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D4.1

Multi layered model for agricultural GNSS enabled services

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Abstract:	AgriBIT system is being developed aiming to offer a variety of services based on the customized needs of its users, described as Use Cases. In the current document, a detailed description of both the conceptual system model and the functional flow process of each AgriBIT Use Case is performed, providing an overview and a detailed analysis of the system components' functionalities as well as further interconnection respectively, debriefing the system's function.		

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Executive Summary

AgriBIT is an elaborate system offering GNSS enabled precision agriculture services. The various system components allow performing and providing a wide array of services, notably:

1. mapping of stationary field elements
2. mapping of mobile field elements
3. route planning for unmanned vehicles and agricultural machineries
4. navigation of agricultural machineries in arable crops
5. EO based PA services for farmers' decision support
6. graphical representation of heterogeneous data for improved decision-making
7. production of advisory and intelligent early warnings
8. prescription mapping for variable rate application

The current document describes the overall idea of the AgriBIT structure (section 5 "**AgriBIT conceptual architecture**" of the current document, as well as specific information on how the system operates in terms of functional relationship (data models) amongst the distinct system components (section 6 "**AgriBIT functional view**" of the current document. The current deliverable exhibits an introduction to the AgriBIT main functions.

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1. Introduction

The main objective of AgriBIT project's Task 4.1 "Multi-layered model for agricultural GNSS enabled services" is to create the multi-layer model of AgriBIT to transform it into a system able to be used for professional GNSS-based precision agriculture applications. The multi-layer model offers the ability to describe and model the process followed in various actions conducted during the system function, using different system components, after exploring the role of each system's sub-part.

For this reason, one of the main goals of AgriBIT partners is to attempt to optimize the interconnectivity of the distinct AgriBIT layers, pursuing in the same time an increased compatibility of the AgriBIT system with external services/objects/sensors used for precision agriculture purposes. To this end, the developed model presents the AgriBIT system in various views. More precisely, a first view of the conceptual architecture view is provided, offering a high-level representation of the system architecture and describing the individual layers of the system and the interconnections among them; together with a functional view of the system that effectively offers an overview of the dependencies between various parts of the system and external systems through flexible interfaces and APIs. Furthermore, a detailed description is provided, regarding the functional view with respect to the customized actions occurring in each different AgriBIT Use Case. In this way, it is possible to provide a clear overview of the functional steps and procedures in each Use Case, allowing an in-depth understanding of the entire AgriBIT solution.

D4.1 is the main result of task T4.1 so far, this task, as already mentioned, concerns the general description of the system model and also contributes to the realization of the D2.2 document architecture. The initial activities have seen the analysis of the requirements obtained in D2.1 and the study, based on these, of a conceptual model. This conceptual model was exploited and used also in tasks T2.2 and T2.3 where the main components of the system were also identified and described in D2.2. These components were then used in the functional part of the conceptual model to deepen its dynamic functioning. The task T4.1 will continue to support the activities of the WP4 along with the architecture design, and may ad-hoc be updated during the project flow in case it is considered as needed, based on the possible amendments of the system architecture.

2. Methodology

As previously stated in the executive summary of the current document, several Use Cases have been predefined in D2.1 “AgriBIT user requirements”. Those Use Cases have been based on the various needs of the potential end-users of the system. As a result, Use Cases represent the actions performed by users in cases of each possible specific query by the side of user when using the system. Each Use Case may be considered as a separate process, during which, users intent to achieve an interaction with the tool.

During time, several models have been developed in order to achieve optimization of conceptual modelling [1]. To this extent, conceptual models have been widely used for the clarification of interconnectivity among fragmented elements that are put together for the development of an integrated framework of differentiated components. This process intends to facilitate and support the design conceptualization, initiation and integration/implementation of the various stages, components, layers, and aspects [2]. In this context, a schematic representation/diagram of the AgriBIT architecture has been developed, aiming to provide a holistic explanatory overview of the entire AgriBIT system, using symbols, rather than real pictures and images for the simplification of the processes’ organization.

On the other hand, in order to properly describe the functional architecture of a product, different models have been developed [3]. Such suggestions lead to the establishment of functional diagrams for the characterization and description of elaborate complicated system structures. As a result, functions can be defined for the identification of input and output flows. Simultaneously, interactions of the distinct components such as data flows can be identified in this way, allowing an in-depth understanding of the system’s specification. The functional architecture of AgriBIT has been developed by introducing a graphic display of the individual system parts and their relationship.

Both conceptual/structural and functional architecture models are usually required for the complete understanding of a system. This because the conceptual one offers an overview of the system and the functional provides a more detailed description of the system.

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[1] Mayr, H.C., Thalheim, B. The triptych of conceptual modeling. *Software System Modeling* 20, 7–24 (2021). https://doi.org/10.1007/s10270-020-00836-z

[2] Buthayna Eilouti, Concept evolution in architectural design: an octonary framework, Frontiers of Architectural Research, Volume 7, Issue 2, 2018, Pages 180-196, ISSN 2095-2635, https://doi.org/10.1016/j.foar.2018.01.003.

[3] Sjaak Brinkkemper and Stella Pachidi, Functional architecture modeling for the software product industry, 2010, Software Architecture, 4th European Conference, ECSA 2010, Copenhagen, Denmark, August 23-26, 2010. Proceedings. Available in Functional Architecture Modeling for the Software Product Industry | SpringerLink

3. Architecture correspondence to user requirements

In D2.1 of the project, user requirements were elicited. More specifically, after monitoring and analysis via the use of questionnaires, it was made apparent that several needs were observed for the various system components. Those are described in **Table 1**, while their correspondence to the various UC is described in the last column of the Table.

Table 1. *User requirements as monitored in D2.1*

<table>
<tr><th>Component</th><th>User requirement</th><th>End-user specifications</th><th>Related UC</th></tr>
<tr><td rowspan="14">GNSS receiver</td><td>Irrigation</td><td>Support of smart irrigation</td><td>UC2</td></tr>
<tr><td>Extension services</td><td>Support for GNSS and EO application</td><td>UC5</td></tr>
<tr><td rowspan="5">Sensors</td><td>Air humidity</td><td rowspan="5">UC1, UC2</td></tr>
<tr><td>Temperature</td></tr>
<tr><td>Soil moisture</td></tr>
<tr><td>Precipitation, seasonal accumulated precipitation</td></tr>
<tr><td>Wind speed</td></tr>
<tr><td>Cost</td><td>Low cost (<=500 euros)</td><td>UC1, UC2</td></tr>
<tr><td>Connectivity</td><td>Connection with public sensors</td><td>UC1, UC2</td></tr>
<tr><td>Flexibility and size</td><td>Plug and Play small compact solution</td><td>UC1, UC2</td></tr>
<tr><td>Precision</td><td>High precision (2-5 meters)</td><td>UC5</td></tr>
<tr><td>Update frequency</td><td>2''-60'' depends of the speed</td><td>UC1, UC2</td></tr>
<tr><td>Configuration and customization</td><td>Adaptable systems with access to historical data and correlation ability</td><td>All UCs (UC1-UC8)</td></tr>
<tr><td rowspan="7">GNSS enabler</td><td>Route planning</td><td>Operational velocity support</td><td>UC3</td></tr>
<tr><td rowspan="2">Boundaries extraction</td><td>Measure areas, export boundaries for mass use applications (like google earth or google maps)</td><td rowspan="2">UC4</td></tr>
<tr><td>Topography and micro-climate definitions</td></tr>
<tr><td rowspan="4">Data acquisition from sensors</td><td>Connection to sensors of local and small weather stations, irrigations systems (control specific data), electronical valves</td><td>UC1, UC2</td></tr>
<tr><td>Micro-climate defined from different sensors</td><td>UC1, UC2</td></tr>
<tr><td>Support of predictive pest and disease models</td><td>UC1, UC2, UC7, UC8</td></tr>
<tr><td>Access to historical data</td><td>UC1, UC2, UC7, UC8</td></tr>
<tr><td rowspan="3">Precision agriculture</td><td>Agricultural practices</td><td>Product recommendation</td><td>UC7, UC8</td></tr>
<tr><td>Pest and disease monitoring and control</td><td>Information about disease severity and pest infestation</td><td>UC5, UC6, UC7, UC8</td></tr>
<tr><td>Crop growth monitoring</td><td>Monitoring of fruit color</td><td>UC5, UC6</td></tr>
</table>

