



DELIVERABLE

AgriBIT community platform (rev. 1)

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Abstract:	<p>This document contains the description of the AgriBIT Community Platform and explains how to use it. The AgriBIT Community Platform shows to external actors how to collaborate and join the AgriBIT network. AgriBIT project offers APIs to consume its services which are delivered by the Community Platform to the external actors, providing all the information to integrate the services in external systems and to invoke them. The document outlines the technological stack of the platform, describing each subsystem, and then presents its functionalities.</p>		

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List of Abbreviations

Abbreviation	Explanation/Definition
API	Application Program Interface
PA	Precision Agriculture
CP	Collaboration Portal
CMS	Catalogues Management System
REST	REpresentational State Transfer
GUI	Graphical User Interface
BDA	Big Data Analytics
DYMER	DYnamic Information Modelling & Rendering
WCM	Web Content Management
IDM	Identity Manager
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secure
YAML	YAML Ain't Markup Language
JSON	JavaScript Object Notation

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Executive Summary

The objective of this document is to explain how to use the AgriBIT Community Platform and to describe its components and functionalities.

The document, in the first section (1 Introduction), introduces the platform providing information on its context and an overview of its functionalities.

The second section (2 The platform technologies stack) deals with the technological stack, describing the subsystems of the platform, their role and showing an example of executive flow between the subsystems.

The content structure of the platform is the subject of the third section (3 Content structure). In the first part (3.1 General) covers the analysis of the common elements of the pages, such as menus, search bars and data structure.

The next part of the third section is the subchapter that deals with the OpenAPI (OpenAPI GUI), it starts with an overview of the OpenAPI¹ standard and then address the description of the structure and the components of the user interface provided by the APIs pages of the platform. The section ends explaining how users can execute an API request by means this user interface.

The topics of the rest of chapter encompasses the contents of the different sections and pages of the platform.

The document ends with the conclusions that highlight the function of this document in this phase of the project.

¹ <https://www.openapis.org/>

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1. Introduction

AgriBIT provides improved Precision Agriculture (PA) services increasing their precision, accuracy, and continuity. The aim of the project is to support the productivity of the farms that can be achieved by the improved PA services provided by AgriBIT but also by enriching the range of PA services offered. For this reason AgriBIT project promotes a network of external users and advisors to support the creation of further services, techniques and how-to, taking advantage of the data and techniques offered by AgriBIT project.

Open communities give a fundamental contribution in increasing the general availability of services, better availability of services and a wider set of services usually gives benefits to the customers, who can thus choose the service that best suits their needs. Moreover, communities give the opportunity to the customers to better exploit the results of the project.

For the creation of this network, the project provides the community platform which serves as a connection between the consortium that carries out the project and the external stakeholders. The Community Platform provides all the tools to the external actors to be able to collaborate and join the AgriBIT network.

The community platform works at two different levels: it informs service providers about the services available within the AgriBIT project, giving the technical details for their integration, and provides them with user pages for interaction with the services APIs.

The information includes a description of the users and the services offered, giving to the service advisors the opportunity to understand what the customers' needs are, and whether the service advisors can provide an adequate solution. The community platform also informs the suppliers about the services already offered within the AgriBIT project. In this way the advisors will avoid proposing products whose functionalities overlap those of AgriBIT.

The community platform mainly provides two integration mechanisms in the form of APIs.

The first is for the exploitation of PA services and the second is for interaction with Big Data Analytics Applications.

The AgriBIT Services APIs are in a standard format called OpenAPI Specification which define shared structure and syntax of REST APIs. The APIs are provided in specific sections of the platform, the OpenAPI pages. By the OpenAPI pages it is possible to interact with the PA services. The page includes a swagger GUI that allows user to execute, test and verify the APIs. Another interoperation mechanism included in OpenAPI Specification standard is the APIs OpenAPI Document, this document contains all the information for the invocations of the services in external environments in machine 2 machine interaction model.

The integration services of AgriBIT are also available through the ALIDA ² platform. ALIDA provide its functionalities as a service. Through this platform the service advisors can exploit the data collected by the project. The community platform describes ALIDA features and guides the service advisors on how to access the BDA services, the community platform also, as for the PA services, provides a swagger interface in order to execute the BDA APIs.

The community platform is provided in three releases depending on the progress of the project. The first one, to which this document refers, contains key information about the project and its partners

² <https://home.alidalab.it/>

as well as some examples of Precision Agriculture and BDA services APIs, and it refers to the first six month of the project.

This release aims to outline the general structure of the community platform in terms of information sections and API exposure methodology.

Since the services at the time of the release of the first version have not even completed the design phase yet, the document shown mainly the purpose of each section avoiding to details its contents that are going to be updated in the next releases. Regarding the APIs, the context is the same. Currently they are still in the initial design phase so that instead of having the exact list of it, which is not available, the document gives some example interfaces, which give an idea of the general aspect of section.

The general structure of the platform will be described in the next chapters.

2. The platform technologies stack

The Community Platform is based on two different modules: Collaboration Portal (CP) and Catalogues Management System (CMS). The CP provides the web application frame for the community platform. It allows to create a portal, structured in sections, and to manage information elements and it is commonly used as an aggregator of contents.

In the Agribit Community Platform, the content presented in the CP are provided by the CMS. Catalogues Management System allows to collect and manage information in form of catalogs, hierachically structured. The platform is also equipped with a component dealing with the users centralized authentication, the Identity Manager.

The high-level decomposition is shown in Figure 1 and each system (including its core technologies and functionalities) is described in more details in the following sub-sections.

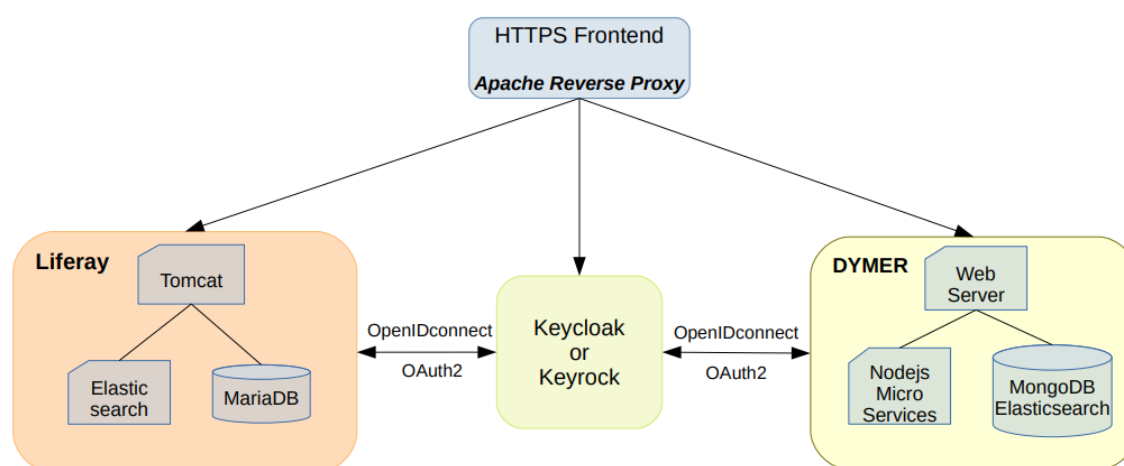


Figure 1 - AgriBIT Community Platform subsystems

2.1. Collaboration portal

The collaboration portal (CP) enables open collaboration, online community building and management as well as access to knowledge. The CP provides functionalities related to the back-end management, structure and storage of the catalogues as well as the front-end interface (integrated within the collaboration portal) allowing users to interact with them (e.g., view, filter and select).

The Collaboration Portal is grounded on Liferay that has been selected since it is a widely used Open Source and state-of-the-art Content Management System. Liferay Portal is a free and Open Source enterprise portal software product written in Java. Liferay includes a built-in web content management system allowing users to build websites and portals as an assembly of themes, pages, modules/widgets and a common navigation.

