



D4.3 INTEGRATED AND VALIDATED VERSION OF ENVISION PLATFORM

Project: Monitoring of Environmental Practices for Sustainable
Agriculture Supported by Earth Observation

Acronym: ENVISION



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Executive Summary

This document aims at describing the progress and accomplishments achieved in WP4 and it tries to give a tour to the ENVISION platform functionalities that were implemented. Furthermore, the deliverable includes a description how the architecture was adapted based on the needs and requirements of the integration.

Specifically, the sections of this deliverables are:

Section 1 – Progress towards ENVISION platform: Contains the progress made by the technical team.

Section 2 – ENVISION Architecture: Contains the modifications/ adaptations that have been performed in the architecture delivered in the D4.2 Initial version of the ENVISION platform.

Section 3 – Tour to ENVISION platform’s functionalities: Contains some user interfaces of the platform in order to give the reader a feeling of the environment and at the same time to demonstrate the main ENVISION functionalities.

Section 4 – Next Steps: Contains a brief description of the next steps that are planned after the release of the first version of the ENVISION platform.

1 Progress towards ENVISION Platform

ENVISION aims to develop a ready-to-market commercial platform of services, co-designed and co-created with PAs and CBs, fit to address their needs. In particular, ENVISION provides PAs and CBs with a robust and cost-efficient set of services allowing them to monitor continuously and systematically the agricultural land, shifting the focus from fragmented monitoring limited to specific fields and dates (or time window) to territory-wide and all-year-round monitoring. Acting as a trailblazer for organisations that monitor environmental- and climate- friendly agricultural practices stemming from CAP, ENVISION increases the effectiveness of risk-based analysis for the selection of farms for inspection; increases the efficiency and transparency of PAs and CBs' procedures when implementing the CAP; reduces the number of on-site visits by performing more targeted controls and reduces operational and administrative costs.

1.1 Development methodology

During this period, several adaptations and modifications have been performed in the platform, not only in the frontend but also in the backend of the toolbox in order for the integrated and validated version of the platform to be delivered.

Several calls have been performed among the technical team and the service providers in order to define the main actions that should be followed to accomplish the integration with the various external components and investigate/ explore alternatives in the case of failure.

Furthermore, the technical team asked all the partners (not only the business cases) to go through the initial platform and provide feedback focused on its operability, improvement and stability. Regular meetings were held in order to facilitate the testers to get more familiar with the functionalities of the platform and to collect issues/ suggestions. These issues were categorised, prioritised and reported to the issue tracking system Trello which is integrated with the internal backlog of the technical team Jira.

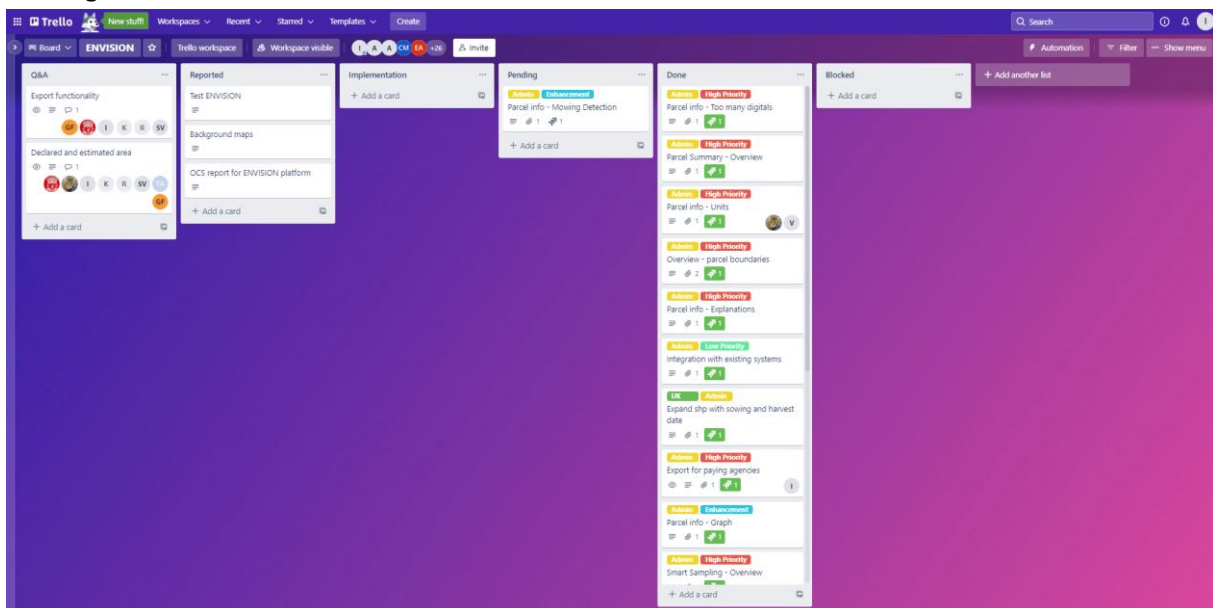


Figure 1: Trello, ENVISION issue tracking system

1.2 Releases

In order to develop a robust and solid integrated and validated version of the ENVISION platform, and based on the iterations/ meetings that were performed, the technical team prepared a timeplan with the actions/ developments that would perform (releases).

- **ENVISION – Version v0.6.0**
 - **Bug**
 - ENV-100 Keep UTF-8 encoding after EPSG conversion
 - ENV-89 Shp upload alignment
 - **Change**
 - ENV-106 Expand shp with sowing and harvest date
 - **Improvement**
 - ENV-108 Appropriately disable/enable "Import" button in ShapefileImport view
 - ENV-105 Inform PAs about result availability in 5-9 days for imported parcels
 - ENV-104 Retain yod information upon returning from parcel inspection to overview page
 - ENV-99 Create crops lookup endpoint
 - ENV-66 Parcel info - Graph
 - ENV-63 Parcel info - Too many digitals
 - **New Feature**
 - ENV-68 Parcel info - Explanations
 - ENV-61 Show parcel boundaries in overview page when clicking a parcel
 - **Story**
 - ENV-101 Create parcel list endpoint
 - ENV-56 Handle parcels import process
 - **Task**
 - ENV-86 There is a hardcoded API key for the base maps in the frontend
 - ENV-62 Don't show the parcel info popup when there is no parcel at the selected location
- **ENVISION – Version v0.6.1**
 - **Change**
 - ENV-112 Remove Cyprus mapper
 - ENV-111 Increase allowed upload size
 - ENV-110 Remove plot id and n plot parcel fields
- **ENVISION – Version v0.7.0**
 - **New Features**
 - Integration with NOA database to retrieve results
 - Integration with geoserdia to retrieve parcel info
 - Integration with AgroApps to retrieve NDVI, Yield estimation and Organic results
 - Ability to download template files: Geoserdia csv, parcels shape



- Ability to upload SOC layers
 - Display the SOC and Yield Estimation layers
 - Ability to export pdf for Paying Agencies
- **Improvements**
 - Improve parcel info as per the: crop classification and Traffic Light
 - Display units on all metrics
 - Add a new business case for UK
- **Fixes**
 - Allow different Paying Agencies to use the same unique id
 - Fix geoserver layer generation from uploaded raster files
 - Fix the default area unit on GeoSerbia data
 - Various fixes and changes while adapting to new NOA DB schema
- **ENVISION – Version v0.8.0**
 - **New Features**
 - Allow filtering on potential problems (Smart sampling)
 - Add case specific classification colors to parcel layers
 - Alert paying agencies for potential problems by email
 - Add GDPR consent popup
 - Add collector for rasters
 - Re-enable export to pdf functionality
 - **Improvements**
 - Display potential problems count in parcel summary (bell icon)
 - Allow PAs to import parcels only for the current year
 - Improve parcel summary pop-up
 - Implement proper logging on the backend
 - **Bugfixes**
 - Fix old NOA corrupt data
 - Replace base map with a FOSS
 - Fix sidebar position when not on top of the page
 - Various bugfixes on the UI and the backend
- **ENVISION – Version v0.8.1**
 - **Fixes**
 - Fix the integration with the OCTOPUSH service hub
 - Integration of open-source license

2 ENVISION Architecture

The ENVISION architecture as it was presented in D4.1 Architecture and Services Specifications report and D4.2 Initial version of the ENVISION platform was followed but with some changes.

2.1 Additions to the initial architecture

2.1.1 System Components

The following Service-Oriented Architecture (SOA) approach is framed by technologies that handle the application development logic and the subsystems should be able to meet the needs for GIS and Web Mapping capabilities.

The data are stored in a geospatial database (for the case of vector files) and in the file system for the cases of raster files. A Central Authentication system controls the rules of user access to the application data. A Notification production subsystem is triggered by predefined conditions and is configured to send emails to the Paying Agencies users to inform them about potential issues.