		Localized growth monitoring; monitoring of differentiated growth patches in the plot	
		Growth forecast	
	Prescription mapping	Ability of choosing the prescription accuracy, classifying the prescription in 2 or 3 level, or use it in high definition accuracy level	UC8
	Precision irrigation	Irrigation dose advice from forecast models	UC2, UC5, UC6
System	Farm size	Support of both small (from 5 hectares) and big farms (up to 100 hectares)	All UCs (UC1-UC8)
	Economics justification	Details on the production costs	All UCs (UC1-UC8)
	Notifications and frequency	SMS and/or system notification daily	UC7
	Automation/actuation	Simple automated systems, without manual data import	UC6
	Software	Web interface	UC6
		Mobile interface	

4. Definitions and terms

Specific explanations of several terms and concepts that are required for the proper understanding of the multi layered model of AgriBIT are presented in the table below.

Table 2. *Explanations of various notions regarding AgriBIT*

GNSS	A complex, multidisciplinary technology that allows compatible hardware (i.e. GNSS receivers) the determination of their own location on Earth. It relies on multilateration of such devices against a dedicated constellation of artificial satellites of orbital trajectories precisely controlled and known, both spatially and temporally. A complex, multidisciplinary technology that allows compatible hardware (i.e. GNSS receivers) the determination of their own location on earth. It relies on multilateration of such devices against a dedicated constellation of artificial satellites, the orbital trajectories of whom are precisely controlled and known, both spatially and temporally. The distance determination requirement is achieved via the time difference of signals, hence high accuracy clocks are used on the airborne segment. Cheaper receiver hardware using clocks capable only of much coarser differences, relies on the incorporation of more satellites to the multilateration problem, further eliminating degrees-of-freedom, yielding a determinate result. For a plethora of reasons, not confined to: atmospheric disturbances, signal propagation multipath and clock errors, basic GNSS services offer a finite accuracy, inadequate for some applications such as Precision Agriculture. To address such issues, complementary technologies have extended GNSS considerably: A common technique is the comparison of deduced positions against other immobile receivers of given position, to expose calculation errors within an area. Depending on the communication of such errors, there are systems like Differential GNSS, for RF signals from terrestrial antennae, or SBAS that use a complex network of ground stations and artificial satellites to cover much greater areas. Another method, RTK, relies on differential calculations on top of attempts to ascertain the number of wavelengths between emitting source (satellite) and receiver, leading to potentially exceptionally high accurate distance measurements between them, thus very accurate positioning. Other assistive technologies exist as well, notably techniques employed by cell telephony providers, caching orbital data to speed-up cold boot of GNSS receivers in smartphones and/or performing rudimentary multiangulation via cell towers.
Earth Observation (EO)	A terrestrial surface monitoring technology, relying on artificial devices in orbit around the Earth that collect and transmit high-resolution photos of the areas they fly above of. Such images may not be confined solely to the visible spectrum, but the infrared and other bands, that can help reveal further insights about the soil, climate/weather (C3S), environment/pollution (CAMS), etc.

Unmanned Systems (aerial/ground) U(A/G)V	Unmanned systems capable of remotely controlled flight by real-time inputs from a human element, in addition to being able to carry out pre-determined flight missions, without further extraneous interaction. They are increasingly becoming a key element in detailed automated mapping of farms and crop monitoring, usually by optical means, but allowing the incorporation of other sensors as well. Other than data recording, active intervention and actuation in response to a field's situation, is another possibility too, albeit much less common as it is subject to a collection of technical challenges and increased costs.
Tractors	The ubiquitous tractor has been the main driving force behind every major cultivation operation during the last decades. Essentially, it is an extremely powerful automotive platform running on diesel, which allows the farmer to attach heavy machinery to accomplish various tasks via traversals of their lands, including tillage and spraying, among others.
Sensors	Devices that record specific data from their surroundings / environment. Their agricultural counterparts focus mainly on ambient parameters like temperature, soil humidity, water salinity and many others that carry some value for the crops' development.
Crop monitoring	A fairly self-explanatory term that groups a wide array of technologies that have a common goal: the collection of various data that pertain to the crop's optimal development over time, in detail. This information is the basis for effective decision making in farming.
Disease Early warning	A technology that builds on top of Crop Monitoring by evaluating the validity of a collection of logical rules and conditions related to the data gathered, in order to actively prompt the farmer in taking timely actions to prevent unwanted developments on their crop.
Yield estimation	Techniques based on plant health and growth prediction models that aim to provide an estimate on the quantity, time and quality of harvest from the agricultural operation. These models depend on multidimensional ambient and crop-related input parameters for the most part of the cultivation period. This is yet another valuable service for the farmer that relies on crop monitoring.
Data repository	A system responsible for safely persisting information, typically without the requirement for uninterrupted power supply for the retention of said information. Building on top of the hardware components that actually change their inner state to record their own interpretation of the of the data they were assigned to keep, there are various layers to translate that state back into a deciphered format, as

	well as to simplify, automate and facilitate the storage and retrieval of information, acting as an interface to the repository's clients.
Big Data Analytics	A diverse set of software and quantitative methodologies that lie behind the aggregation of high-volume, low-level events and their subsequent abstraction into high-level information of manageable volume that are meaningful and readily exploitable by humans. BDA is invaluable to the creation of Dashboards / DSS.
Field operations	Sessions consisting of actions carried out by farmers, agronomists and other agri-tech professionals that are beneficial and important to the development of the crops. Those include tillage, seeding, irrigation, fertilization, harvesting etc., depending on the crop stage and individual needs of a particular cultivation.
Web Platforms	Instances of software that are centrally hosted on a web resource and available to the users or other platforms over network communication infrastructure. The ubiquitous nature and far reach of the Internet coupled with a wide client device compatibility and the redundancy of specialized hardware, makes them ideal for interconnection of multiple users and the synchronization of large datasets, including analytical / historical data.
Mobile applications	Instances of software / automated logic that can be run from a handheld electronic device, commonly a smartphone or tablet. The advantages these devices bring to Precision Agriculture lie within their portability, interconnectivity and incorporation of sensors, making the in-situ exploitation of ICT technologies a reality for the agricultural producer.

5. AgriBIT conceptual architecture

Taking into consideration the needs of the AgriBIT system, a conceptual architecture model has been developed. The individual notions that constitute the system as a whole, along with their interconnections, are visually presented in an abstract manner, classified under the three major categories of AgriBIT technical contributions. Those classes are:

- The Physical layer: That would encompass all the hardware subsystems developed by the Consortium. In similar phrasing: tangible, material devices and mechanisms. A prime example is the custom, high accuracy GNSS receiver, while other instances may include sensors developed by the AgriBIT partners. In addition, a few selected commercial-of-the-shelf solutions will be used as well (UAVs, adapted GNSS receivers, weather stations, agricultural sensors).
- The user-facing Applications: Software that is meant to enable the farmers and other end-users interaction with the system's *data services*, and depending on the use case, *hardware components* like GNSS receivers, vehicles and sensors on the farm itself. The most important role of elements in this class is that they bridge the gap between these two. Applications that mostly focus on crop status, decision support, monitoring and historic data are accessible via a web interface, while those that revolve around in-situ sensor data and real-time farming operations guidance are delivered via smart devices, leveraging their portability and interconnectivity. Regardless, applications are designed with usability in mind.
- The intelligent data aggregation Backend: This is another complex software and data layer. Unlike members of the previous software class i.e., *Applications*, components of this category are inaccessible to the end-user, or at least not in a direct fashion. They remain "hidden" from the general public and convey information to / gather information from *Applications*. They also integrate data from other sources like EO satellites and seamlessly fuse information coming from those multiple channels, storing them safely. They subsequently extract useful insights about the overall state of the farming operation and its history. More importantly, they employ AI to ascertain future projections and produce warnings and timely advisory output.