2.2. Catalogues Management System

The Catalogues Management System handles the resources organization and cataloguing, being configured according to the platform instance requirements.

The system offers a single access point for users leveraging on already existing information in different organizations by creating a federation of catalogues for a scalable system (data blending).

The Catalogue Management System relies on DYMER (DYnamic Information Modelling & Rendering) which is a WCM (Web Content Management).

2.3. Identity Manager (IDM)

The Identity Manager (IDM) is the subsystem in charge of centralizing user authentication, defining their roles and granting their access while using the other applications. Administrators can use it to set specific roles or permissions, while common operations (e.g., registration of a new portal user) can be executed on the PORTAL, since its integration with IDM will assure that the newly created user on the PORTAL will be automatically propagated to the IDM and registered with the permissions following the policies defined.

The Identity Management – KeyRock³ is the FIWARE Generic Enabler, that covers a number of aspects involving:

- users' access to networks, services and applications, including secure and private authentication from users to devices, networks and services
- authorization & trust management
- user profile management
- privacy-preserving disposition of personal data
- Single Sign-On (SSO) to service domains
- Identity Federation towards applications

The Identity Manager is the central component that provides a bridge between IdM systems at connectivity-level and application-level. For end users, the IdM provides a convenient solution for

³ <https://fiware-idm.readthedocs.io/en/latest/>

registering with applications by giving a mean to re-use attributes like address, email or others, thus allowing an easy and convenient management of profile information.

2.4. Execution flow

When user accesses to the community platform invoking its URL in the browser the request is sent to the community platform reverse proxy that forward the request to the CP. If the page requested is private the CP call the IDM to ask for identify the user, as is shown in Figure 2.

If the user is logged, IDM sends the user authentication data, otherwise the user is redirected to the IDM login page. When the user accesses to a private page the CP invokes the catalogue component. In the community platform the catalogue component is provided by the CMS DYMER, so CP identifies the catalogue component contained in the page and asks for it to DYMER which responds with the catalogue that contains the information ready to be displayed, including formatting and graphic.

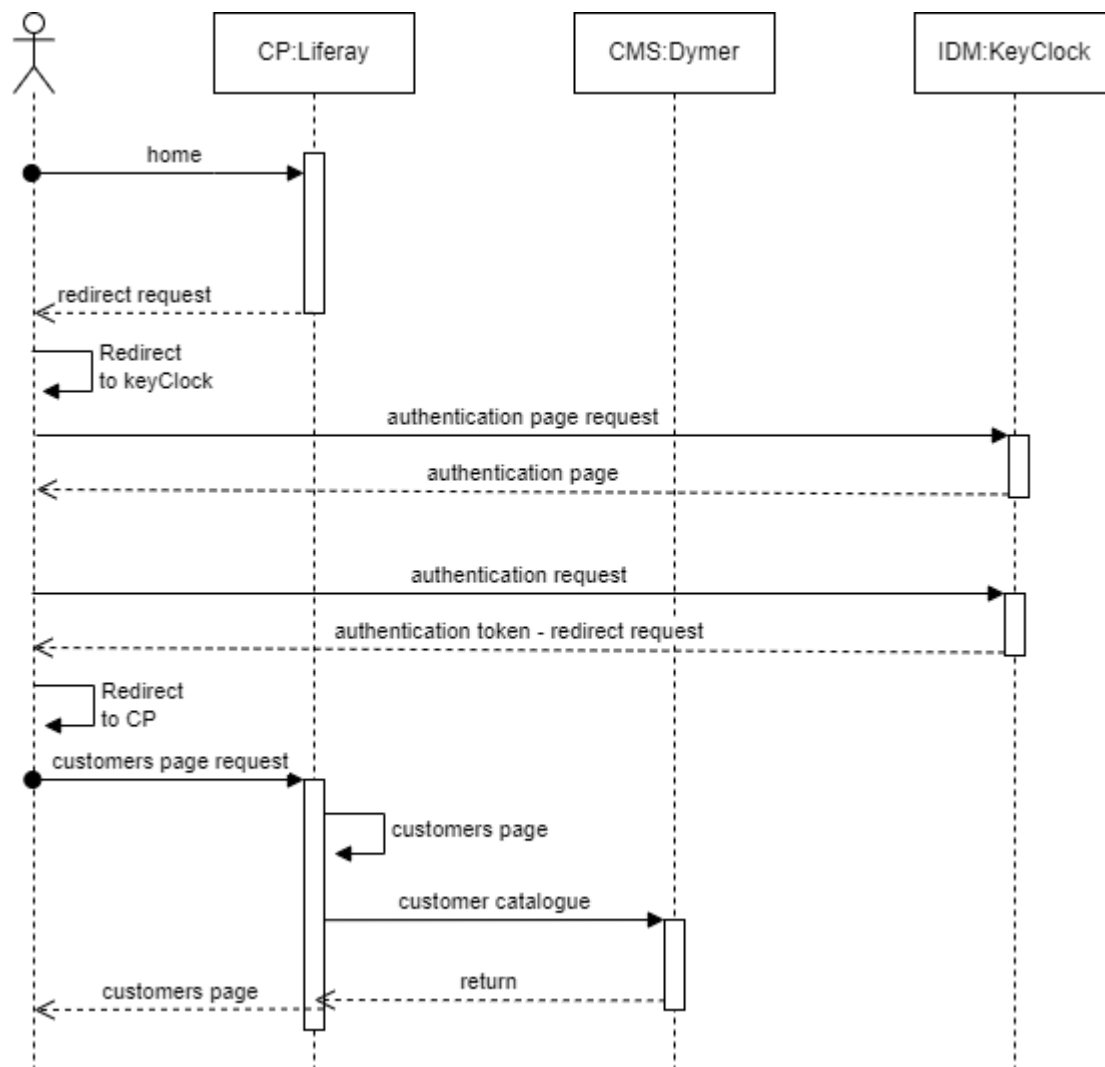


Figure 2 - AgriBIT Community Platform execution flow

3. Content structure

This chapter analyzes the contents structure of the platform, describing its main components and graphical elements and detailing the data model of each of the main section.

3.1. General

Agribit Community Platform has a public page, the home page, for not authenticated users, and private pages for the authenticated users. The private pages are grouped in sections, each section contains a list page and a details page.

The home page includes a general description of the platform sections as shown in the Figure 3:

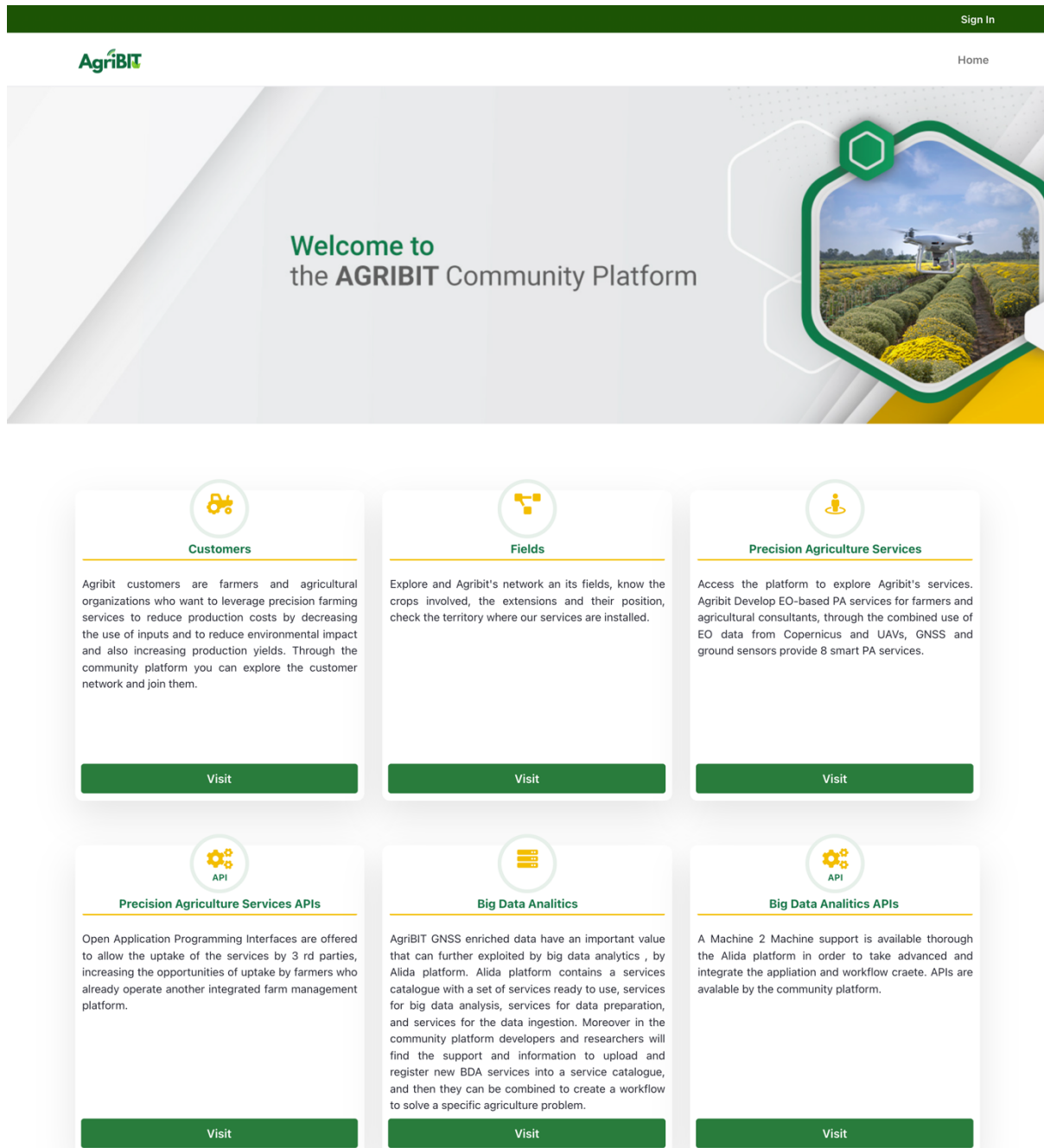


Figure 3 - Home page

At the top right of the page a "Sign in" button is present. Clicking on the "Sign in" button the system shows the IDM sign in page and after username and password are filled in and the submit button is clicked, user is redirected to the private pages of the Platform.

Each private section of the platform is broken down in two pages: a page list (Figure 4) and a detail page. The elements of the list are paginated and shown title and a description, when the “view more” button of an element is clicked the details information page is shown.

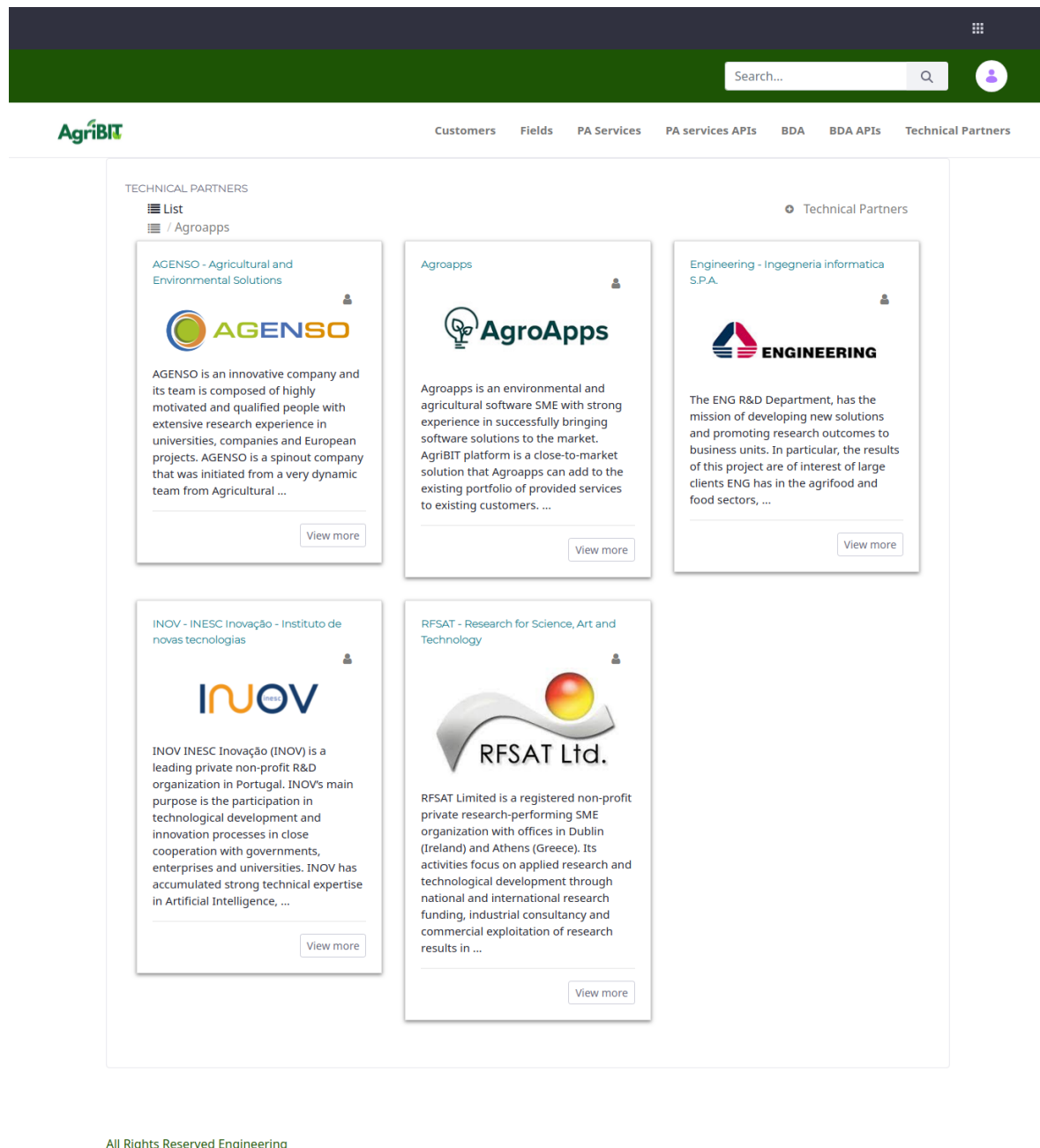


Figure 4 - List Page

In general, each private page contains:

- The CP bar, on the top of the page. On the right of the bar there is CP menu, which contains the CP resource that the user can access.

- The bar below the CP bar contains the full text search field and the user menu; the full text search field can be used to search text through all contents of the platform; the user menu contains the link to access to the user information like display name, address and so on.
- The menu bar includes the list of all the private pages
- The content component made up by:
 - Search content, which searches text only in the current section
 - The breadcrumbs which show the navigation path
 - The add button which opens the form to add new entity in the section
 - The content itself

As already said, the content can be shown in two different ways, the list and the details.

The list represents all the elements and contains just the title and the first part of the description of the element. Moreover, in the element card a user avatar is shown if the logged user is the owner of the resource. If the user is the owner of the resource the resource can be edited or deleted.

The details contain the full information of the entity, each entity is structured in different way and contains different information, in the next section each of these elements are described.

If the user is the owner of the entity, by the details visualization, the resource can be edited or deleted. When the user selects the edit button in the details view, an edit modal is shown. The edit modal contains a form for editing the content of the entity, as shown Figure 5.