More specifically, the components and technologies to be applied to the SOA approach are:

- **Geospatial Server:** The GeoServer allows the display of spatial information to the users. Implementing the Web Map Service (WMS), WMS-T standard, GeoServer can create maps in a variety of output formats. GeoServer is built on GeoTools, an open-source Java GIS toolkit. There is much more to GeoServer than nicely styled maps. GeoServer conforms to the Web Feature Service (WFS) standard, and WCS standard which permits the sharing and editing of the data that is used to generate the maps. GeoServer also uses the Web Map Tile Service (WMTS) standard to split your published maps into tiles for ease of use by web mapping and mobile applications. GeoServer is a modular application with additional functionality added via extensions.
- **Web Server:** For sending the Web UI of the platform as well the RESTful APIs, a NGINX server has been used. NGINX is an open-source software for web serving, reverse proxying, caching, load balancing, media streaming, and more. It started out as a web server designed for maximum performance and stability. In addition to its HTTP server capabilities, NGINX can also function as a proxy server for email (IMAP, POP3, and SMTP) and a reverse proxy and load balancer for HTTP, Transmission Control Protocol (TCP), and User Datagram Protocol (UDP) servers.
- **Authorisation Server:** A KeyCloak authorisation server has been used to enable OpenID Connect functionalities to the platform in order to protect the resources from unauthorised use. KeyCloak is a standalone authorisation server that undertakes to maintain and apply user access rules to systems centrally, based on the industry standards for identity and access management for modern applications and services.
- **Geospatial Database:** PostgreSQL is a powerful, open-source object-relational database system that uses and extends the SQL language combined with many features that safely store and scale the most complicated data workloads. PostGIS is an Open Geospatial Consortium (OGC) compliant software used as an extender for PostgreSQL, which is a form of object-relational database. While PostGIS is free and open source, it is used in both commercial (e.g., ArcGIS) and open-source software (e.g., QGIS). PostGIS extends capabilities

of PostgreSQL to increase its management capabilities by adding geospatial types and functions to enhance spatial data handled within a relational database structure. The language of PostGIS is similar to SQL and allows spatial analysis and typical queries to be performed on spatial data with relative ease. This makes it a powerful backend for databases within larger software, helping projects to use SQL-like functionality to do more complex spatial analysis and queries.

- **Web Application User Interface:** The Web Application User Interface is a JavaScript Single Page Application (SPA) powered by Vue.js and Vuetify. Vue.js is a modern, component-based, web application building framework and Vuetify is a components library and framework used on top of Vue.js for building interactive web interfaces by providing a set of pre-made common and mature components. The Web Application User Interface is the interface between the platform components and the Paying Agencies (PAs) and Certification Bodies (CBs) users. It contains all the necessary web elements and tools to provide a friendly user experience.
- **Web API:** The Web API is an application powered by the Django web framework, which is a FOSS that follows the model–template–views architectural pattern. The main responsibility of this component is to handle the CRUD operations done on the ENVISION database. The Web API is reachable via Gunicorn, a web server gateway, that is responsible for translating the python responses to HTTP responses and vice versa, acting as an intermediate layer between the Web Server and the Django application.
- **Mobile Application:** A Mobile Application will be used to allow farmers to access information about their parcels. The development of the mobile application will be based on hybrid technologies such as Vue.js together with Capacitor. Capacitor is an open-source runtime for building web-based applications that can run natively on Android, iOS and the Web.
- **Parcel import component:** The parcel import component allows the PAs and the CBs to upload data to the ENVISION platform in various ways. The main parcel import is done by providing zipped shape files via the front end. An exception to this is the Serbian Paying Agency for which the user interface accepts csv files instead. The information provided in the csv files is combined with the data available on the GeoSerbia web API before they are stored in the ENVISION database. The import component is backed by an HTTP/RESTful API that is secured through the OpenID Connect layer on top of the OAuth 2.0 protocol, provided by the Authorisation Server.
- **Data product import components:** The Data product import components collect the calculated data for the uploaded parcels. ENVISION provides an interface that allows the CBs to upload raster layers, just like the parcel import component above. Additionally, ENVISION periodically collects raster files and raw calculated values directly from the CBs services through secure connections, using the ssh protocol and API key authentication.
- **GeoServer Protection component:** In order to protect the spatial data served by GeoServer from unauthorized use, the calls to the GeoServer are flowing through the Web API which guards the access acting as a reverse proxy, using the OpenID Connect layer on top of the OAuth 2.0 protocol, just like the import components above.

- **Notifications service:** The notifications component is responsible for generating template-based emails that are dispatched daily to the Paying Agencies whenever the Service Providers have new results available.

Each of the components above resides in a separate Docker container that communicates with each other. A Docker container is a unit of software that packages up code and all its dependencies to a reliable and portable computing environment. Every Docker container is a derivative of a Docker image that is a stand-alone, executable package of software that includes the necessary components to run an application. Any sensitive information such as passwords, API keys or secret keys as well as the application's data such as parcels and their calculated results, are provided from the host machine to the Docker containers upon initialization for security reasons.

The components of the ENVISION system are split into the following Docker Containers:

Table 1: Docker Containers along with the respective environments

PostgreSQL/PostGIS	The database of the platform that stores the Paying Agencies' parcels and the calculated product data provided by the Service Providers
GeoServer	It provides OGC services to the platform via the WMS protocol such as the tiles, parcels and raster layers
Django/Backend	The backend consists of various components such as the notification service, the parcel-product import service, the data collectors, the RESTful API etc
Redis	A Redis server for supporting the Django/Backend asynchronous processes
SPA/Frontend	The PAs and CBs web application/UI which is a Vue.js SPA built on top of the Django/Backend APIs
KeyCloak	The central Authorization Server used across the system for protecting the resources and managing the users
KeyCloak DB	A dedicated PostgreSQL database required for the operation of the Authorization Server

By separating the systems' components as described above, the application dependencies are isolated avoiding conflicts between libraries, frameworks and operating system binaries. To orchestrate the containers and have them work in unison, the docker-compose tool is used. The entire stack is described in configuration files (.yml) taking into consideration the needs of each one of the environments that is used during the project lifecycle:

- development
- staging
- production

2.1.2 Dataflow Diagram

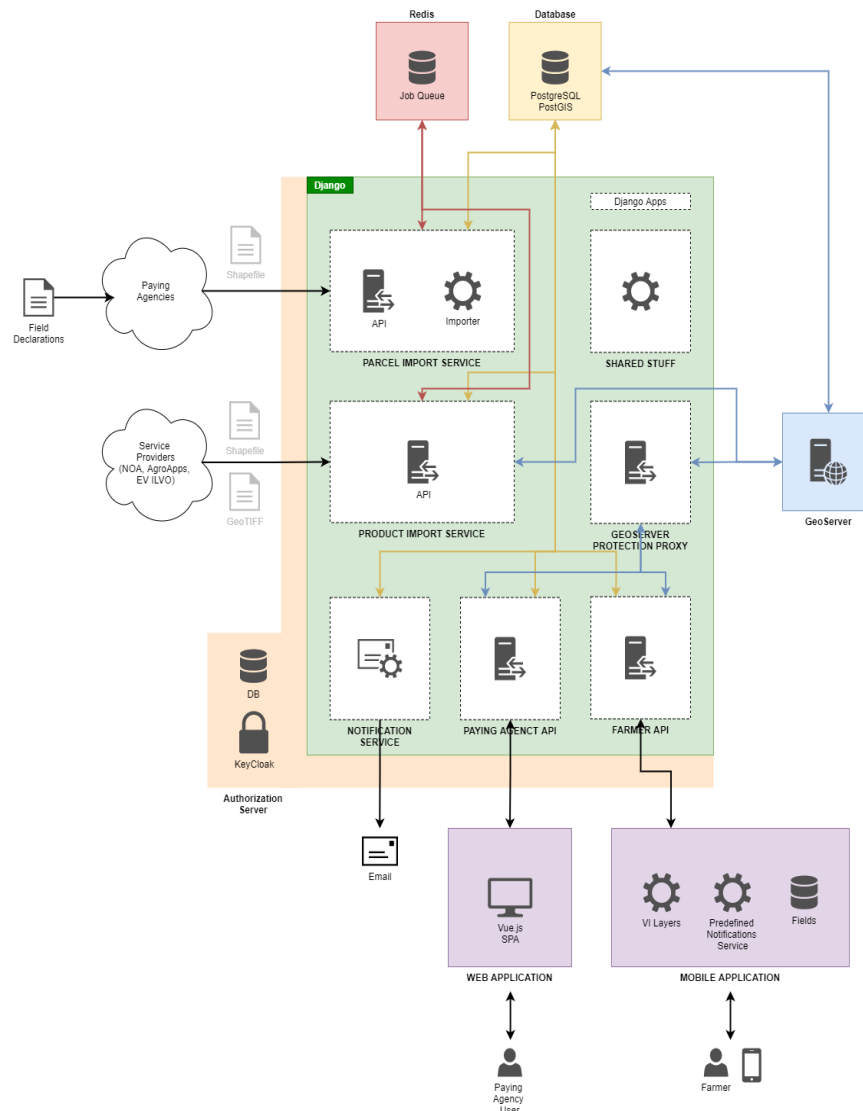


Figure 2: Dataflow Diagram

The above data flowchart presents the components of the platform and how they communicate with each other. The data interconnection between PAs and CBs and service providers is performed via the Parcel Import and the Product Import components.