The developed conceptual architecture model is presented in **Figure 1**. Following the abstract presentation of the system, and before delving into the more specific nature of the functional representation, it would be useful to shed some light on various aspects, aiming to clear any misconceptions. Revisiting the conceptual model graphic after having understood the following definitions, should give the reader a more concrete perception of the system, even while having kept the approach of de-structuring complex systems to the innately quite abstract and high-level nature of the conceptual model.

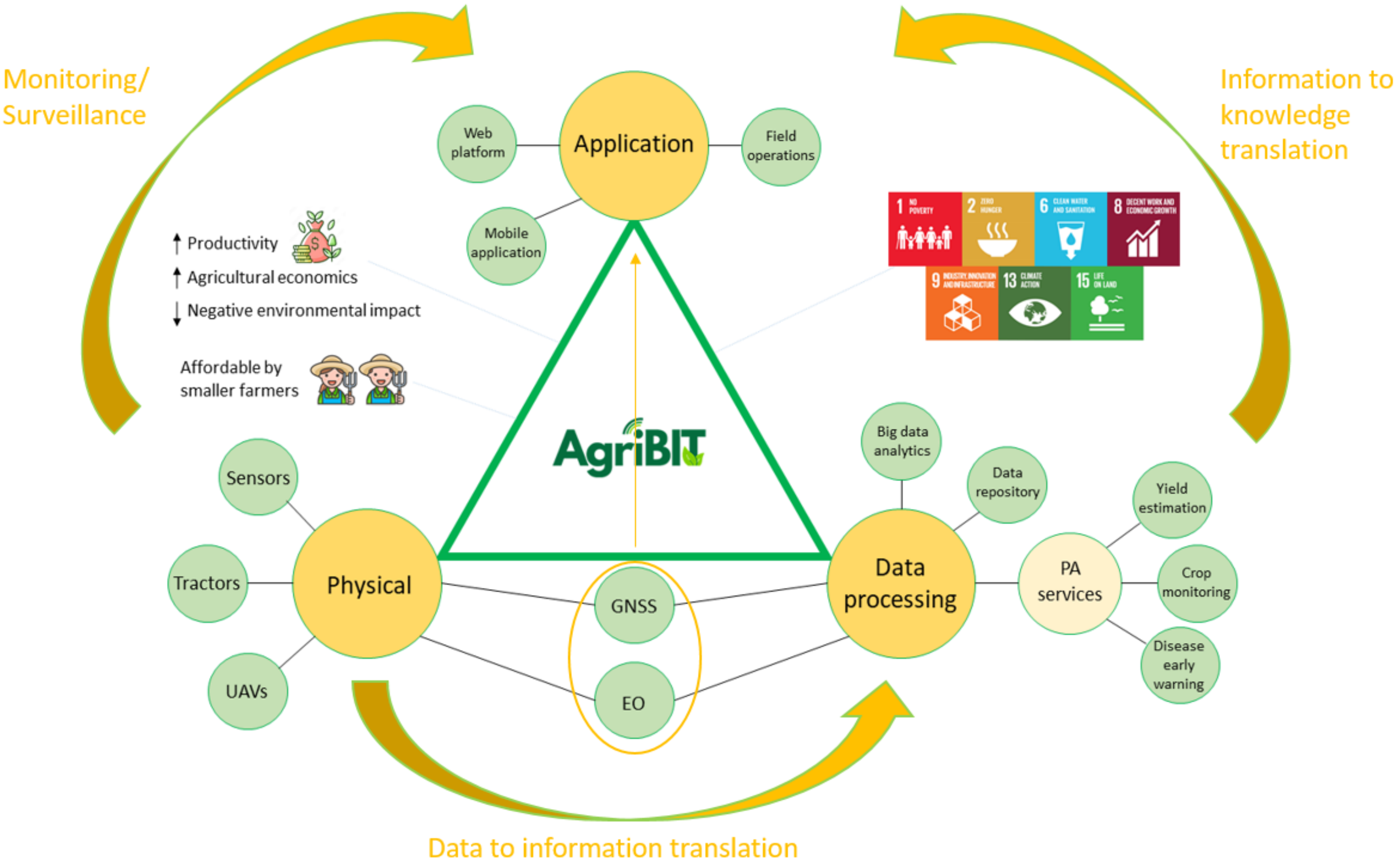

Figure 1. *Conceptual Model of AgriBIT*

6. AgriBIT functional view

For the further elaboration of the AgriBIT system, its functional model view is presented in subchapter 4.1 of the current document, whereas specific explanation for each Use Case of the system is provided in the following subchapters (4.1.1.-4.1.8.). This model focuses on the interconnection and flow of information across the subset of components involved per Use Case.

6.1. Comprehensive overview

The functional model system of AgriBIT is laid out in **Figure 2**, thus allowing the understanding of the role of each AgriBIT component in the process of supplying high-end valuable information for GNSS enabled precision agriculture services. In the legend of Figure 2 is described which part of the system is a GUI, a component, a database, and equipment, based on different colour representation. A further detail description of the system parts is presented in Deliverable 2.2 of the project accompanied by an in depth analysis, as Deliverable 4.1 is destined to provide a holistic first overview of the system.