Figure 5 - Edit form

The platform is made up by the following different sections that are described in the next chapters:

- Customer
- Fields
- Precision Agriculture Services
- Precision Agriculture Services APIs
- Big Data Analytics
- Big Data Analytics APIs
- Technological Partners

3.2. OpenAPI GUI

The main aim of the AgriBIT Community Platform is to provide to the third parties service advisors the interoperability tools. One of the common ways to provide interoperability machine to machine is to expose Application Program Interface - API. APIs hide the complexity of the system and provide its functionality to the outside world. APIs can be method or class in a program but commonly the word API refers to web APIs, which are APIs through HTTP. HTTP APIs are a very spread way to provide interoperability. The advantage is that they are universal and can be embedded and used in any program language and they can be invoked using a simple http call as well, no implementation needs to start testing. There is also a specific architectural style in which implement the HTTP APIs that is called REST (Representational state transfer). REST in a nutshell is a way to implement HTTP APIs that organizes its structure focusing on the resources and on the usability of the APIs. A successful organization that focused its effort on this topic is SMARTBEAR⁴ with its suite of tools SWAGGER⁵. Swagger was a standard de facto to build effective APIs and from the Swagger specifications has been created a standard called OpenAPI specification, that is an Open Standard and practically implement the Swagger best practices.

The standard defines a format in which describes all the information needed in order to invoke and integrate the API. This information need is coded in a document (YAML⁶ or JSON⁷), which is the OpenAPI document. The OpenAPI document is the only thing needed to embed the APIs in a software.

There are also free tools available in the market that support the integration of the OpenAPI and among them there is swagger UI.

Swagger UI allows users to create a GUI by reading the OpenAPI document.

AgriBIT implement the OPEN APIs standard and moreover embed the free application SWAGGER UI to provide the APIs information and to gives a way to the users to direct interact with the API and explore them without the need of any other tool.

The APIs GUI regard two different sections

- Precision Agriculture Services APIs
- BDA APIs

In each of these sections there is a list of services and for each service is possible to view the details and the details are in fact the APIs exposed in the APIs GUI.

The Figure 6 shows ad APIs page of a PA service.

The page is made up by different part:

- A title of the APIs service and the related base endpoint
- A selection scheme , where it can choose between HTTP or HTTPS
- Authorize button: it opens a modal for setting the API Key
- API invocation box: is the core of the GUI and in this section all the information about the API are shown

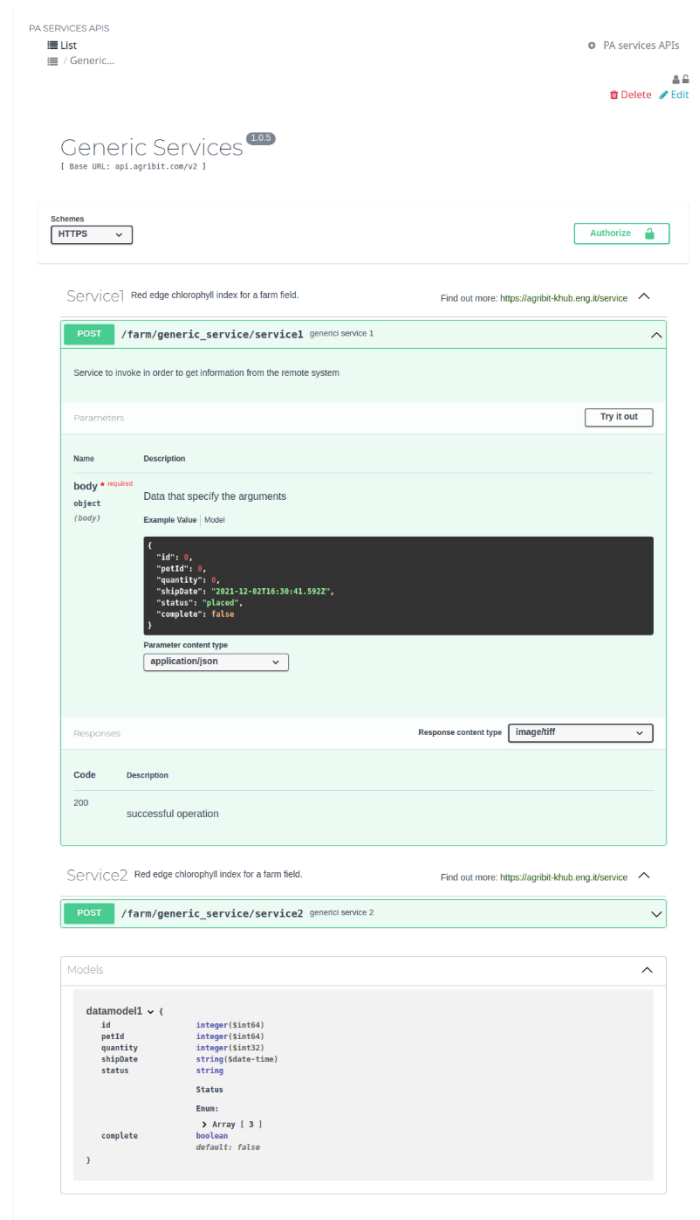
⁴ <https://smartbear.com/>

⁵ <https://swagger.io/>

⁶ <https://yaml.org/>

⁷ <https://www.json.org/>

- Model section: describe the models of the arguments of the different API



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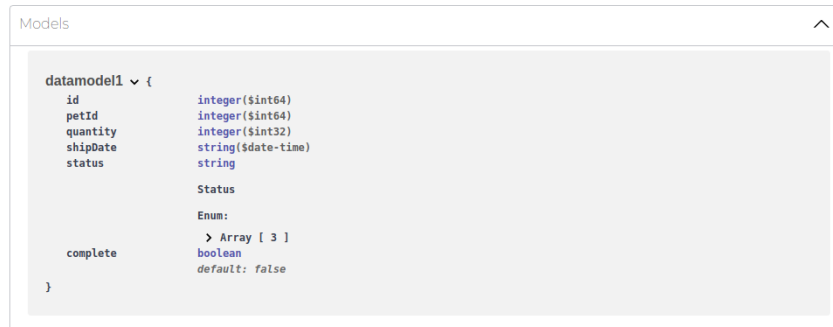
Figure 6 - PA services APIs

The API section contains different information:

- paths
- method
- summary: "generate CLRE ",
- description: "Generate the red edge chlorophyll index for a farm field",
- the consumes type: ex "application/json"
- the produces type: ex "image/tiff"
- the parameter
- the body

- the models
- the request type
- a list of possible responses with related description.

At the end of the APIs list a description of the model of the APIs arguments is presented.



The API can be also tested and invoked directly by the GUI.

Right below the definition of the path of each API there is a button "try it out", and by clicking on this button user can enable the interaction with the sent form.

After clicking on the button, the text box of the body gets editable, the user can choose to send the example data for a test by select the "model" tab or edit the data by selecting "Edit Value". Once the data are ready, to send the request user has to click on execute. The tool will send the request and the user will visualize the response right below the execute button.

3.3. Customers

The section contains the information of the AgriBIT customers. The AgriBIT customers are people or organizations that manage crops, they can be small or medium enterprise or single person.

In the list the customers are shown in cards with title and description (Figure 7).

