

The DIONE Toolbox: An integrated EO-based monitoring solution for modernising CAP area-based compliance checks and assessing respective environmental impact

Within the EU-funded project **DIONE** (No.870378), a Software-as-a-Service (SaaS) toolbox is developed, offering an innovative and scalable solution that aims to assist the European Paying Agencies to comply with the Modernised CAP regulation and its “Greener” perspectives. The DIONE Toolbox has been designed following a user-centred approach, with a notion to address the needs of a plethora of relevant stakeholders, among them being Paying Agencies and national Ministries, Certification and Control Bodies, and members of the wider EO and Agri-consulting community. As a whole, the DIONE Toolbox offers clear value to significantly lower inspection costs and improves the overall monitoring of farmers compliance. The DIONE’s overall concept is illustrated in the following figure.

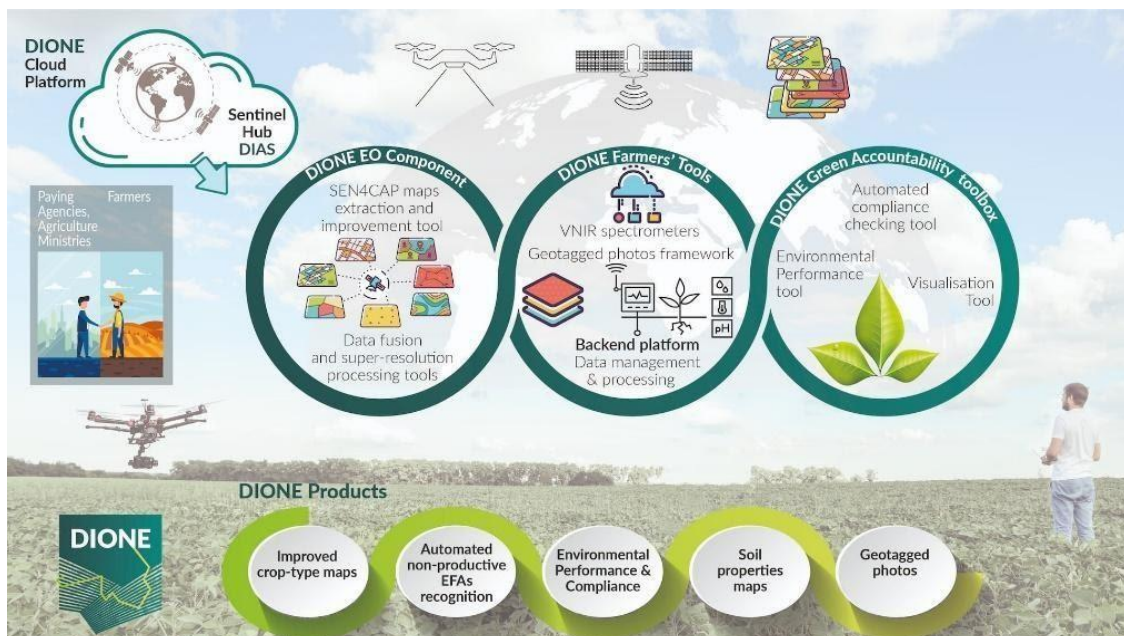


Figure 1: The DIONE overall concept

“Unpacking” the DIONE Toolbox

Having a closer view in **DIONE Toolbox**, it primarily consists of the three main components of (i) the Earth Observation (EO) Component, (ii) the In-situ Component, and (iii) the Green Accountability Component.

I. EO Component

The **EO component** stems from the use of various platforms (Sinergise Sentinel Hub, DIAS and AWS S3 bucket) and sensors with the will to improve the workflow of agricultural monitoring by the deduction of the related operational and computational costs, arising from the on the spot checks procedure. Leveraging on various EO-data sources retrieved from the Copernicus Sentinel’s missions, the ESA Data Warehouse mechanism, and drones, and through a set of image analysis and machine learning techniques (data fusion, super-resolution, and area monitoring markers), the EO component enables for the first time the identification of crop-type maps in smallholders parcels, small-scale features, such as the non-productive EFAs types



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and the detection of agricultural activities (i.e. grassland mowing/ploughing events, etc.). Within the EO component, the DIONE's area monitoring markers RESTful service is deployed giving at great accuracy and at several times during the growing season information of several markers, such as homogeneity (determine if multiple crops exist in the parcel), bare soil (as a consequence of a plowing, harvest events), mowing (detect mowing events on meadow/grass), crop (detect crop growth), land (identify land types and non-productive EFAs).

