Sentinels Synergy for Agriculture

Deliverable D8.20

Final update of the Exploitation Plan beyond SENSAGRI

V 1.0

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Abstract (for dissemination)	This report details the final Exploitation Plan for SENSAGRI, including the lessons learned from the Living Lab process and the different exploitation scenarios (standalone services, DIAS, other mid-user platforms and Copernicus core services). The Intellectual Property Rights (IPR) and knowledge management policy are also included.
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[1] R = Document, report; DEM = Demonstrator, pilot, prototype; DEC = Websites, patent fillings, videos, etc; OTHER; ETHICS = Ethics requirement

[2] PU = Public; CO = Confidential (Consortium and Commission Services); EU-RES = Restreint UE; EU-CON Confidentiel UE; EU-SEC = Secret UE (Commission Decision 2005/444/EC)

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1. Introduction

1.1. Scope of the document

The Exploitation and dissemination work package plays a central role in the SENSAGRI project, as enhanced from the H2020 programme itself, which in this regard establishes as main objectives the promotion, service providing and further development of the prototype products and outcomes generated in the WPs. This document describes the project exploitation strategy according to the analysis to date of different exploitation scenarios, interaction with Copernicus Entrusted Entities and other European stakeholders, as well as the results extracted from the Living Lab process. The Exploitation Plan was conceived as a living document, as the exploitation activity is carried out during the entire project's life and after its end. Therefore, EP has been updated through all the stages of the project.

1.2. Notations, abbreviations and acronyms

ACM	Advanced Crop Map
ATBD	Algorithm Theoretical Basis Documents
CAL/VAL	Calibration/Validation
CAP	Common Agricultural Policy
CEE	Copernicus Entrusted Entities
CESBIO	Centre d'Etudes Spatiales de la BIOsphère
CNES	Centre National D'etudes Spatiales
CNR	Consiglio Nazionale delle Ricerche
CREA	Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria
DIAS	Data and Information Access System
DoA	Description of the Action
EC	European Commission
EE	Entrusted Entities
EP	Exploitation Plan
EU	European Union
GIS	Geographic Information System
GSAA	GeoSpatial Aid Application
IaaS	Infrastructure as a Service
IACS	Integrated Administration and Control System
IM	Irrigation Map
IPP	Institute of Plant Protection
IPR	Intellectual Property Rights
IREA	Istituto per il Rilevamento Elettromagnetico dell'Ambiente
ITACyL	Instituto Tecnológico Agrario de Castilla y León

JECAM	Join Experiment of Crop Assessment and Monitoring
LAI	Leaf Area Index
LPIS	Land Parcel Identification System
LUCAS	Land Use/Cover Area Frame Survey
OTSC	On-The-Spot Check
PaaS	Platform as a Service
PEDR	Plan of the Exploitation and Dissemination of Results
PMT	Project Management Team
RD&I	Research, Development and Innovation
SCM	Seasonal Crop Map
SENSAGRI	Sentinels Synergy for Agriculture
SMOSAR	Algorithm for Soil Moisture Retrieval using Sentinel 1 data
SSM	Surface Soil Moisture
TCM	Tillage Change Map
TBD	To Be Defined
TRL	Technological Readiness Level
UPS	Université Paul Sabatier
UVEG	Universitat de València
WP	Work Package
WT	Work Task

2. Evolution of the Exploitation Plan (EP)

2.1. Initial EP at the DoA

In the SENSAGRI Description of the Action, the initial Exploitation Plan, included in WP8, was first schematized, based on the well-proven concept of "Living Lab". A living lab is a user-centred, open-innovation ecosystem, often operating in a territorial context (e.g. region), integrating concurrent research and innovation processes within a public-private-people partnership. The concept is based on a systematic user co-creation approach integrating research and innovation processes. These are integrated through the co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases. Such use cases involve user communities, not only as observed subjects but also as a source of creation. This approach allows all involved stakeholders to concurrently consider both the global performance of a product or service and its potential adoption by users. ITACyL (in Spain), IPP (in Poland) and CREA (in Italy) also adopted the Living Lab approach that CESBIO initially experimented in France (in the Languedoc-Roussillon Midi-Pyrénées Region) with public and private actors of the agricultural sectors and private companies. Accordingly, UPS-CESBIO was designed as the leader of the Exploitation Tasks of WP8 (WT 8.1, 8.2 and 8.3). The initial idea of the EP was, in summary, based on a first Living Lab, adapted to SENSAGRI and whose principles would be transferred to the other three validation sites of the project. The key actions of the exploitation plan were assigned to specific Work Tasks in WP8, as outlined in Table 1.

Table 1. Initial assignation of exploitation plan Work Tasks.

Key action	WT
Identification of users and user groups, explanation of the process. Agreement on the roadmap.	8.1
Two workshops at each site will serve to tune SENSAGRI approach with potential end-users towards innovation and future marketable services and products. With this purpose, the workshops will gather, at each site, local users from the precision agriculture/ smart farm industry, agri-business and insurance companies, agro management and crop protection agencies, civil protection departments and statistical institutes, as well as scientific users.	8.1
Training on the use of the SENSAGRI products and services, preparation of demonstration data sets.	8.2
Iterative sessions dealing with the products and services (including the Web GIS).	8.2
Final assessment of the outputs of the project by the users and recommendations.	8.3
Explore the applicability of the services outside Europe, in countries in which the availability of reliable crop data is scarce and the access to EO advanced agricultural services is very limited.	8.4

The initial approach for the exploitation of SENSAGRI services expected to trigger a diversity of innovative products and services, new business opportunities and concepts for commercialisations. The idea was that the delivered services would nurture the business of remote sensing monitoring companies in support of the emerging market of data-driven smart farming. Together with data from other sensors (e.g. drones, field sensors), these data services could be integrated into a (cloud-based) smart farm systems. The initial EP acknowledged that the exploitation of SENSAGRI services and products is contingent on the implementation of enabling factors by Copernicus, which in the end are necessary for the realisation of market potential and corresponding downstream services.