The Service Providers' data products are collected by the backend, and they are post-processed by the geospatial server that provides OGC web services (WMS, WCS/ WMS-t). These services are consumed by the Web Application User Interface feeding interactive maps that are implemented on OpenLayers, a powerful library for creating interactive maps for the web.

The Web API is protected for unauthorized use via a user authentication mechanism provided by KeyCloak, the Authorisation Server of the ENVISION platform. Finally, the farmer RESTful API will be the backend system that will support the Mobile client applications that will be used by the farmers.

2.1.3 Component Interface

The table below presents an analysis of the internal interfaces used by the components as well as how they are interconnected.

Table 2: Analysis of the internal interfaces

Web Server	Web API Authorization Server GeoServer Protection Parcel Import Product Import Web Application User Interface Mobile Application
Authorisation Server	Web Server GeoServer Protection Web API Parcel Import Data Product Import
Geospatial Server	Geospatial Database Geoserver Protection
Geospatial Database	Geospatial Server Web API Parcel Import Data Product Import Notifications service
GeoServer Protection	Web Server Authorization Server Geospatial Server
Web API	Web Server Authorization Server Geospatial Database
Parcel Import	Web Server Authorization Server Geospatial Database
Data product import	Web Server Authorization Server Geospatial Database
Notifications service	Geospatial Database
Web Application User Interface Mobile Application	Web Server Web Server

2.1.4 Data Inputs/ Outputs

The following table reports the input and output data that the system receives and generates:

Table 3: Input data

Vector files	Shapefiles (.shp) provided by the Paying Agencies/ Certification Bodies
CSV files	CSV files (.csv) provided by the Paying Agencies
PNG files	PNG files (.png) provided by the mapbox service



Raster files	GeoTIFF files from service providers as service products
Rest Payloads	JSON data for communication between components and external services and clients
Database data	Database data from the communication between components and external databases

Table 4: Output data

Rest Payloads	JSON data for communication between system components and external clients (web browsers, mobile clients)
Geoserver Payload	XML data for communication between system components and external clients (web browsers, mobile clients) PNG images for the communication between the Geoserver system components and external clients (web browsers, mobile clients)
Database data	Database data from the communication between components and external databases

2.1.5 Application Interface

The system provides capabilities for communication with external systems (third-parties) through the following protocols:

Table 5: Protocols for communication with external systems

HTTPS	ENVISION connects with the service providers, the paying agencies, the mapbox service and the web clients via HTTPS protocol
SSH	ENVISION collects data from third party databases by setting up an SSH Tunnel via Postgres connector

2.1.6 Security

The system communicates with the outside world via secure HTTPS over TLS connections. The HTTPS protocol provides data integrity between the communicating entities while the TLS protocol provides security using end-to-end encryption. In addition, the platform resources are kept private by the OAuth2/ OpenID Connect infrastructure so that only authorized entities are able to access them.

From a system administration and maintenance perspective, the access to the system's servers, the containers of the components and the database data is achieved through SSH and SSH tunneling with the use of private/ public keys.

On top of these, an Application Firewall allows access only to the necessary system ports, while blocking any unwanted/malicious traffic arriving to the system.

2.2 Mapping of user requirements

The following table presents a requirements' traceability matrix with regards to the ones that refer to the platform development.

User Story - Requirement	ENVISION Platform
As a Controller, I would like to receive data of crop type maps every two weeks from the middle of April to the middle of August (ideally mid-September)	ENVISION offers a two-week frequency for output through the smart sampling algorithm.

As a Controller, I would like grassland mowing and grazing layers every two weeks from June till November with more than 85% accuracy

As a Controller, I would like to be able to mask layers of interest with information from ENVISION outputs, for example to check parcels which intersect with soil erosion results, or to link crop type maps with grassland mowing layers

As an Organisation, we would like to be able to identify and distinguish between organic and conventional crop, and to monitor pesticide use on the declared plots because this is an important objective in many agri-environmental policies

As an Organisation, we want to get ENVISION outputs per parcel, especially for information on yield of each crop

As an Organisation, we need the performance of the system to be fast, to enable quick testing

As an Organisation, we want the system to provide us with errors against legislation that we can communicate to farmers

As an Organisation, we need to be able to integrate services in our own applications. It is important to us that the ENVISION toolbox features as many standards as possible and that the various outputs are downloadable or easy to share via APIs so that we can analyse them in our own existing systems (interoperability and potential to transfer/download data)

As an Organisation, we need all our data to be stored in one place

As an Organisation, we want to have an idea of the accuracy of the output of a service through relevant indicators and sufficient documentation of the methodology, as well as to receive notifications when the accuracy degrades throughout the cultivation period

As an IT expert, I want the ENVISION platform to monitor itself and notify me if there is a problem,

ENVISION offers a two-week frequency for output through the smart sampling algorithm.

ENVISION offers the possibility to visualize results derived from the EO services as layers on top of the map.

ENVISION offers a distinct classification/categorization on the platform between organic and conventional parcels that have been imported. Each of them is coloured with a different colour based on its category (green-organic, purple – conventional). Furthermore, vegetation indices are provided to the end-users as a layer on top of the map as well as through a graph.

ENVISION offers the possibility to export the outputs.

The ENVISION platform and relevant operations (data processing) is reasonably quick, since they are based on a web application.

ENVISION provides notification to the end-users through email.

ENVISION offers to the end-users APIs in order to be able to integrate their existing systems with the ENVISION platform.

All relevant outputs and data are stored in the ENVISION database for the ENVISION lifetime. Participating organisations are able to download outputs (i.e., shapefiles, csv files etc.), share via APIs or access the data storage online

ENVISION provides to the end-users along with the outputs of the services and the relevant accuracy.

A notification mechanism has been development in order to automatically inform

so I can be confident that everything is ok if I am not notified

As an Administrator, I need to know when ENVISION services' outputs are not available so I can warn the respective farmers that they need to provide the relevant information themselves

As an Inspector, I want the results from ENVISION's remote monitoring services to be reliable and verifiable on the spot

As an Organisation, we need to receive outputs both as maps/layers and relevant tables/numeric information, as well as to receive time series of various indicators to study changes and emerging problems

As an IT Expert, I want the toolbox to be installed on DIASes, or that DIASes offer the tools as a service so it is preinstalled there, accessed and even maintained by the DIAS

As an IT Expert, I want good quality to characterize the ENVISION platform services, in terms of ease of use, security and interoperability

As an Organisation, we would like to be able to visualize historic data and all relevant to a plot information on the platform, for as far back in time as possible

As an Inspector, I would like to see through the ENVISION platform what is important to check for each plot, according to a farmer's declaration. This is important as it will clarify the reason why certain parcels need to be checked according to the organisation's sample

the end-users for any issue that may occur. This mechanism is based on the defined thresholds that the service providers have set.

Indications are given if values are "Not Available – N.A" for certain pixels or parcels.

ENVISION is a web-based application and can be used anywhere since there is an internet connection. Furthermore, ENVISION offers the possibility to download the output and print them.

ENVISION offers to the end-users both layers and graph, depending on the output of each service.

The ENVISION platform has not been installed on DIASes. However, the DataCube has been built on DIASes and ENVISION will be integrated with it.

ENVISION has paid great attention to the security both of the services and the data handling.

ENVISION stores historical data with regards to compliance results. However, vegetation and biophysical indices will not be kept in the system.

ENVISION will sent notifications to the end-users with possibly breaches and the users are able to perform queries in order to retrieve easily and faster results for parcels compliance.

2.3 ENVISION as an open-source platform

The ENVISION platform is an open-source platform and will be licensed under the MIT Licence¹. Permission is granted, free of charge, to any person obtaining a copy of this software and associated documentation files, to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions: The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

The open-source code can be found here: <https://git.draxis.gr/open-source/envision-2020>

¹ https://en.wikipedia.org/wiki/MIT_License

3 Tour to the ENVISION Platform

This section details the second version of the ENVISION platform that will be used by the business cases partners to test and validate its provided services and functionalities. This last release of the platform is as complete as needed until the next defined version.

The ENVISION platform is accessible through the following link: <https://platform.envision-h2020.eu/>.

The administrator (technical team) has already generated accounts for each business case in order for the users to have access to the web application.