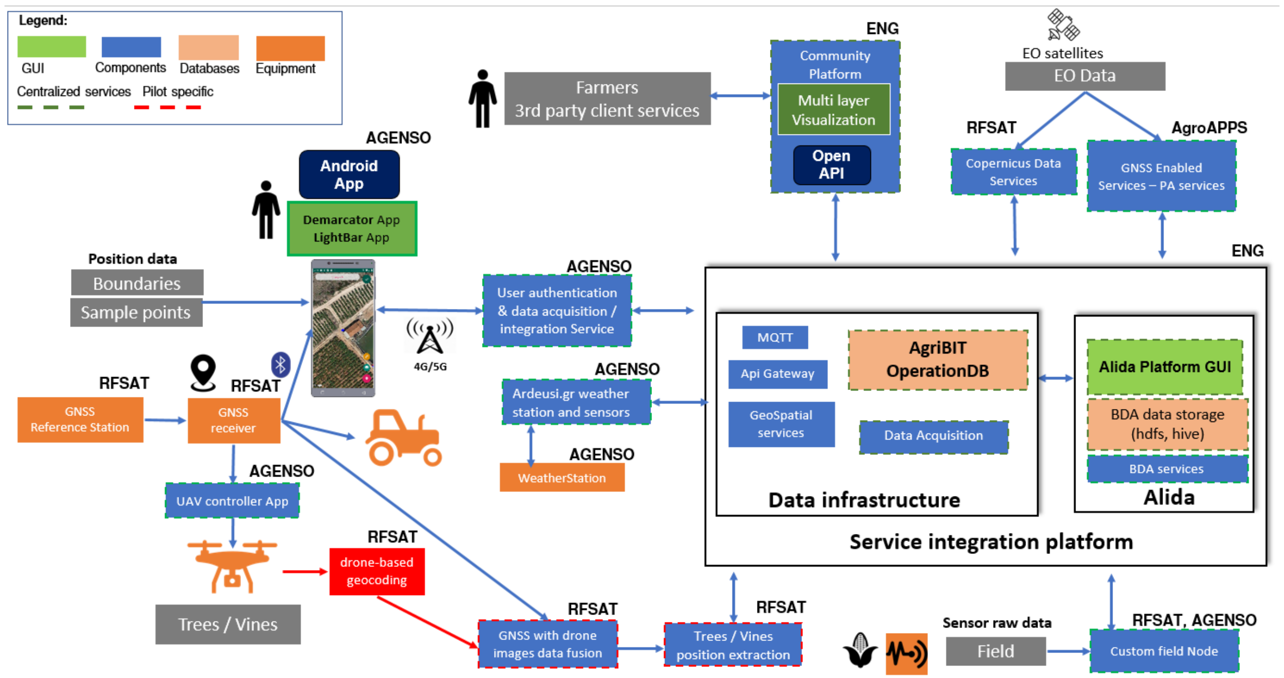

Figure 2. AgriBIT functional diagram

6.1.1. UC1: mapping of stationary field elements

In the case of mapping of stationary field elements, the RFSAT reference station via the GNSS receivers wirelessly and periodically transmit accurate position data to the Android App, and precisely the Demarcator App. Consequently, the App communicates the aforementioned data to the AGENSO back-end integration services (User authentication and data acquisition), before data being pushed to the Data infrastructure. Finally, data is being projected for users in the community platform. The flow is presented in **Figure 3**.

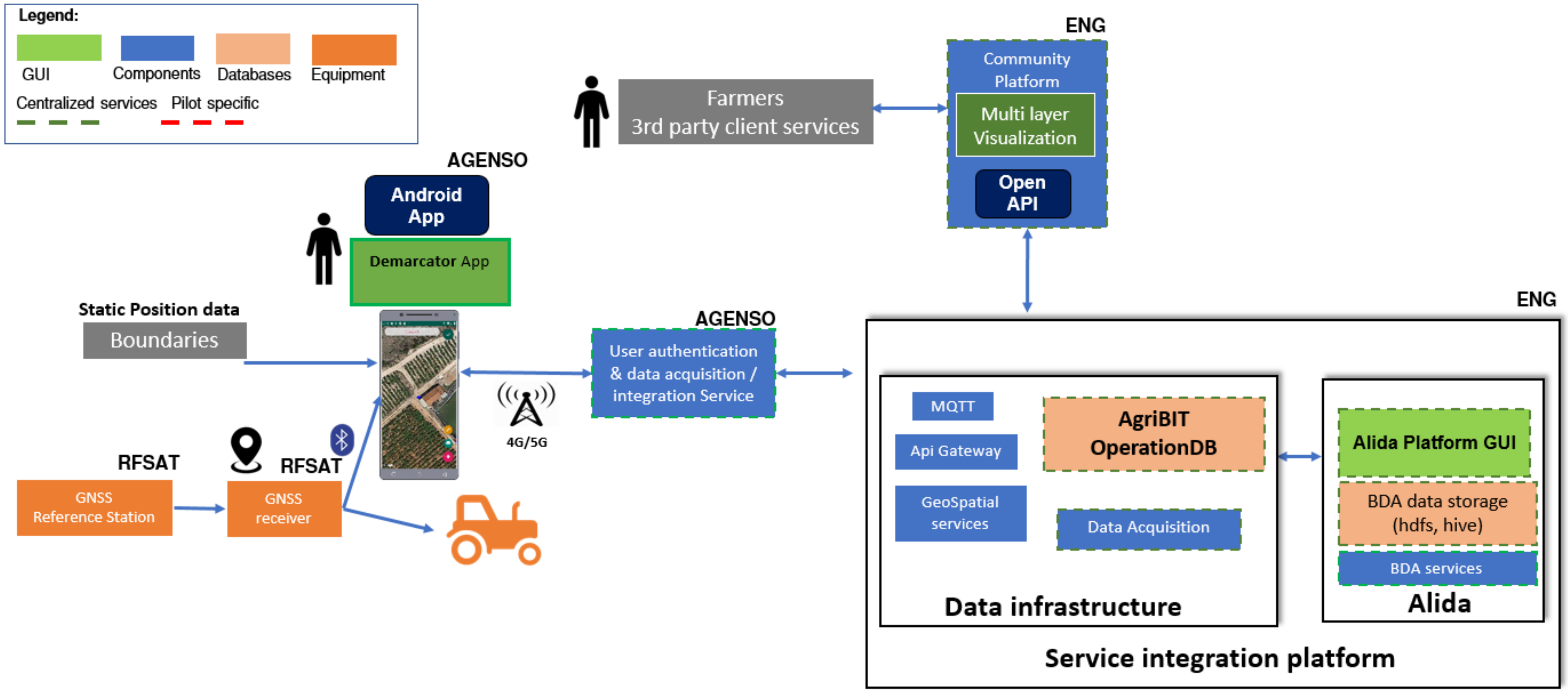

__Figure 3.__ UC1 functional diagram

6.1.2. UC2: mapping of mobile field elements

In the case of mapping of mobile elements, the same procedure as the previous one is followed, with the only exception that the Demarcator App also records/logs measurements from mobile sensors that are portable and provide the ability of installation in various locations.

Furthermore, specific field measurements taken by AGENSO weather stations and/or RFSAT custom field nodes are similarly relayed to the centralized data storage point of the AgriBIT Database. Respectively, data is being put together in the data infrastructure of the service integration platform before being projected to users via the community platform. The schematic follows in **Figure 4**.