II. In-situ Component

The **in-situ component** establishes an ecosystem of low-cost smart tools to complement EO based monitoring. It includes the DIONE geotagged photos framework that consists of a mobile application for data collection, enabled by augmented reality features that aims to assist farmers to collect representative photos, and server-side processes that ensures the integrity and anonymization of received data. Furthermore, the DIONE soil scanning system has been developed, consisting of a mobile application working in tandem with portable low-cost soil spectrometers, with which the user can collect reflectance measurements. The aforementioned data are processed and validated, and subsequently converted to soil properties point observations and maps using novel machine-learning models and EO data.

III. Green Accountability Component

The **Green Accountability component** consists of a Compliance Monitoring tool, which decides on beneficiaries' compliance and is integrated with the existing tools of paying agencies and an AI-enabled Environmental Performance tool, accompanied with a visualization engine.

The Compliance Monitoring tool is a web-based solution, where key functionalities received by the aforementioned components (e.g. parcel boundaries, geotagged photos, biophysical indices, markers, and many more) are visualised and synthesised generating dedicated forms and reports towards assessing the compliance status of a farmer with respect to CAP green direct payment scheme rules. Under a similar concept, the Environmental Performance tool computes and allows relevant stakeholders to receive information regarding several agro-environmental indicators, such as the land cover change, the fields under organic cultivation practices, the Greenhouse Gases (GHGs) emissions, the water quality over the watercourses and the crop types that are under the Natura 2000 and high nature value (HNV), through a web-based interactive visualisation dashboard.

The DIONE toolbox and its components are demonstrated in areas of Cyprus and Lithuania and under the collaboration with the two project partners - the National Paying Agency of Lithuania and the Agricultural Payments Organisation of Cyprus.

Meet the DIONE team

The DIONE Toolbox has been developing under the framework of the DIONE project (grant agreement No. 870378), a Research and Innovation program, fully funded by the European Union's Horizon 2020. This project benefits from the presence of 4 innovation-oriented SMEs (GILAB, Sinergise, CORE, and INOSENS), two very high-profile research institutes (ICCS and i-BEC) and two very important PAs (CAPO and NPA).



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Private sector- 01



02 - End-users

Research institute- 03

This project kicked off in January 2020, with a mission to improve the workflow of agricultural monitoring and compliance checks for area-based direct CAP payments, and consequently to drastically reduce related operational costs. The project will end in June 2022. As the project enters its final phase, many important outputs are to come out soon. So, stay tuned for the new insights and results by **[subscribing to Dione's newsletter!](#)**

For more information, please contact us at: **nicin@inosens.rs**





Editor notes

Short description: DIONE proposes a close-to-market and integrated area-based direct payments monitoring toolbox that will address the forthcoming Modernised CAP regulation of using automated technologies to ensure more frequent, accurate and inexpensive compliance checks. The project will exploit DIAS' storage of Copernicus data in its fullness, making use of not just the data but also DIAS provided services such as Data Catalogue as well as Sentinel Hub, which is operational on 3 DIASes. DIONE toolbox will be further enhanced through complementary data sources (VHR images from drones as well as ground-based images taken by the farmers). The DIONE toolbox will include a Green Compliance toolbox, allowing paying agencies to check the compliance of farmers but at the same time monitor the green direct payments' environmental performance.

Starting date: 01/01/2020

Duration: 30 Months

Total cost: 2.377.125,00

EC contribution: 1.999.837,50



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[Core Innovation and Technology OE](#) Greece

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[InoSens doo](#) Serbia

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