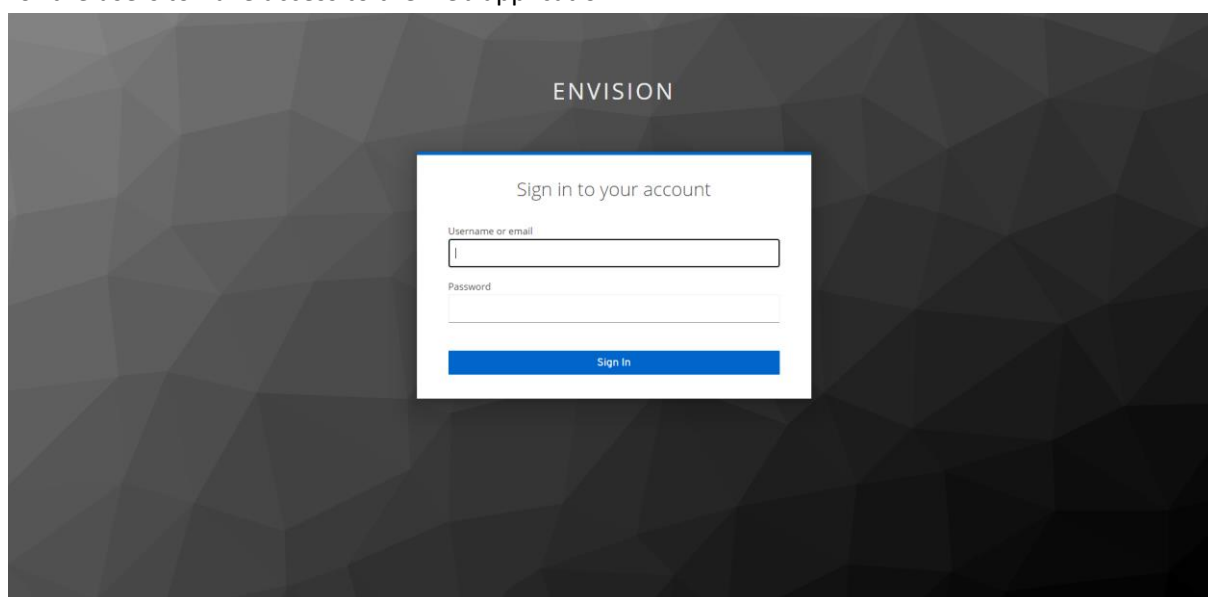
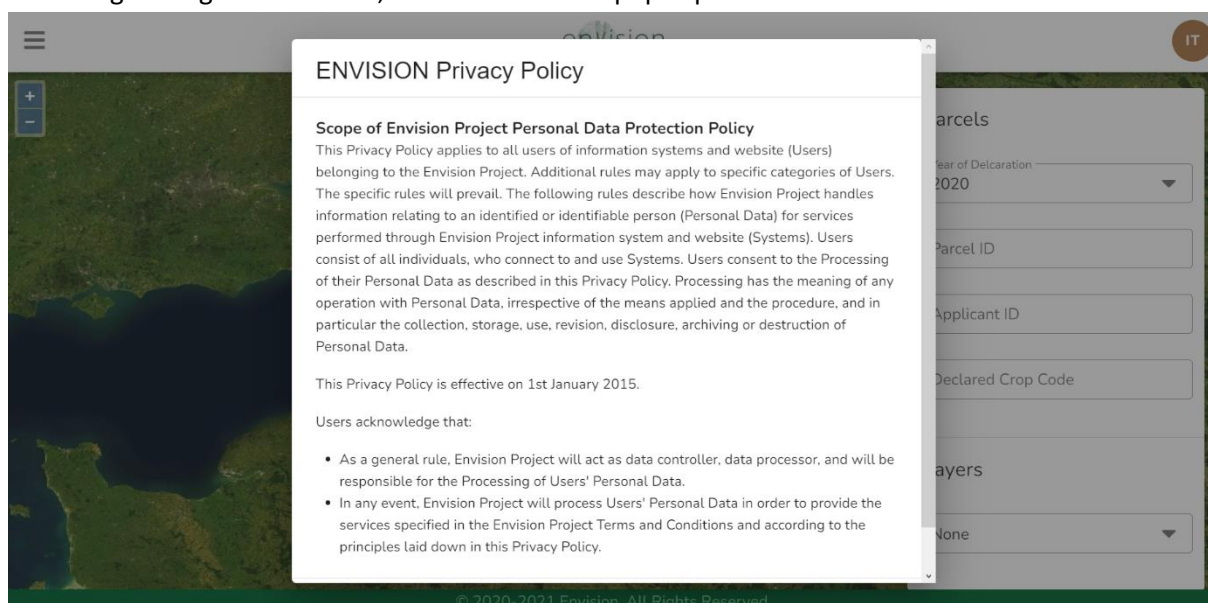


Figure 3: Log in

Following the log in of the user, the GDPR window pops up.



After the user has given their consent to the Privacy Policy, they land on the overview screen.

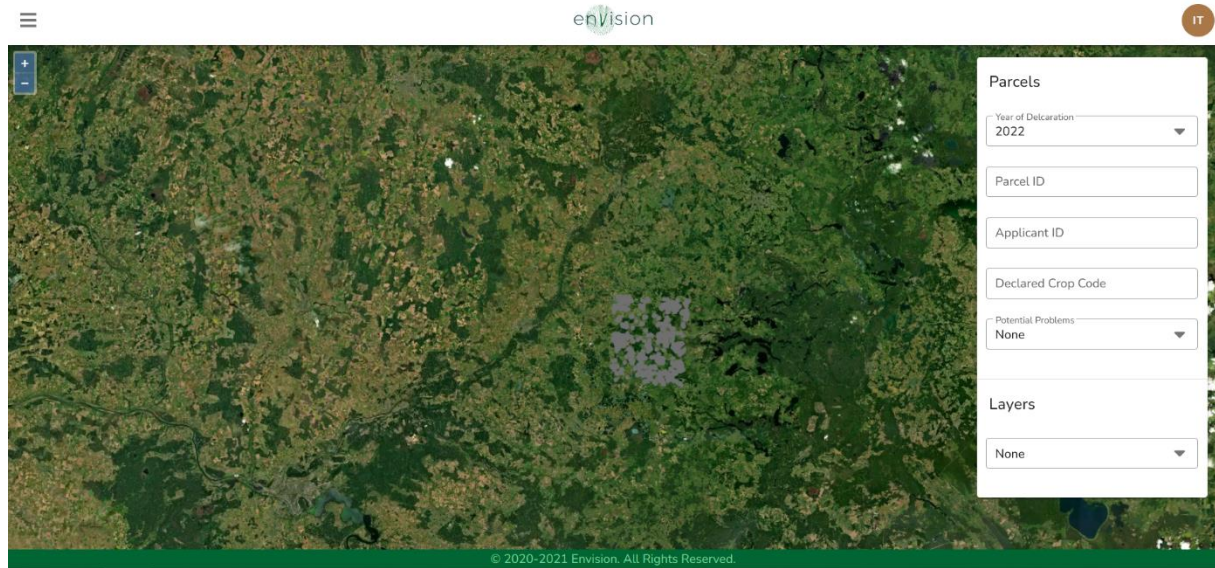


Figure 4: Overview

In the overview, the users are able to view all the imported parcels of the Area of Interest (AOI). If in the imported information the categorisation (organic, conventional) is filled in, then the parcels are coloured differently (green – organic, purple – conventional, grey – not defined). In that way, the users are able to identify easily and quickly the type of the parcel.

Furthermore, in the overview, the users are able to visualise layers on top of the map and perform specific queries to retrieve information with regards to the potential problems such as misclassifications and mowing events or the level of compliance. The users are also able to see previously imported declarations by selecting their preferred year and they can search a parcel either with the parcel ID, the Applicant ID or the Declared Crop Code.

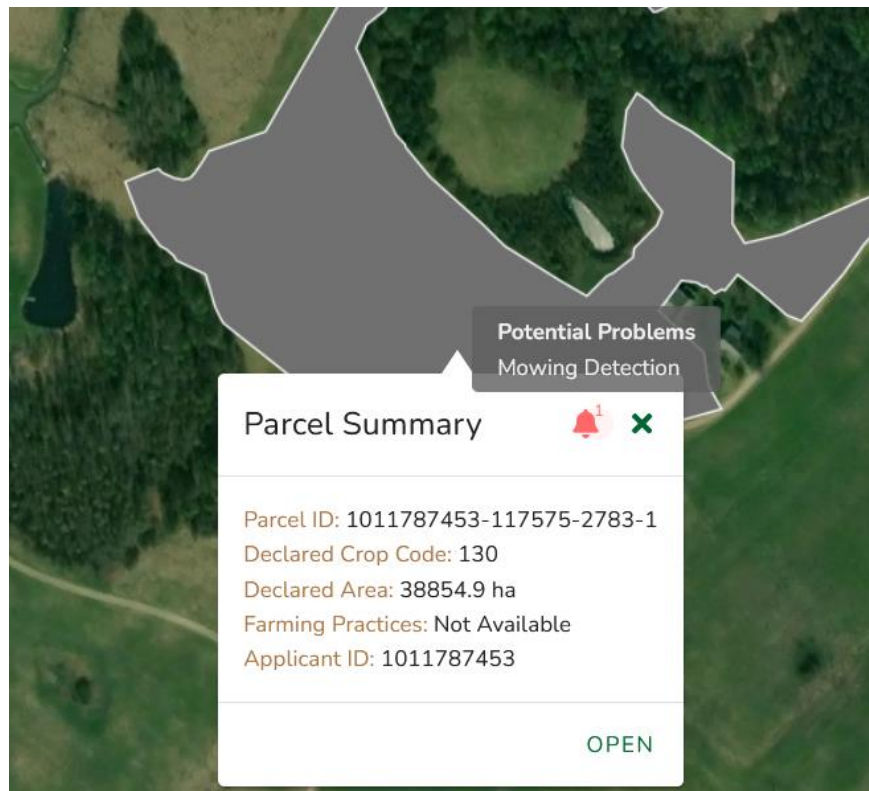


Figure 5: Parcel information

When the users click on a parcel, they can see the above information (Parcel ID, Declared Crop Code, Declared Area, Farming Practices and Applicant ID). In contrast to the previous version, the notification bell was added as a new element. When hovering over the bell, a text box displays information about the detected potential problems regarding the parcel. Finally, the OPEN button redirects the user to the monitoring screen of the selected parcel, as seen below.