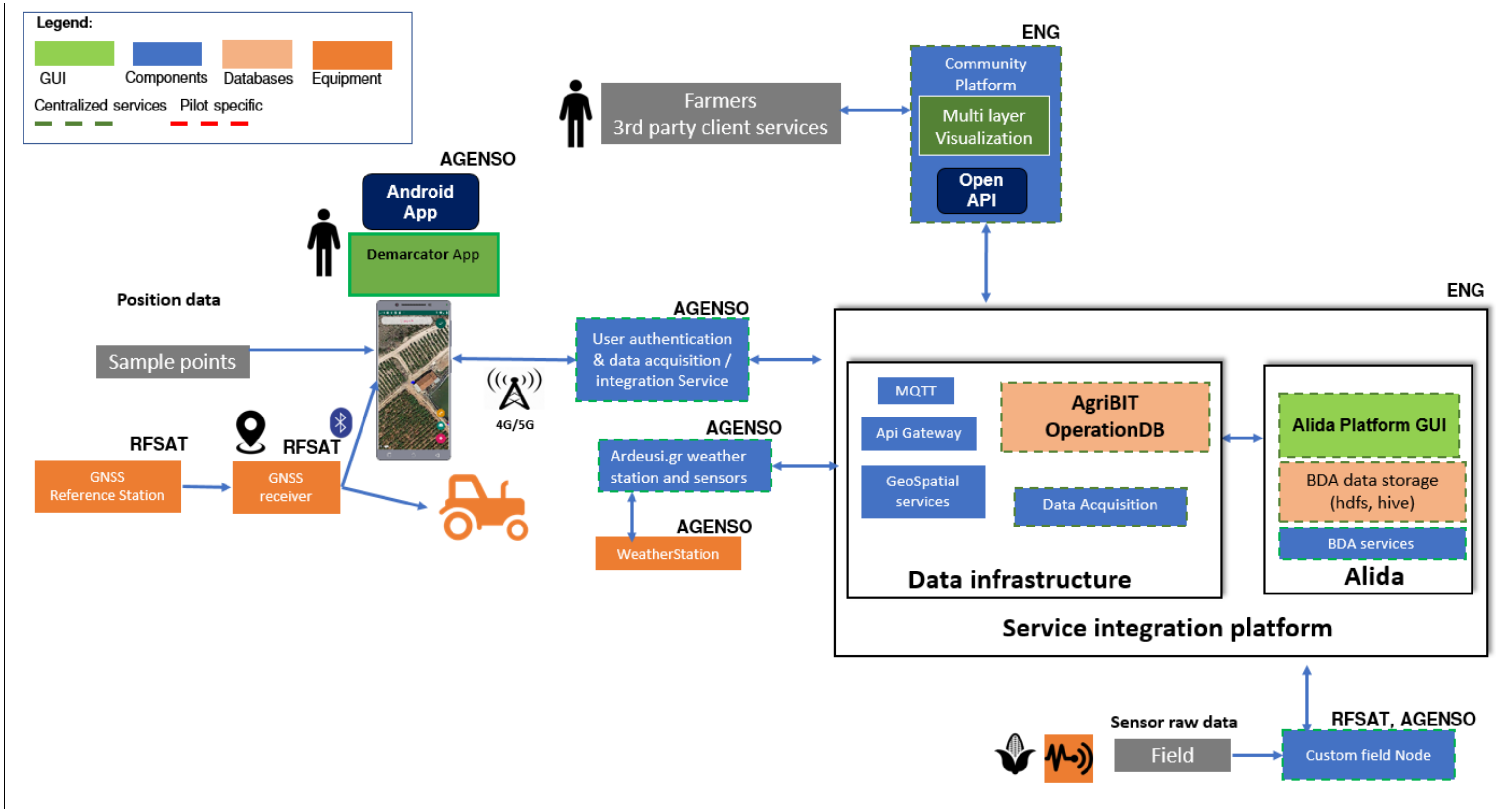

Figure 4. UC2 functional diagram

6.1.3. UC3: route planning for unmanned vehicles and agricultural machineries

In the case of route planning, two different procedures are followed. More specifically, one for aerial and one for terrestrial / on earth route planning. For the aerial occasion, the RFSAT GNSS receivers transmit location data to the UAV controller App which transmits the mission area boundaries to the RFSAT drone-based geocoding service. The latter produces the route plan of the subsequent flight path. Afterwards, the drone will follow the aerial route for obtaining images of trees and vines cultivations. The next step carried out by RFSAT, is the position extraction of the recorded imagery. For the route planning of terrestrial vehicles and machineries, the LightBar App retrieves field data from the AGENSO back-end (User authentication and data acquisition), in order to set crucial route parameters such as working width, starting point and bearing. Afterwards, route guidelines are generated and subsequently, results of the entire process are uploaded in the AGENSO back-end (User authentication and data acquisition) - and from there - to the data infrastructure, before being projected to users via the community platform. The overall flow is presented in **Figure 5**

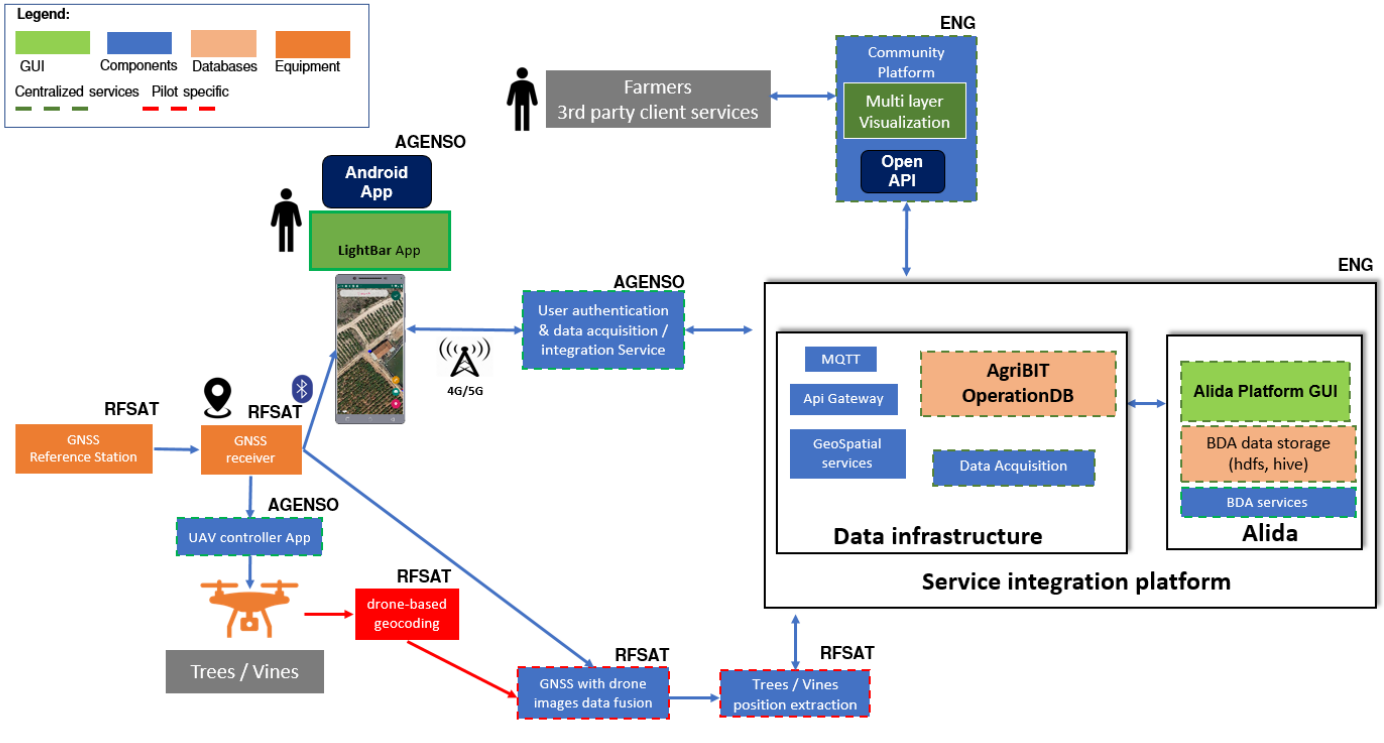

Figure 5. *UC3 functional diagram*

6.1.4. UC4: navigation of agricultural machineries in arable crops (LightBar application)

In the case of navigation of agricultural machinery, LightBar App retrieves route data from the AGENSO back-end (User authentication and data acquisition), as well as high accuracy positioning data from the RFSAT GNSS receiver. Subsequently, the system provides real-time correction advisory with respect to vehicle deviation from the optimal path. Moreover, the application continuously records kinematic parameters including deflection, direction of travel, speed and others. This assists the derivation of detailed statistics for the session's duration in total. After the traversal is concluded, actual session data are uploaded to the AGENSO back-end (User authentication and data acquisition), before a web push to the Data infrastructure. The components involved in the actions described above, are presented in **Figure 6**.