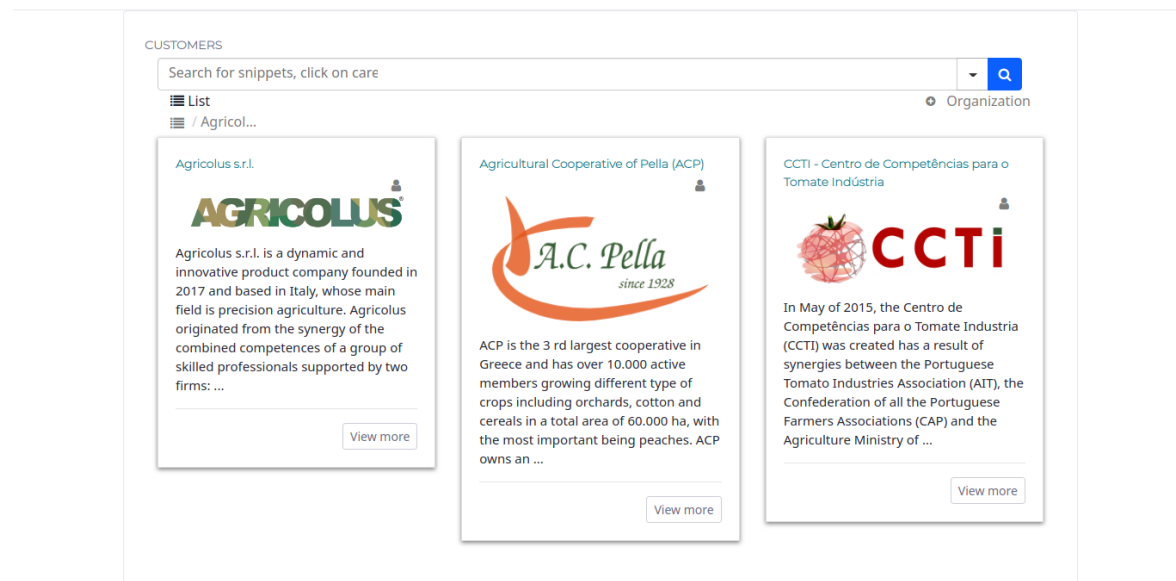


Figure 7 - Customers page

Clicking of view more button the details page is shown (Figure 8), the details page contains:

- **Title:** the name of the customer
- **Description:** a text that explains the general activity of the farmer, the crops type they works on and the fields size
- **Fields:** links which connect the customer page with the information contained in the field section
- **PA services:** link to the AgriBIT services that the farmer adopts
- **Location:** the head quarter address of the customer
- **Contacts:** email or telephone number of the customer

The screenshot shows a customer profile page for 'Agricolus s.r.l.'. At the top, there's a green header with the company name and 'Delete' and 'Edit' buttons. Below the header, the 'Description' section contains a detailed paragraph about the company's background and services. The 'Fields' section lists 'Vineyard'. The 'PA Services' section lists 'Tillage Scheduling web application' and 'Innovative Irrigation scheduling system'. The 'Location' section provides the company's address in Italy. The 'Contacts' section lists an email address.

Figure 8 - Customer details page

If the user logged in is the owner of the resource an edit button is shown. Clicking on the edit button the system shows the edit modal (Figure 9).

The screenshot shows the 'Customer edit modal' for 'Agricolus s.r.l.'. It has a 'Name' field with the company name, a 'Description' field with a text area, and a 'Logo' field with a file upload button. Below the logo field, there's a 'PA Services' section with a dropdown menu. The modal is overlaid on a background showing a list of customers.

Figure 9 - Customer edit modal

3.4. Fields

The fields section contains information on the fields of the customer, fields where are deployed and running the AgriBIT Services.

Unlike the other section, the field section, instead of a list in the main page, shows a map where the fields of the AgriBIT customers are located (Figure 10).

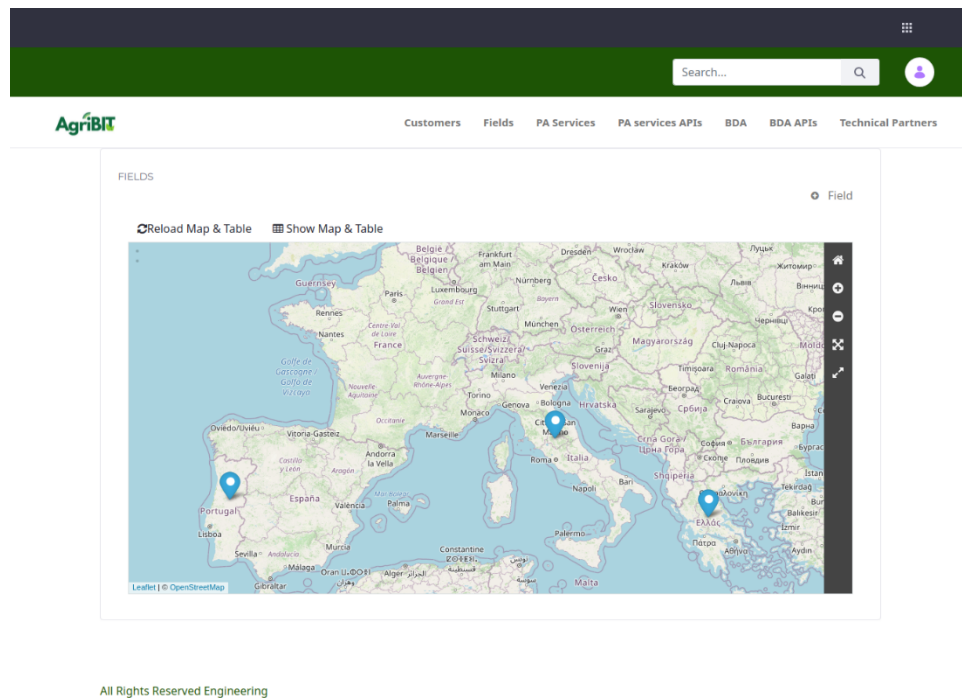


Figure 10 - Fields Map

Clicking on the icon a side page is shown, the page contains title and the description. Clicking on “view more” the details page, as in the other section, is shown (Figure 11).

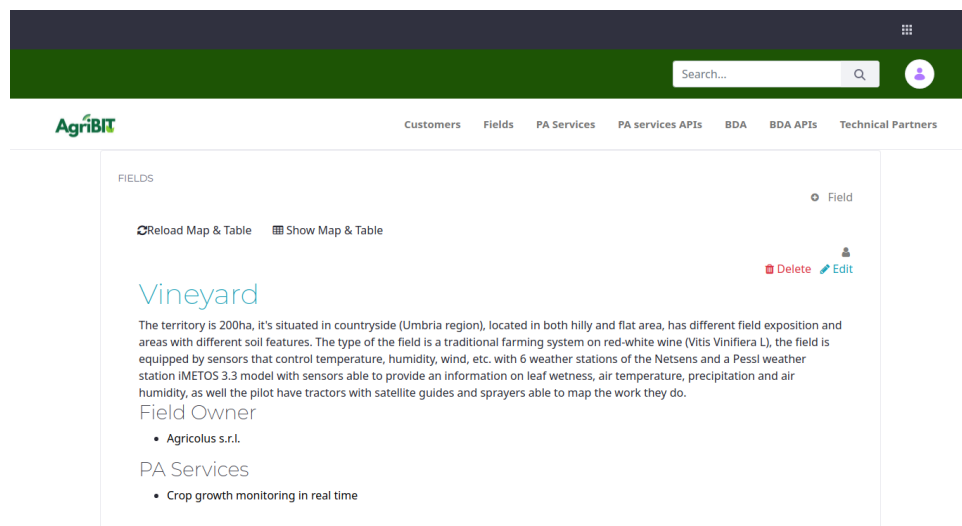


Figure 11 - Field details page

The page contains the following section:

- **Name:** the name of the field
- **Description:** text containing the general information of the field like type of crops, extension, sensors in the fields.

- **Administrator:** is the customer that manage the field, can be the owner of also an advisor or a consultant.
- **PA services:** the Precision Agriculture Services that are deployed in the field.

If the user logged in is the owner of the resource edit button and delete button are shown. Clicking on the edit button the system shows the edit modal. The click on the delete button will delete irreversibly the resource.

3.5. Precision Agriculture Services

Precision Agriculture Services contains the description of services provided by AgriBIT to the final user. The section explains services functionalities and the technical information and contains information, material, and the links of the service. The main page presents the list of PA Services with title and description (Figure 12).