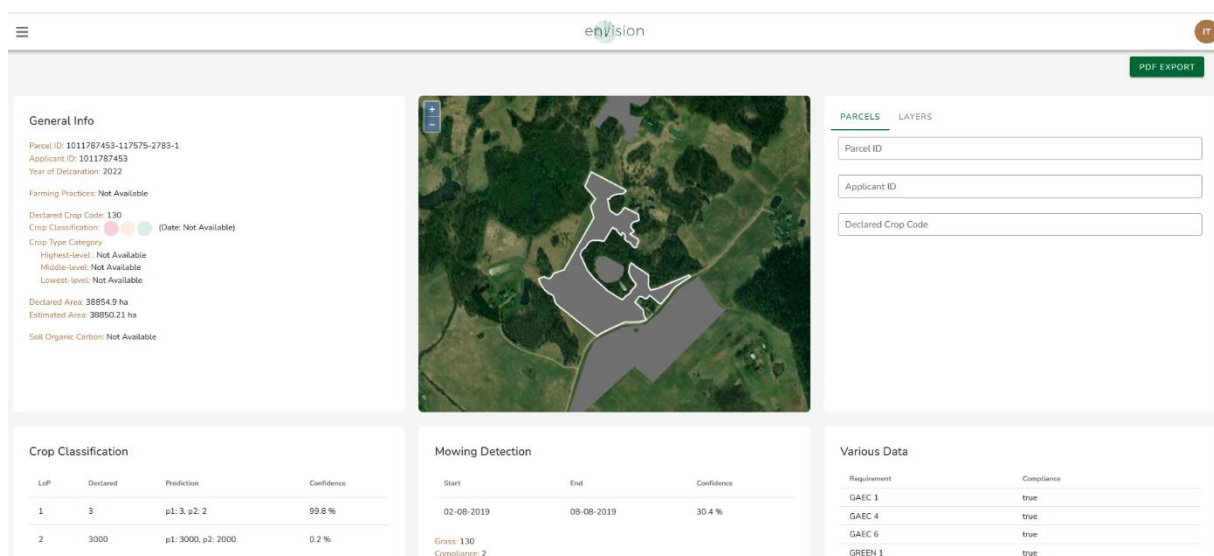





Figure 6: Parcel view

In the parcel view screen, the users can see general information about the parcel as well as the outcomes of the ENVISION services.

General Info

Parcel ID: 1011787453-117575-2783-1
 Applicant ID: 1011787453
 Year of Declaration: 2022

Farming Practices: Not Available

Declared Crop Code: 130
 Crop Classification:    (Date: Not Available)
 Crop Type Category
 Highest-level: Not Available
 Middle-level: Not Available
 Lowest-level: Not Available

Declared Area: 38854.9 ha
 Estimated Area: 38850.21 ha

Soil Organic Carbon: Not Available

Figure 7: Parcel General Information

In the General Info block the user can view the following:

- Parcel ID
- Applicant ID
- Year of Declaration
- Farming Practices: The declared type of farming practices (organic or conventional)
- Declared Crop Code
- Crop Classification (along with the respective traffic light system)
- Crop Type Category
- Declared Area
- Estimated Area: The area that is estimated from the ENVISION platform
- Soil Organic Carbon



Figure 8: Parcel view in the map

The map in this screen is responsive. This means that the users are able to see the parcel in zoom but they are also able to zoom out and see the provided results in a wider area.

PARCELS

LAYERS

PARCELS

LAYERS

None

NDVI

Figure 9: Filters

The users are able to search for a parcel using the filters depicted in the above figure. In addition, the users can apply on the map the NDVI layer, which is derived from the EO-based services.

Crop Classification

LeP	Declared	Prediction	Confidence
1	3	p1: 3, p2: 2	99.8 %
2	3000	p1: 3000, p2: 2000	0.2 %

Result: Classified_conform

Crop Compliance: true

Crop Diversification: Exemption1 (Not_required)

* Evaluated 52 pixels from Satellite 1 and 294 pixels from Satellite 2

Mowing Detection

Start	End	Confidence
02-08-2019	08-08-2019	30.4 %

Grass: 130

Compliance: 2

Various Data

Requirement	Compliance
GAEC 1	true
GAEC 4	true
GAEC 6	true
GREEN 1	true
GREEN 2	true
SMR 1	true (Risk: 2)

Aspect: 208.24

Slope: 7.6 %

Water Proximity: 566.32 m

Soil Erosion: 0.01

K-Factor: 0.03

C-Factor: 0.2

BSM

Figure 10: ENVISION Services

The ENVISION services with regards to CAP compliance are presented in the above figure. The users are able to see the results derived from the algorithms along with the respective accuracy.

More specifically, the user can see the number of crops identified on the parcel and the respective crop classification with the level of confidence for the result. Also, the system presents the detected mowing events, the estimated dates that the potential mowing event took place and the level of accuracy regarding this probability. Finally, the user has access in various data about the parcel, such as the proximity to water sources, level of soil erosion and others. If a service does not have any result to demonstrate, then a message “Not Available” appears to the respective box.

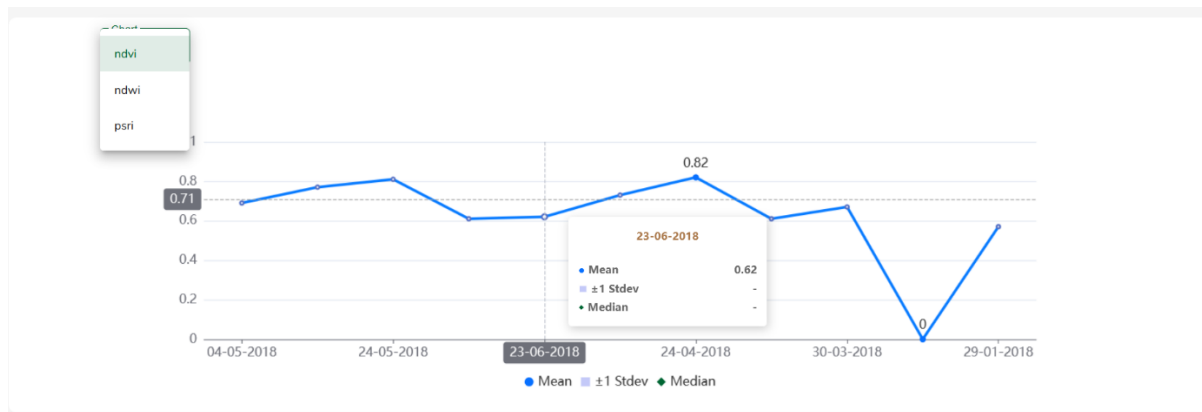


Figure 11: Graph

Furthermore, the users are able to see time-series of crop growth monitoring indices (NDVI, NDWI, PSRI) and some measures of statistical analysis. In addition to the previous version, the dates on which the highest and lowest statistical value was measured for every index are presented on the graph.

Another functionality that was added, is the export one. The users are able to export the viewed parcel along with its general information.

