR_TransportEvents	TrailerLicencePlate	Trailer Licence Plate	nvarchar	8	NULL	NO
AGR_TransportEvents	HasSensor	Measuring Parameters?	bit	1	((0))	NO
AGR_TransportEvents	DeliveryAccepted	Accept Delivery?	bit	1	((0))	NO
AGR_TransportEvents	Comments	Comments	nvarchar	-1	NULL	YES
AGR_TransportEvents	IsActive	Active	bit	1	((1))	NO
AGR_TransformationEvents	ID		int	4	NULL	NO
AGR_TransformationEvents	EventDateStart	Start at	datetime	8	NULL	NO
AGR_TransformationEvents	AGR_Transactors.ID	Producer	int	4	NULL	NO
AGR_TransformationEvents	AGR_Places.ID	Place	int	4	NULL	NO
AGR_TransformationEvents	AGR_Products.ID	From Product	int	4	NULL	NO
AGR_TransformationEvents	AGR_Products.ID	New Product	int	4	NULL	NO

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_TransformationEvents	AGR_MeasurmentUnits.ID	Unit	int	4	NULL	NO
AGR_TransformationEvents	Quantity	Quantity	decimal	9	NULL	YES
AGR_TransformationEvents	AGR_Products.ID	New Product	int	4	NULL	NO
AGR_TransformationEvents	AGR_MeasurmentUnits.ID	Unit	int	4	NULL	NO
AGR_TransformationEvents	Quantity	Quantity	decimal	9	NULL	YES
AGR_TransformationEvents	EventDateEnd	End at	datetime	8	NULL	NO
AGR_TransformationEvents	HasSensor	Measuring Parameters?	bit	1	((0))	NO
AGR_TransformationEvents	Comments	Comments	nvarchar	-1	NULL	YES
AGR_TransformationEvents	IsActive	Active	bit	1	((1))	NO
AGR_EventFactorLimits	ID		int	4	NULL	NO
AGR_EventFactorLimits	Title	Tracing le	nvarchar	30	NULL	NO
AGR_EventFactorLimits	AGR_IoTDataFactors.ID	Io Family	int	4	NULL	NO
AGR_EventFactorLimits	UpperValue	Tracing erValue	decimal	9	NULL	YES
AGR_EventFactorLimits	LowerValue	Tracing erValue	decimal	9	NULL	YES
AGR_EventFactorLimits	Comments	Comments	nvarchar	-1	NULL	YES
AGR_EventFactorLimits	IsActive	Active	bit	1	((1))	NO
AGR_EventFactorLimits	ID		int	4	NULL	NO
AGR_EventFactorLimits	AGR_TransportEvents.ID	Transport Family	int	4	NULL	YES
AGR_EventFactorLimits	AGR_TransformationEvents.ID	Transformation Family	int	4	NULL	YES
AGR_EventFactorLimits	AGR_EventFactorLimits.ID	Event Family	int	4	NULL	NO
AGR_EventFactorLimits	Value	Tracing ue	decimal	9	NULL	YES
AGR_EventFactorLimits	Comments	Comments	nvarchar	-1	NULL	YES
AGR_EventFactorLimits	IsActive	Active	bit	1	((1))	NO
AGR_TransformationEventLots	ID		int	4	NULL	NO
AGR_TransformationEventLots	AGR_TransportEvents.ID	Transport Family	int	4	NULL	YES

Object	Field	Label (EN)	Data Type	Length	Default	Nullable
AGR_TransformationEventLots	AGR_Lots.ID	LOT In	int	4	NULL	YES
AGR_TransformationEventLots	Quantity	Quantity	decimal	9	NULL	YES
AGR_TransformationEventLots	AGR_Lots.ID	LOT Out	int	4	NULL	NO
AGR_TransformationEventLots	Quantity	Quantity	decimal	9	NULL	YES
AGR_TransformationEventLots	Comments	Comments	nvarchar	-1	NULL	YES
AGR_TransformationEventLots	IsActive	Active	bit	1	((1))	NO