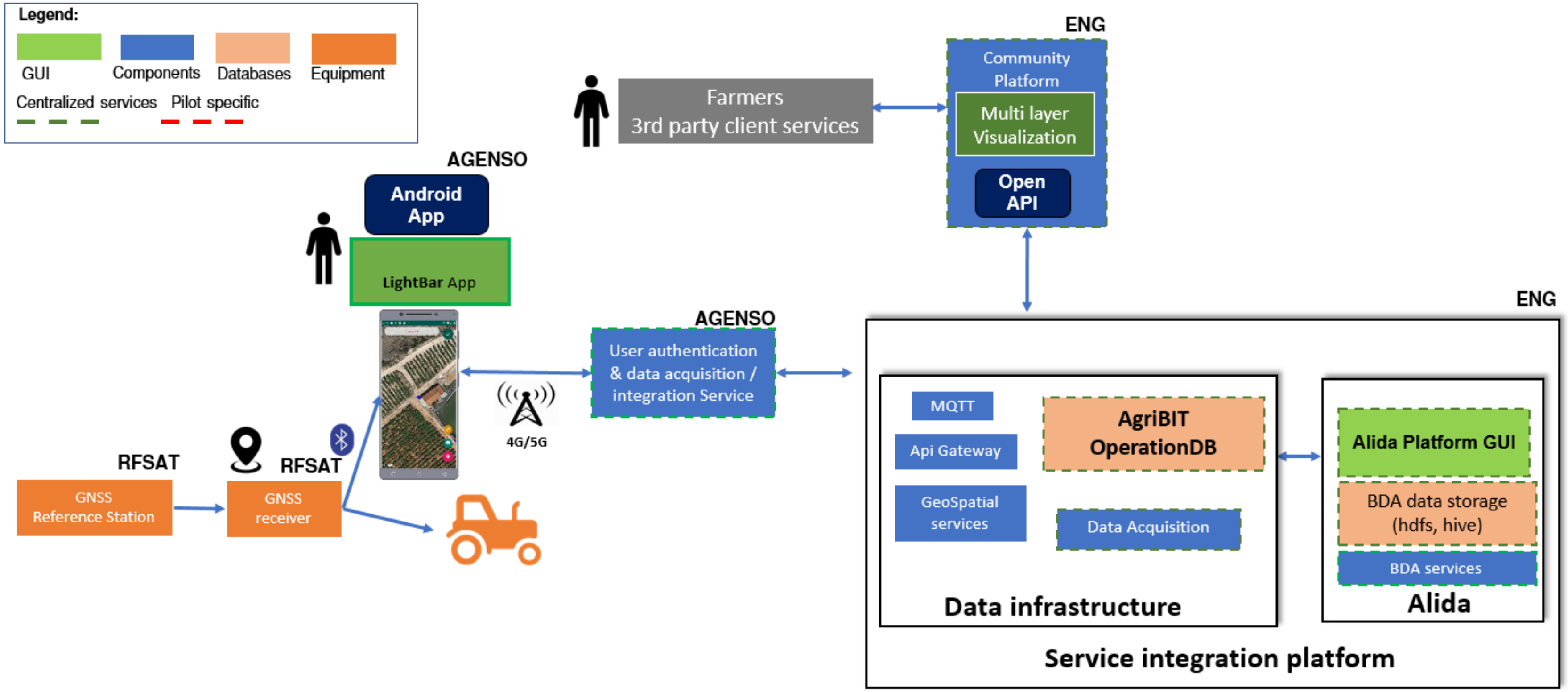

Figure 6. UC4 functional diagram

6.1.5. UC5: EO based PA services for farmers' decision support

In the case of Earth Observation (EO) precision agriculture services, the initial and most essential step is the retrieval of EO data from the Copernicus data services. Apart from that, the AgroAPPS GNSS enabled PA services analyse the imagery deducing high-level insights of agricultural value, before conveying relevant information to the Service Integration Platform. Both aforementioned components serve as a gateway of the PA services output to the service integration platform. The data flow management system for big data analytics and the PA services of the Alida platform allow derivation of cumulative data in the AgriBIT Database before data abstraction. This allows data display into the community platform (open API) ad-hoc, upon user's request, apart from display in MyAgroapps app. The flow of the information path is depicted in **Figure 7**

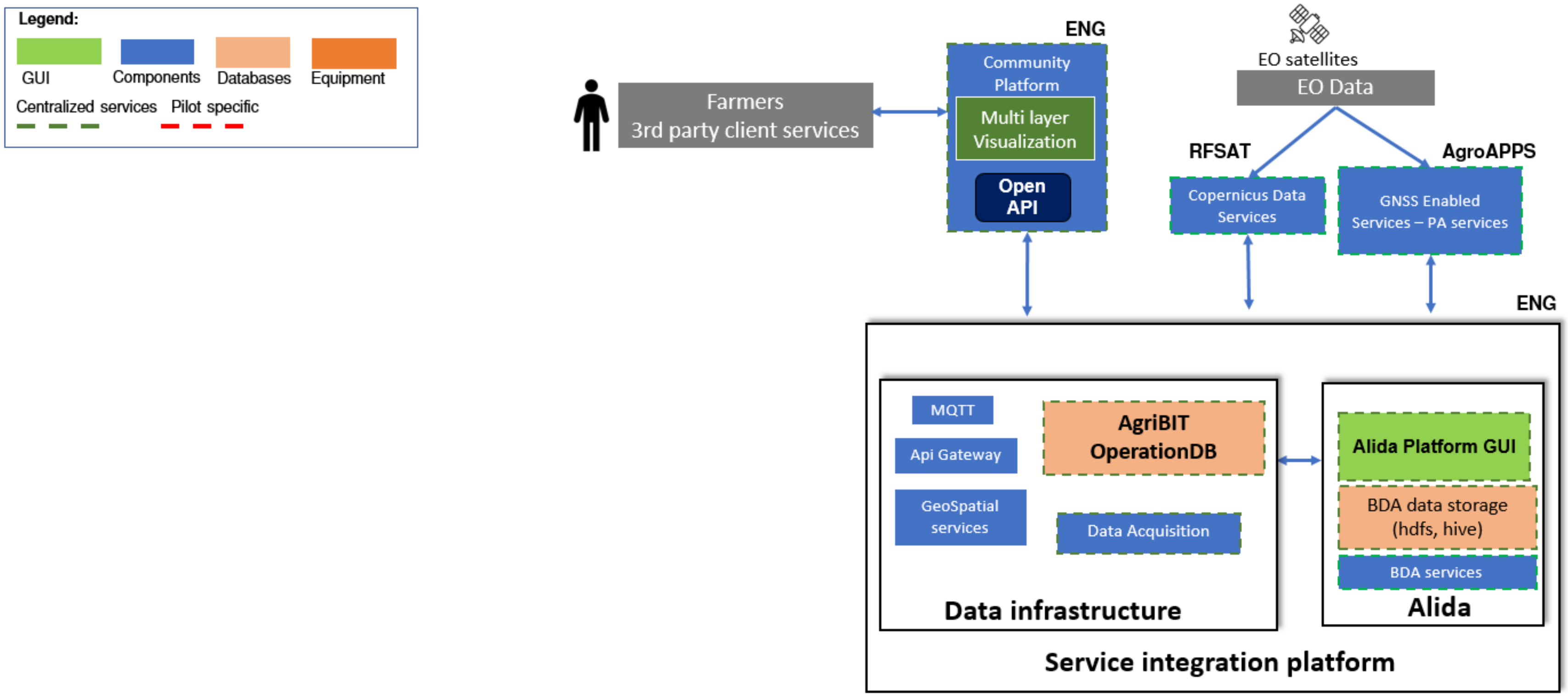

Figure 7. *UC5 functional diagram*

6.1.6. UC6: graphical depiction of heterogeneous data for improved decision-making

In the case of graphical representation of heterogeneous data, related procedures rely on the entire process depicted in the functional model system, for supporting users through the Data storage of the AgriBIT database. Under this use case, results that are being saved, as well as insights on raw low-level data are used in order to extract aggregated high-level information and various statistics that are finally being visualized and displayed through the community platform for assisting user's independent decision. Users, upon accessing the aforementioned data, have the ability to decide regarding the needed actions to be taken for the benefit of their farm. Flow is presented in **Figure 8**.