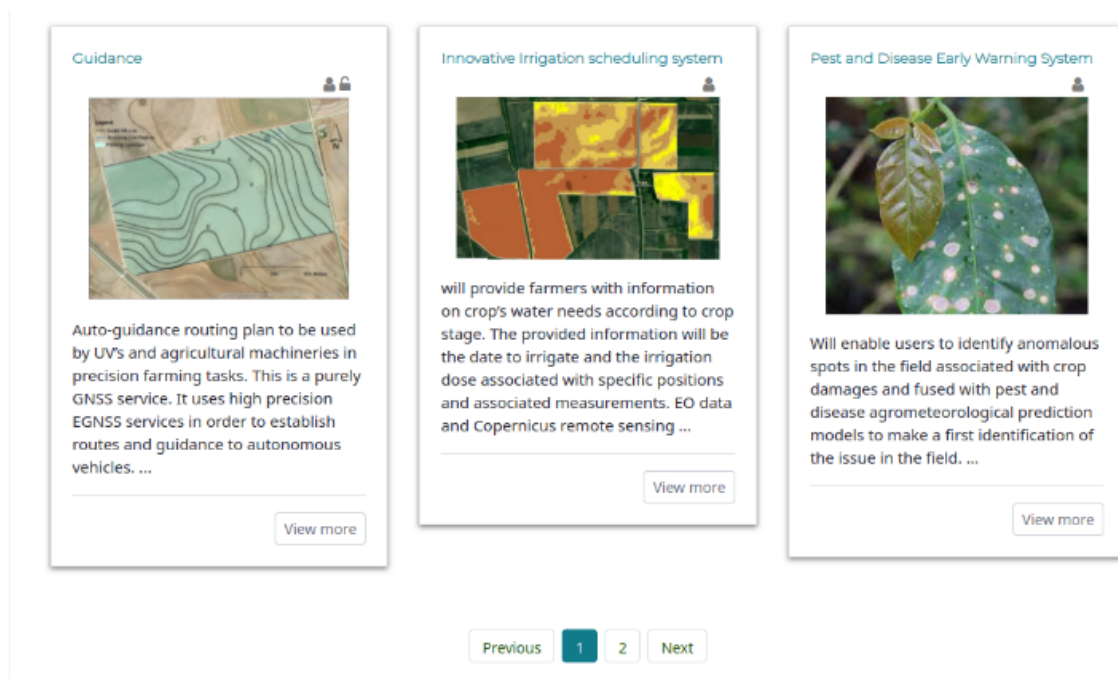


Figure 12 - Precision Agriculture Services list page

Clicking on view more the details page, as in the other section, is shown (Figure 13).



Figure 13 - Precision Agriculture Services details page

The details page of the Precision Agriculture Services contains the name of the service and its description. The page can be enriched with links and attachments to give a further detail on the service.

The page also lists the APIs related to the service. The APIs are the heart of the platform and the structure of the two APIs pages, Precision Agriculture Services APIs and Big Data Analytics APIs are explained in the OpenAPI section.

If the user logged in is the owner of the resource, edit button and delete button are shown. Clicking on the edit button the system shows the edit modal. The click on the delete button will delete irreversibly the resource.

3.6. Precision Agriculture Services APIs

This page contains the Precision Agriculture Service APIs.

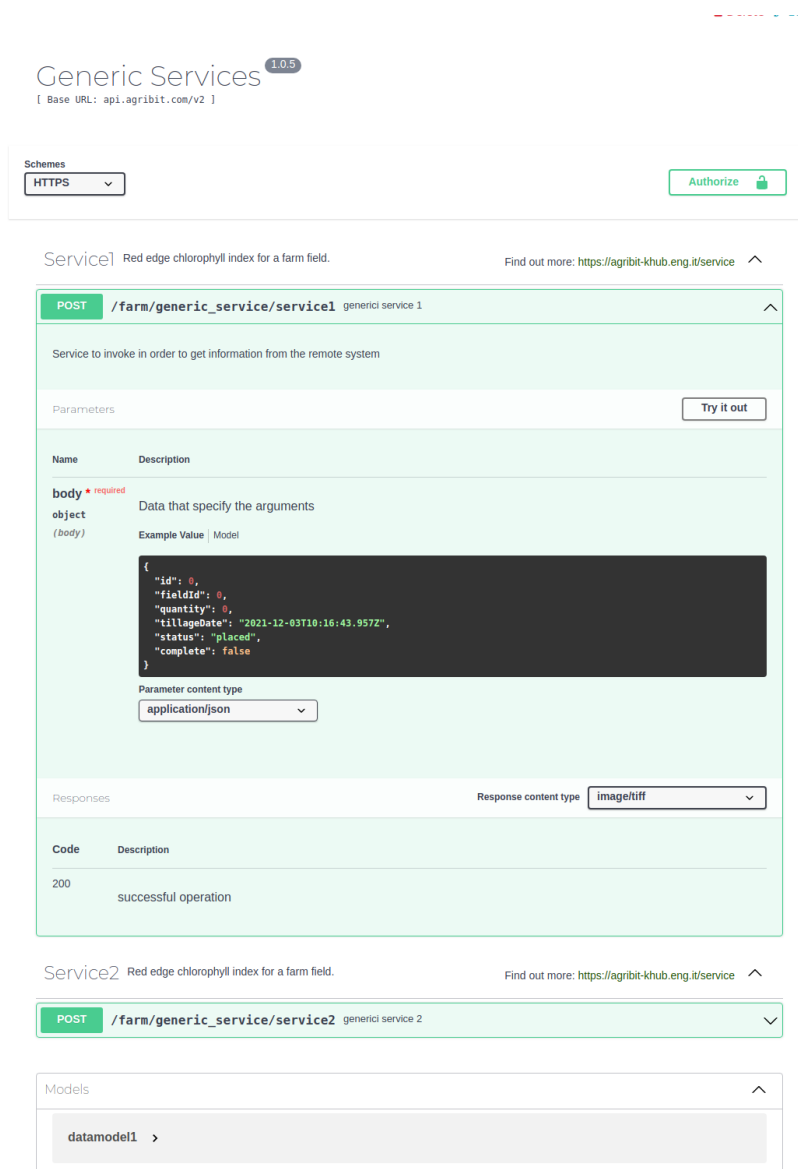


Figure 14 - Precision Agriculture Services APIs

The section contains a list of services, the details of the services contain the APIs for that specific service.

A PA service can provide one or more APIs.

As explained in the OpenAPI GUI chapter, this section allow user to explore and obtain all the information on how use the services and also provide a GUI to test the APIs and execute them.

3.7. Big Data Analytics

The BDA (Big Data Analytics) section presents the information of the AgriBIT Big Data Analytics system and on its functionalities. AgriBIT involves different data producers, like sensors and agriculture machineries. These data can be read and elaborated also by third parties service advisors. BDA application, allow these users to access AgriBIT data by providing big data analytics as a service. The BDA page in the community platform gives information on the main tool that supplies the services, ALIDA platform (Figure 15).

The page gives generic information on the platform and the informative material and links for guiding user in manage the BDA applications on ALIDA.