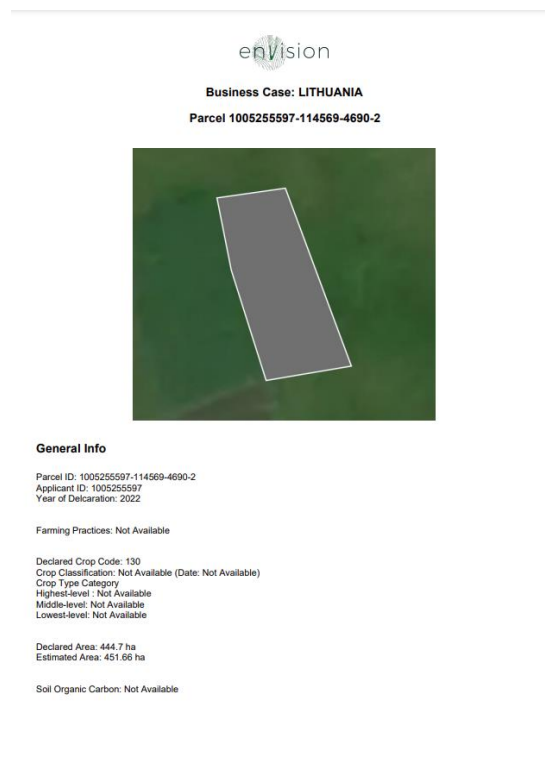


Figure 12: Parcel export

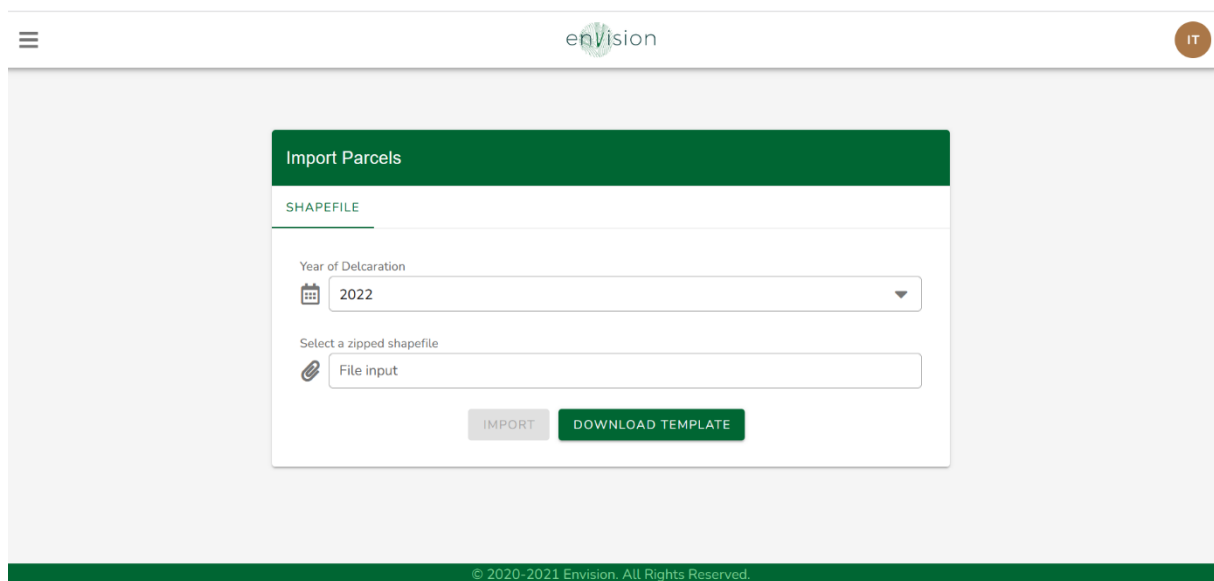


Figure 13: Import functionality

The users are able to import their parcels in the form of a shapefile and set the year of declaration. However, it is only allowed to declare a parcel on one of the two previous years. This means, that when a user imports a new parcel, they can set as the year of declaration the current or the previous year only. Furthermore, the users are able to download a shp. file template in order to see what type of information should be included (i.e. Cyprus, Lithuania and UK) and specific instructions are provided to the Serbian business case (ANNEX – IMPORT PARCELS).

Nonetheless, the system stores all previous imports and the user has access to the historical data from the overview page.



Figure 14: Use case assignment

Finally, each user is assigned to a specific use case (i.e. Lithuania). However, the platform offers the possibility to assign more than one cases in a specific user (SuperUser). This process is implemented only for the administrator of the platform (the technical team).

4 Mobile App Wireframes

In this section, the wireframes for the mobile application are being presented, illustrating the main features of the app.

The initial page the user sees is the log in page.

ENVISION APP

Username

Password

[Forgot Password?](#)

Log in

Don't have account?
[Create an account](#)

Figure 17: Log in

In the case the user does not have an account, they can create one through the sign up page.

EU

Username

Email

Applicant ID

Password

Create

Figure 18: Sign up

After the user has created an account and has logged in, they land on the overview page.

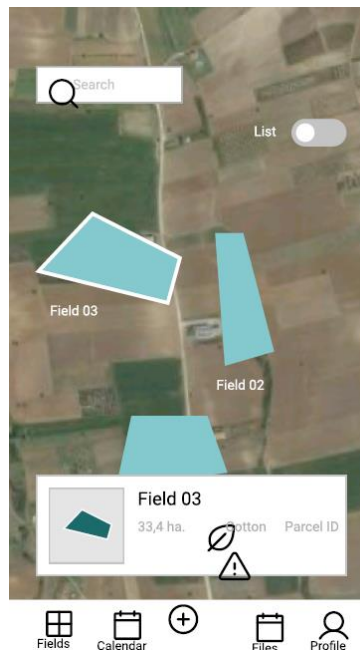


Figure 19: Overview page

In the main page the user can see on an interactive map the parcels that they have declared. They can search for a specific parcel or they can tap on a parcel on the map and view the relevant information (Declared Area, Crop Classification, Parcel ID).

Under the map, there is a menu with the main components of the application, which are the Fields, the Calendar, the Files and the Profile.

When the user taps on the Profile icon, they are redirected to the account settings. More specifically, they can view or edit the applicant ID, change the password, log out or delete the account.

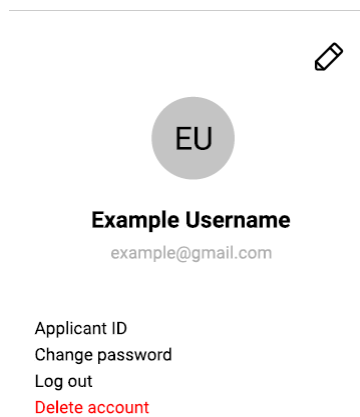
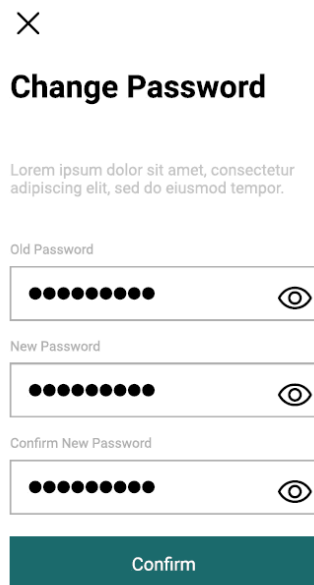


Figure 20: Account settings

In order to change the password, the user is asked to insert their old password and their new password twice, as seen below.



The image shows a 'Change Password' form. It starts with a close button (X) and the title 'Change Password'. Below the title is a placeholder text: 'Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor.' The form contains three password input fields, each with a label and an eye icon for toggling visibility: 'Old Password', 'New Password', and 'Confirm New Password'. At the bottom of the form is a teal 'Confirm' button.

Figure 21: Change password

The user can, also, change the username and the email of the account.

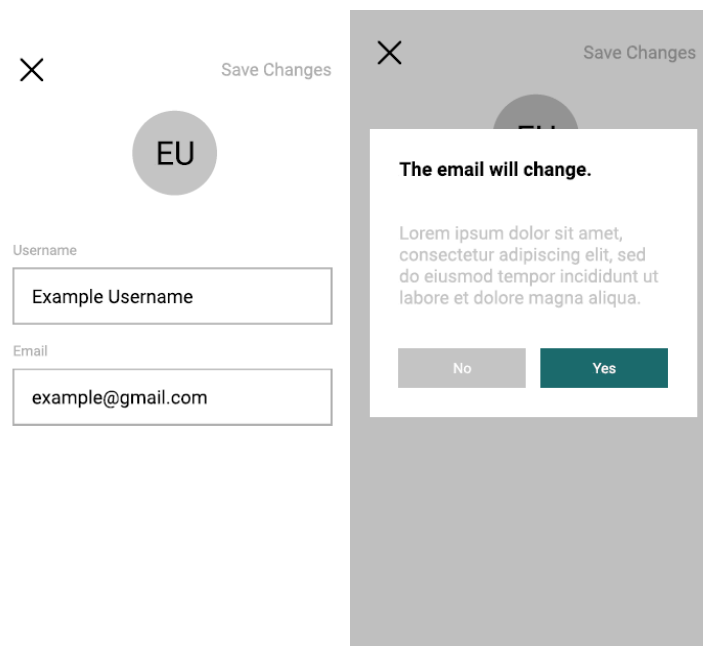


Figure 22: Edit username & email

In the Fields component, there is a list of all the parcels the user has imported.

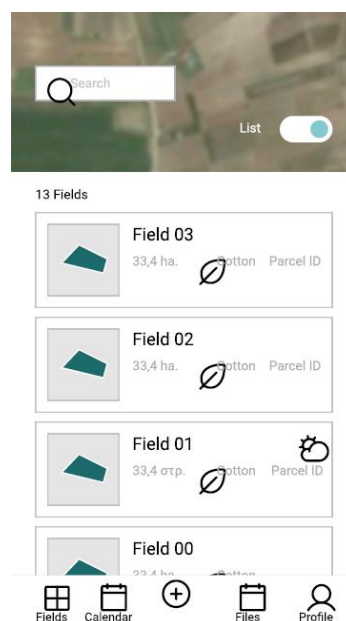


Figure 23: Imported parcels

When the users tap on a field, they are redirected to the monitoring page of that parcel.

On this page, the user can see the crop growth monitoring indices (NDVI) of the parcel, the declared area, the crop type and the dates of the important events that occurred on the parcel.

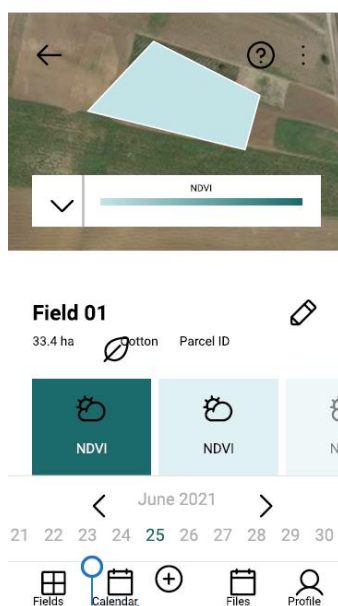


Figure 24: Parcel review

In the calendar component, the user can choose to see the dates of the declarations or other actions that took place for the imported parcels.