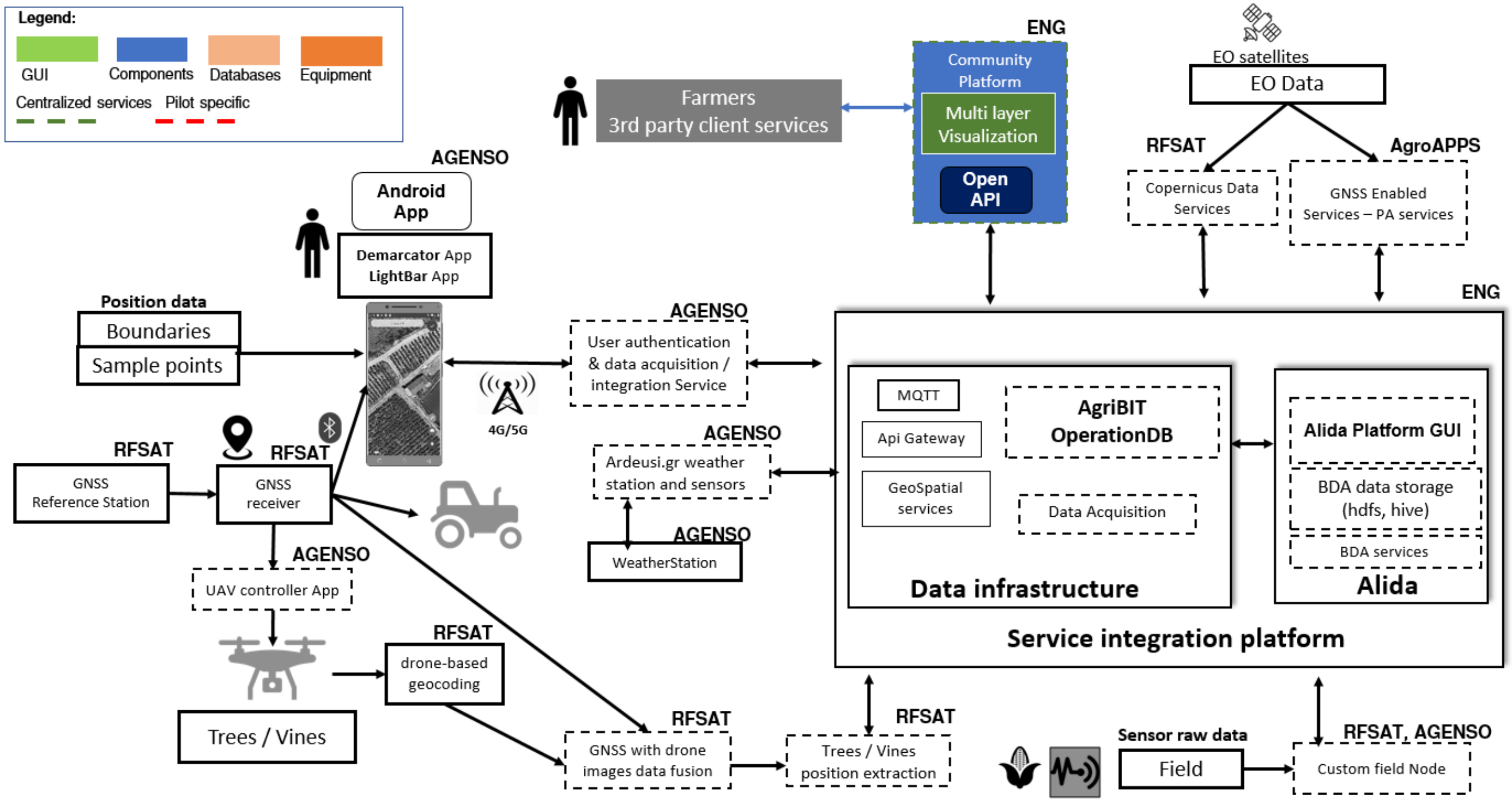

Figure 8. *UC6 functional diagram*

6.1.7. UC7: production of advisory and intelligent early warnings

For production of timely and accurate early warnings, a process virtually identical to that of Use Case 6 is conducted, albeit the system additionally provides its users with unsolicited information in the form of notifications, aiming to advise and warn them whenever necessary, based on the customized needs of each user. Flow is presented in **Figure 9** while service integration platform allows eliciting of warnings and community platform their displaying.

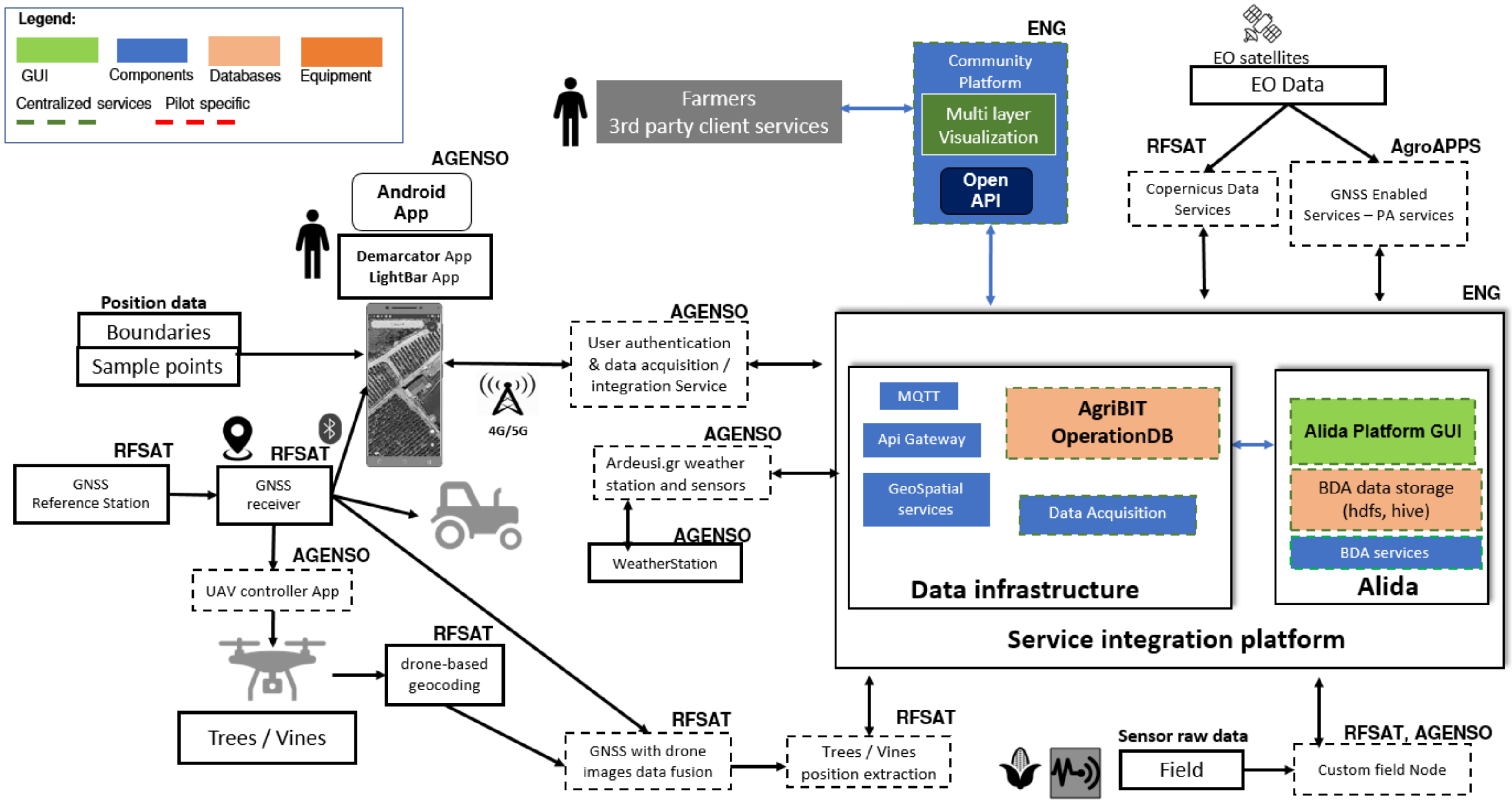

Figure 9. UC7 functional diagram

6.1.8. UC8: prescription mapping – variable rate application (VRA)

In the case of prescription mapping for variable rate application, EO data retrieved by Copernicus data services together with the AgroAPPS GNSS enabled PA services, are pushed into the Service Integration Platform, before map results are finally visualized in the community platform. Flow is shown in **Figure 10**