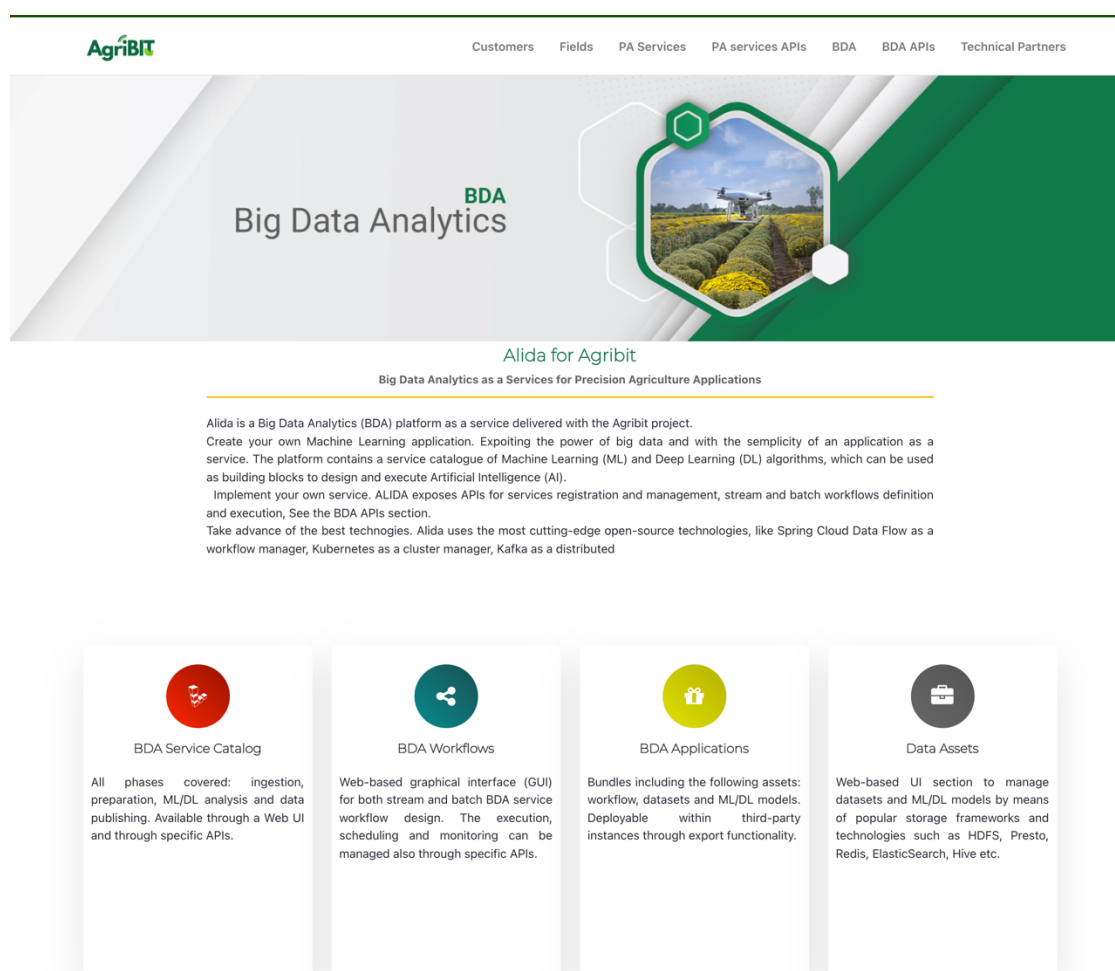


Figure 15 - BDA page

3.8. Big Data Analytics APIs

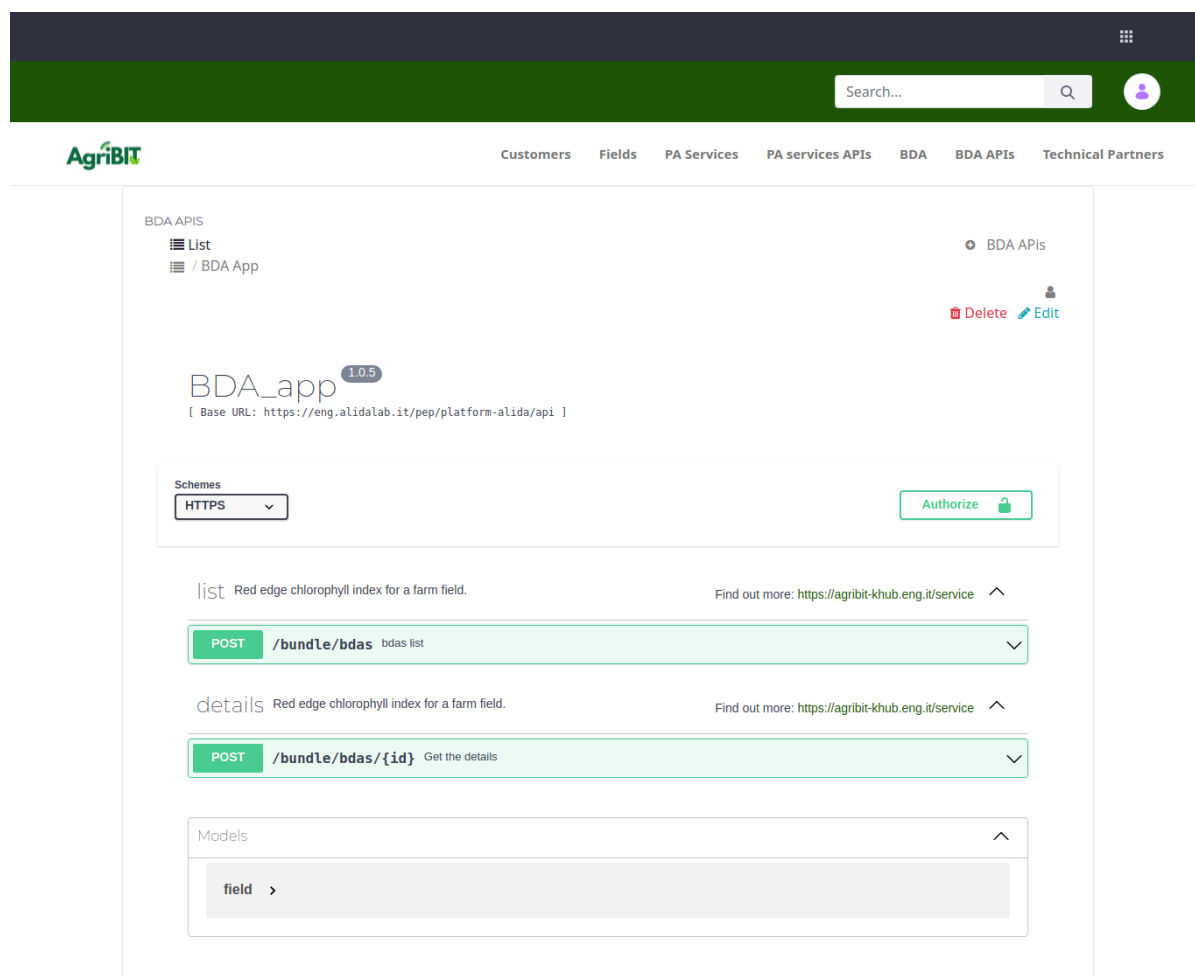
This section is similar to the section Precision Agriculture APIs, and collects all the APIs of BDA platform.

These APIs are meant to manage the application and the services included in BDA platform. The APIs have to be used along with the ALIDA GUI and from the GUI it is possible to create applications that perform workflows on AgriBIT data.

The APIs in this section allow you to manage applications, run, stop and delete them, the APIs also give the ability to read the list of applications and services and get the status.

The section is made up by list page and details page, the list page shows the BDA APIs grouped by type, the details contain the APIs GUI that allow users to read the specifications and to run the APIs, as is shown in Figure 16.

The description and the guide on how to use the APIs GUI is given in the OpenAPI GUI chapter of this document.



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Figure 16 - BDA APIs

3.9. Technological Partners

The technological partners section contains information of the technical partners of the AgriBIT consortium. The other partners, customers, are presented in the Customers section of the Community Platform.

The section is made up by the list page with the list of all the partners: name, logo and description; and by the details page, that can be access by clicking on “view more” button.