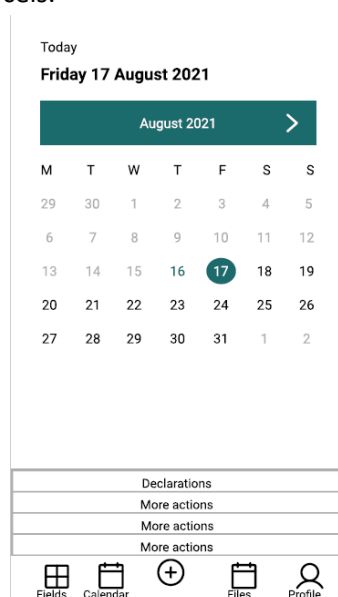


Figure 25: Calendar

Finally, when the user taps on the plus button, the camera switches on so as the user can take a picture and upload it on the application. The picture provides the application with the geospatial data of the parcel and a timestamp and it confirms the event that occurred on the parcel.



Figure 26: Take a picture functionality

The user can upload various pictures and pdf files regarding one parcel. These are accessible through the files button on the main menu. The user can insert a parcel id and view all the files that have been uploaded regarding that parcel.

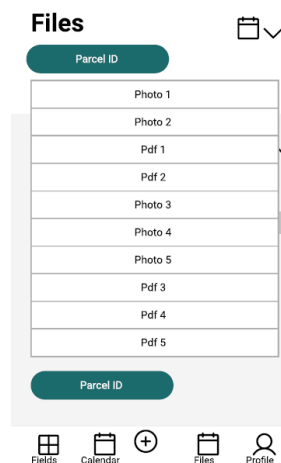


Figure 27: Files

5 Next Steps

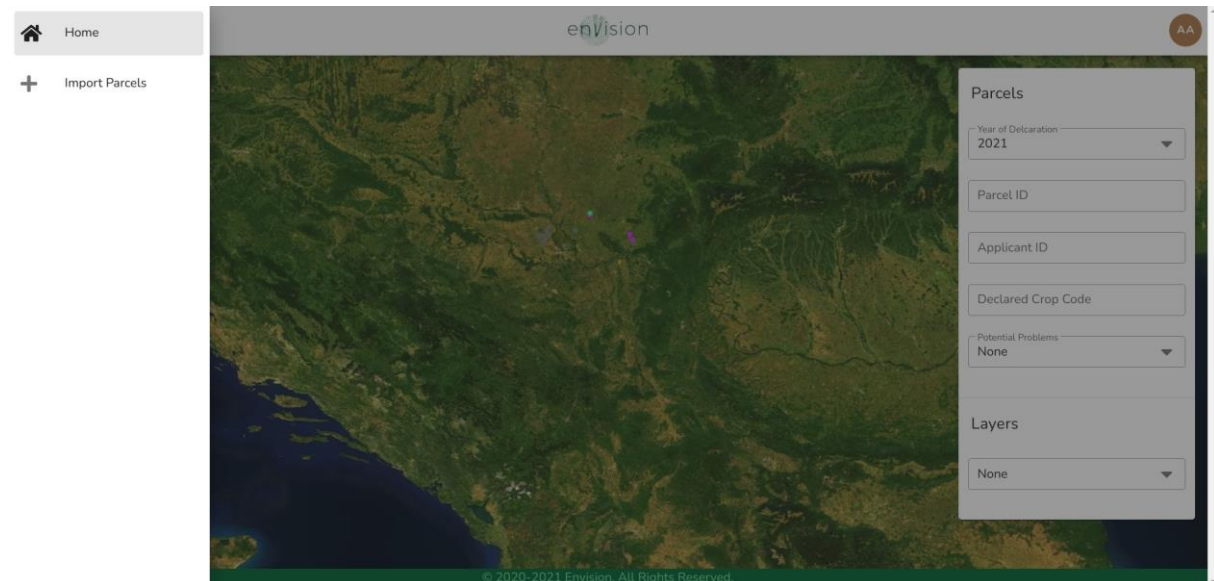
Our plan is to continue improving the platform both from a feature perspective, but also from a perspective of performance and quality of provided information and user experience. This version is the second one, which also includes the integration with the service providers and any external system that will be used during the business cases implementation phase. This version was built in order to collect valuable feedback and better understanding of the users' needs and processes. Our aim is to build on top of this version and further improve it the next months in order to deliver a ready-to-market solution.

In addition, following the meetings with the farmers and developers and the feedback that will be collected, the mobile application and the Add-on Development tool will be built during the next months.