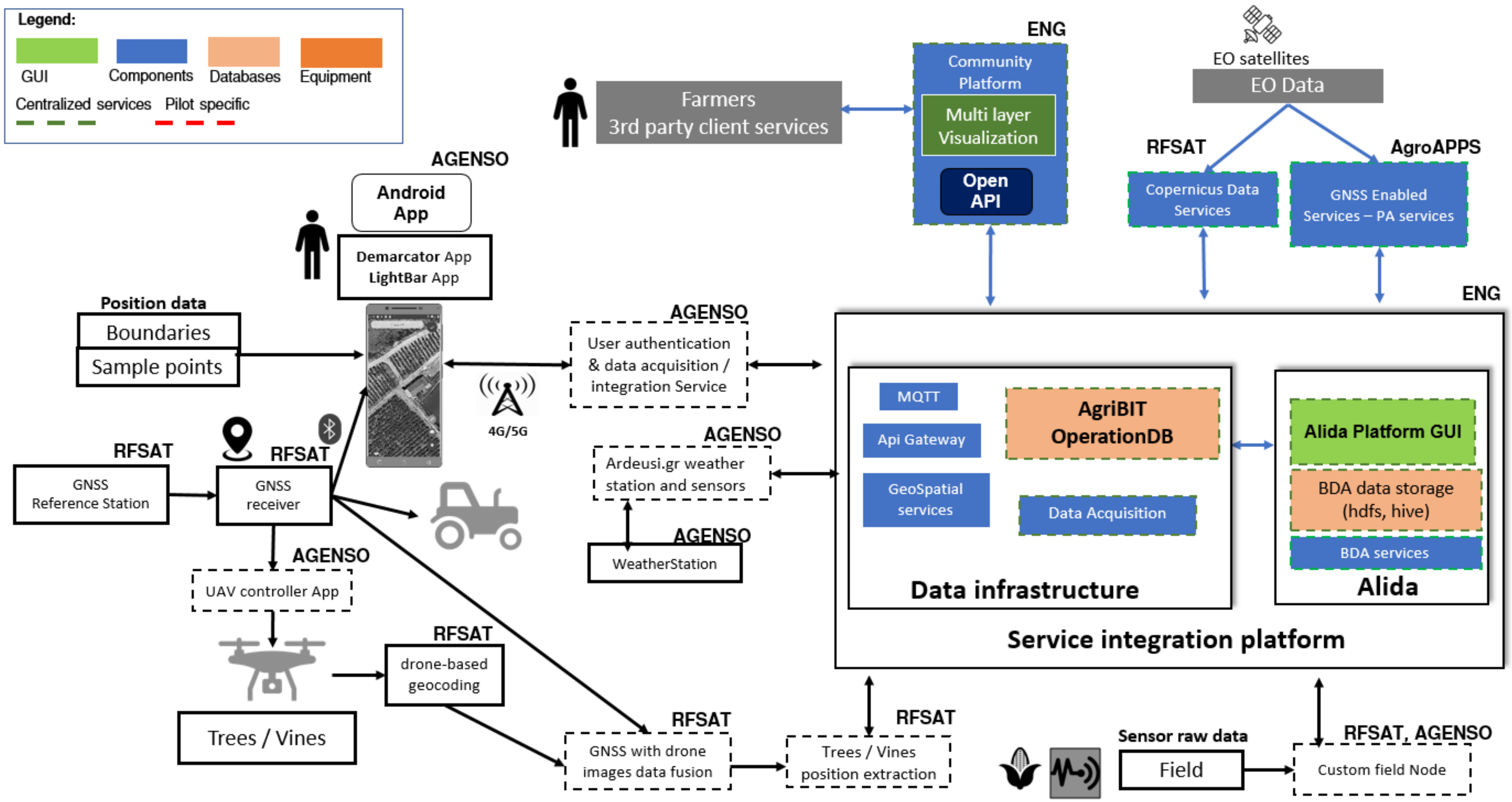

Figure 10. UC8 functional diagram

7. Conclusions

In the current deliverable, a detailed description of both the conceptual model and the functional flow process of AgriBIT system was performed. The conceptual model provides a preliminary overview of the system, while the functional model provides elaborate information about the detailed structure of the system. The process flow for each distinct use case of the AgriBIT system was presented, allowing an in depth understanding of the use of the system. Consequently, depending of the possible diverse needs of the end-user, different components of AgriBIT system are being activated. This process flow is described, facilitating the understanding of the interconnections of the various system components. In addition to that, the current deliverable constitutes an integral part of the work conducted in WP2 regarding the definition of the detailed AgriBIT system architecture. As the current deliverable constitutes a first view of the AgriBIT system, there is a possibility of future amendments due to amelioration of the interconnections of the system's components. This means that an ad-hoc update of this deliverable may be needed during the project lifetime for covering users' needs with the best possible way and delivering a state of the art system.

List of Abbreviations

Abbreviation	Explanation/Definition
GNSS	Global Navigation Satellite System
EO	Earth Observation
UAVs	Unmanned Aerial Vehicles
PA	Precision Agriculture
API	Application Programming Interface
GUI	Graphical User Interface
SBAS	Satellite-Based Augmentation System
RF	Radio Frequency
RTK	Real-Time Kinematic

Internal Deliverable Review Form

Project Acronym	AgriBIT
Project Title	Artificial intelliGence applied to pRecision farmIng By the use of GNSS and Integrated Technologies
Grant Agreement number	101004259
Call	SU-SPACE-EGNSS-3
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Date of Review:	15/07/2020		
Internal Reviewer:	Artur KRUKOWSKI (RFSAT)		
Classification:	Consortium Only		

Topic	Answer	IF "No", classify as "Major" or "Minor" issues	Comments
1. Is the content and structure of the deliverable in accordance with the DoA?	☒ Yes ☐ No	**n/a**	Both conceptual architecture and the functional view of the system has been provided fort enabling GNSS services for agricultural purposes. As such it complies well with expected scope of the deliverable as per DoW.
2. Is the content of the deliverable scientifically relevant?	☒ Yes ☐ No ☐ N/A	**n/a**	Evidence of applied R&D with respect to architectural customisations to identified use cases
3. Is the content of the deliverable useful for the subsequent work on the project?	☒ Yes ☐ No ☐ N/A	**n/a**	Offers a clear view of the system architecture customisation to identified Use Cases
4. Is the deliverable suitable to be submitted to the EC?	☐ Yes ☒ No	**Minor**	There are still few document formatting issues that need correcting (see below)
If not:			
4.1. Does it need formatting adjustments?	☒ Yes ☐ No	**Minor**	Change spelling language to English-UK for the whole text, unless local names are used. Formatting suggestions have been provided in amended version of D4.1 v2.0
4.2. Does it need content adjustments?	☐ Yes ☒ No	**n/a**	Content is sufficient, even though more explicit identification of differences among architectures corresponding to each of the use cases would be beneficial.
4.3. Does it need to be significantly refined (e.g. content improvement, structure changes, etc.)?	☐ Yes ☒ No	**n/a**	Minor changes have been suggested, not requiring another internal peer-review.

Additional comments

Minor corrections have been suggested, not requiring another peer-review.

Majority of suggestions refer to formatting:

- Main issue is with images that exceed page margins. They need to fit to margins, so if they need to become bigger for improved visibility, consider landscape mode for figures.