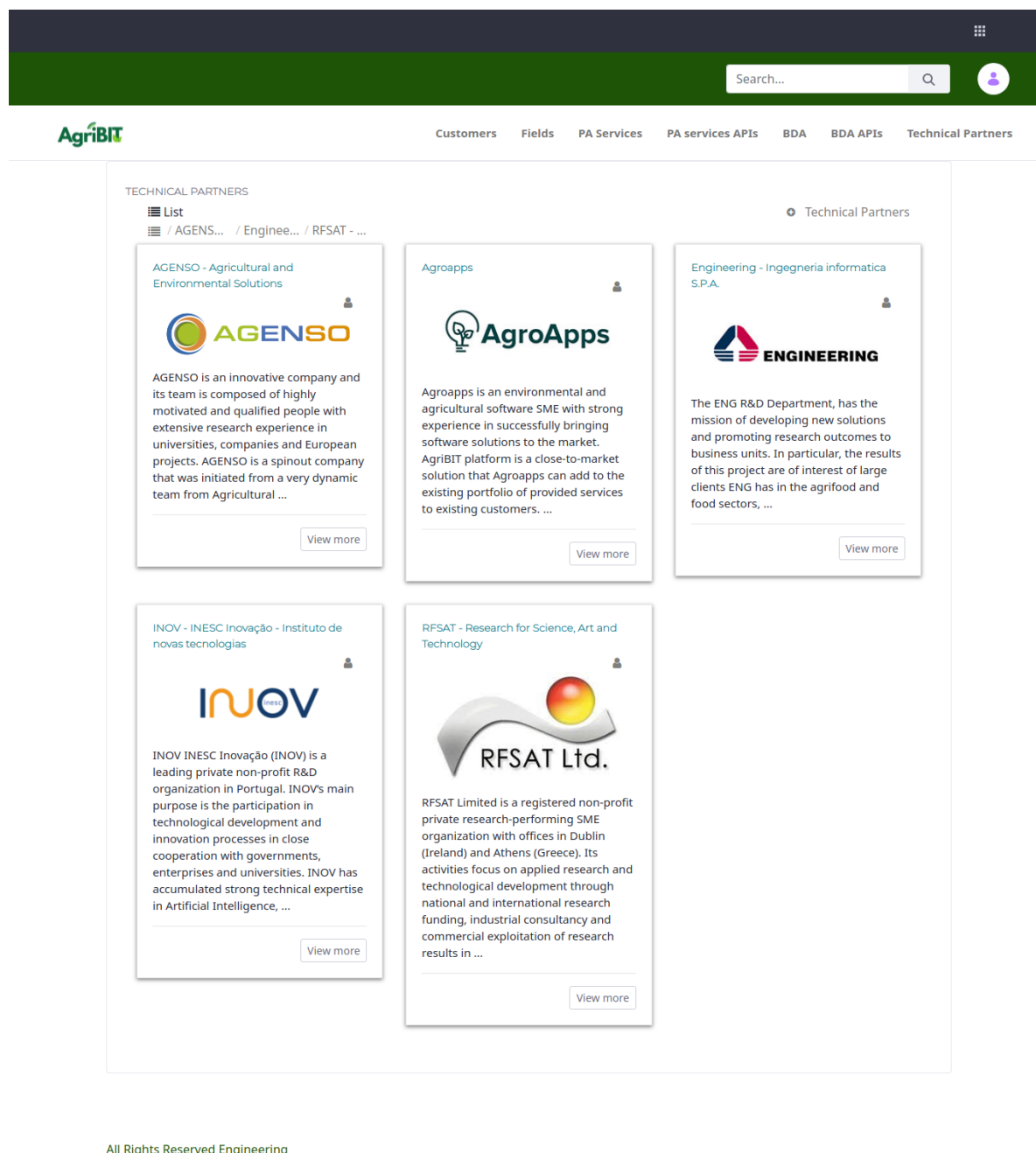


Figure 17 - Technical partners list page

The details page contains the complete description of the partner (Figure 18).

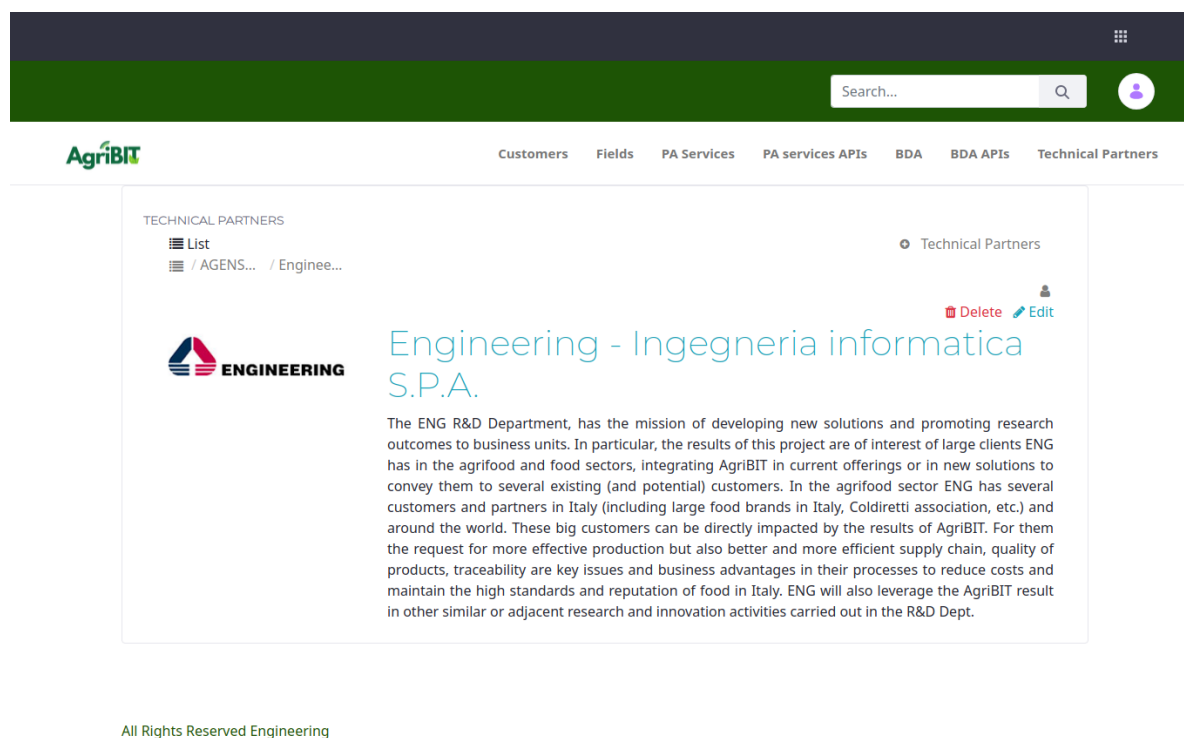


Figure 18 - Technical partners details page

4. Conclusions

This document provides information on the first release of the AgriBIT community platform. The document contains an overview on this first version of the platform and a guide to explore its contents. The document will be enriched and updated in the next versions following the development of the platform and of all the whole project. The platform is a tool that provides users with an insight of the services offered by the project, services that are still in the planning phase, thus the platform structure will also vary according to the services that will be released during the next phases of the project. Nevertheless, this document represents a good general vision also in terms of the future development of AgriBIT community service



Internal Deliverable Review Form

Project Acronym	AgriBIT
Project Title	Artificial intelligence applied to pRecision farming By the use of GNSS and Integrated Technologies
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Funding Scheme	Innovation Action (IA)
Project duration	36 Months

Document Information			
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Work Package:	WP5	Task:	T 5.1
Date of Review:	21/12/2021		
Internal Reviewer :	CCTI – Centro de Competências Tomate-Indústria		
Classification:	Very Good		

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		It is focused on deploying the pre-existing community mechanism to support farmers and service advisors during the requirements gathering phase

2. Is the content of the deliverable scientifically relevant?	Yes N/A		It has no scientific purpose, but is relevant for the aims for which it is intended
3. Is the content of the deliverable useful for the subsequent work on the project?	Yes		
4. Is the deliverable suitable to be submitted to the EC?	Yes		
If not:			
4.1. Does it need formatting adjustments?	Yes		
4.2. Does it need content adjustments?	Yes		Very small details, marked in the text
4.3. Does it need to be significantly refined (e.g. content improvement, structure changes, etc.)?	No		
Additional comments			
Very good document. Clear, and with very accessible language, even for lay users in the scientific areas covered			