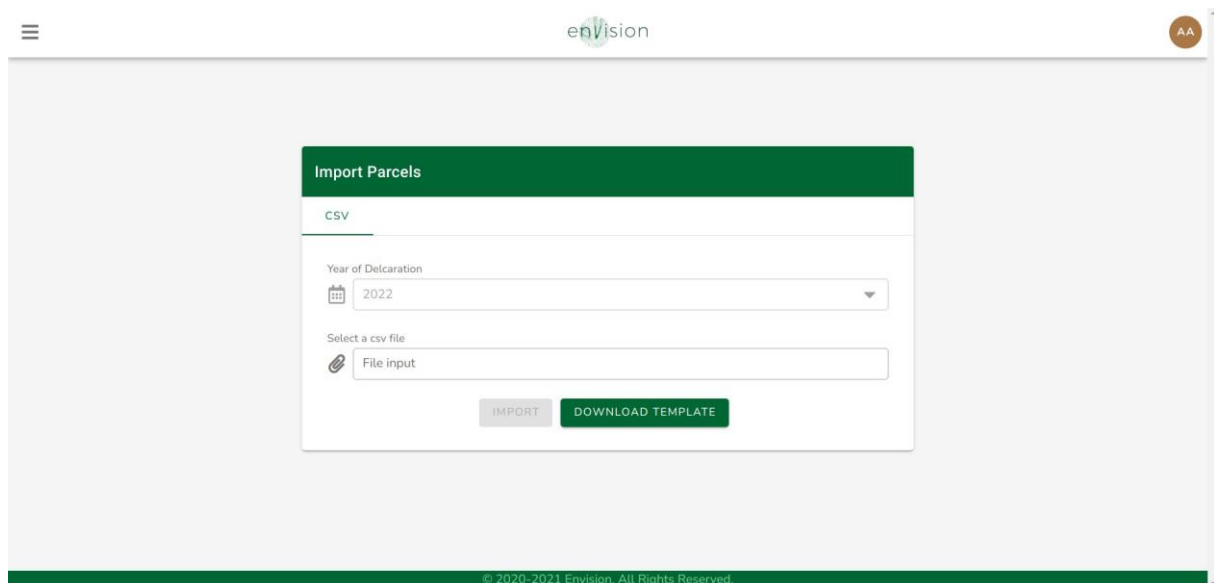


The Serbian case

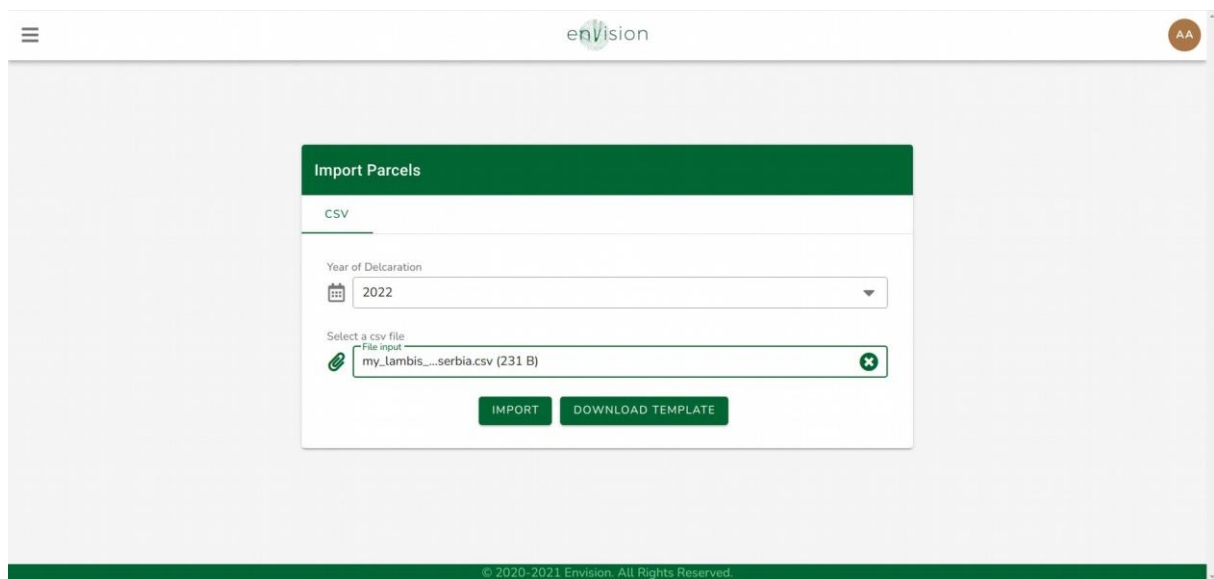
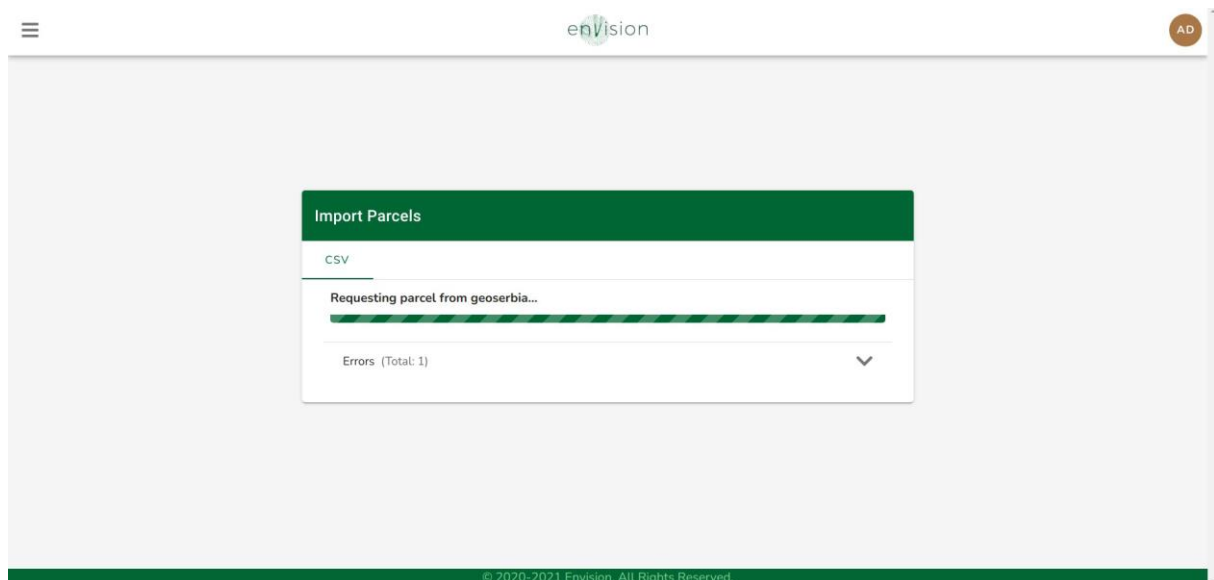
1. Select "Import Parcels" from the "hamburger" icon on the top left corner



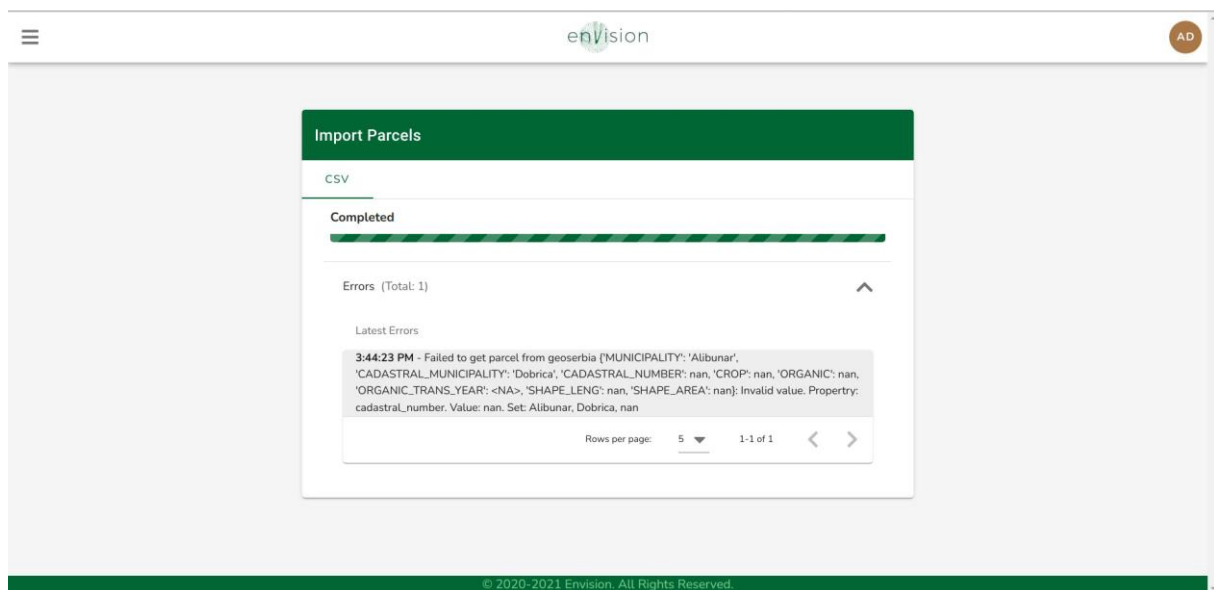
2. Click on the "DOWNLOAD TEMPLATE" button



3. Fill up the csv template file and save it
4. Select the csv file, then click "IMPORT"

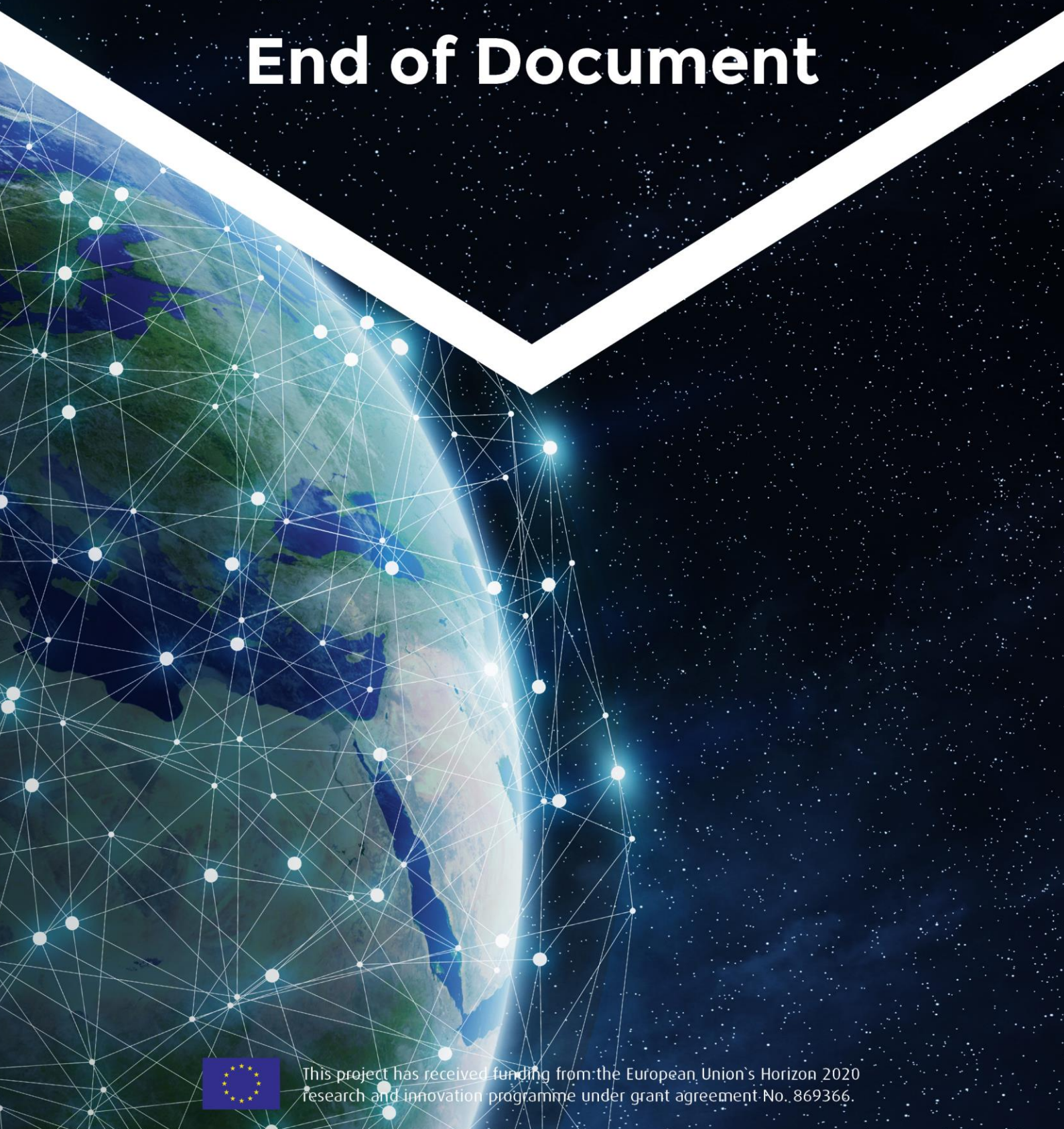
5. Wait for the parcels to be integrated from Geoserbja
6. Check for any errors. i.e. During the import process in the picture bellow, one parcel failed to be imported due to invalid input data. The rest of the parcels were successfully imported



Once the integration process has been completed, the services will start calculating the results.



End of Document



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