2.2. Interaction with CEE and re-definition of target users. The mid-user concept

During the negotiation of the SENSAGRI Grant Agreement, the initial exploitation strategy, outlined in the SENSAGRI proposal, was modified following the guidelines of the Project Officer, from the EC Research Executive Agency (REA). The indications from the REA officers led to a re-definition of the target users of SENSAGRI. From an initial approach, more centred in end users (farmers, agroindustry, stakeholders) and in the identification of potential downstream applications, towards an exploitation scheme centred in the identification of the CEE requirements for new upstream Copernicus services.

Consequently, the main objective of the SENSAGRI exploitation became the interaction with the Copernicus Entrusted Entities. This interaction should be bidirectional: for informing the CEE representatives on the implementation advances and orientation of the SENSAGRI services, as well as for asking the CEE officers for the needs and requirements for new Copernicus upstream services (and more specifically, for agricultural-related services in the Pan-European Land component).

The re-orientation of the SENSAGRI Exploitation Plan required a revision and adaptation of the whole Living Lab (LL) approach. This adaptation was two-fold: on the one hand to envisage the potential application of the LL procedures for interacting with CEE representatives; on the other hand, to re-think the strategy of the local LL, to be performed in the four SENSAGRI core tests sites.

The adaptation of the LL was outlined in the deliverable D8.12 (Second Report on the Living Lab) and was centred in the redefinition of target users and the introduction of the mid-user concept. The key elements of the LL strategy, as defined in D8.12, were the following:

- **Mid-user, intermediate user**: potential user of SENSAGRI services and provides downstream service. This role is between SENSAGRI provider (in the frame of the project) or Copernicus (in operational mode) and end-user. They are segmented in several fields, such as insurance, agribusiness, precision agriculture or statistical institutes. The heterogeneity of mid-users is noticeable in terms of maturity, in terms of familiarity and capability to deal with remote sensing data, and in their different level of relationship with other actors of the value chain.
- **Mid-user service**: service provided by mid-user, and includes internal, Business-to-Business (B2B) service, or end-user (B2C) services.
- **End-user**: beneficiary of mid-user service, out of the scope of SENSAGRI, but needed when mid-user explicit their experiences and requirements. End-user are involved punctually in the Living Lab Process, in each iteration-workshop as usability experts.
- **Relevant European Actors**: firstly, Copernicus Entrusted Entities (CEE: JRC and EEA) and secondly European Directorate-Generals (DG- AGRI, DG-CLIMA, DG-REGIO). They are also considered as SENSAGRI services users. More details will be provided when strategic plan of interaction will be set up.

2.3. From centralized to user-driven services. CAP monitoring as a change of paradigm

The initial idea of SENSAGRI was to define, develop and validate prototypes for new Copernicus services, taking the existing ones (Pan-European Land component) as a reference. These services are intended to generate consistent and accurate Pan-European products, in the form of wide-coverage, low-temporal-frequency static maps. For the production of these maps, it is essential to implement optimised algorithms, as well as processing chains able to handle large amounts of data on a timely manner.

However, during the development of SENSAGRI, two factors converged towards a different approach for the Copernicus services, based on flexible tools, designed for a user-driven generation of tailored outputs (maps, statistics, graphs, reports). One is the advent of the Copernicus DIAS (Data and Information Access System) as cloud-computing infrastructures allowing the implementation of processing chains for the generation of Sentinels-based products. The second is the entry into force of the new set of regulations to shape the future EU Common Agricultural Policy (CAP), put forward by the European Commission on 1 June 2018 as part of the preparation of the EU budget for 2021-2027 [W2].

The most relevant aspects of the new CAP monitoring, from the SENSAGRI perspective are:

- The progressive substitution of the On-The-Spot Check (OTSC) of aid applications or payment claims, based on field inspections, by a new "checks by monitoring" system mostly based on Sentinels' data (Devos et al., 2017).
- The focus on agricultural practices, shifting from mere crop maps to indicators of the actual agricultural activity of parcels, as well as the requirement for "markers" (such as phenological or time-evolution indices), which require local- or regional-tailored approaches.
- The full responsibility of national or regional Paying Agencies in the implementation of the monitoring.

This new approach of the CAP 2020 monitoring will therefore require flexible and locally-tuned tools, which could be implemented in a DIAS, rather than static Pan-European maps requiring more "conventional" processing infrastructure. In the context of SENSAGRI, some of the prototypes or proof-of concepts (such as the tillage change product or the combined time series of green and brown LAI) can effectively be used in CAP monitoring tools available through a DIAS.

The following paragraphs summarize the evolution and status of SENSAGRI in relation to the implementation of the CAP monitoring:

- In the initial stage of the project, there was no clear link between Copernicus and Common Agricultural Policy. The proposed SENSAGRI products were suitable for general-purpose agricultural activities monitoring at different levels (Farmers, government and researchers). That approach is still valid to some extent.
- After the launch of SEN4CAP project during 2017, the CAP Monitoring approach was presented by JRC and DG-Agri at the 23rd MARS conference in Dublin (Nov. 2017). SENSAGRI was presented in that MARS Conference, where Paying Agencies and the JRC could anticipate the interest of some SENSAGRI products for CAP monitoring.
- As the preparation for the new CAP monitoring framework advanced, it became clear that projects like SENSAGRI or SEN4CAP could provide new tools adequate for those monitoring needs. It is important to remark the differences between tools and products. CAP monitoring will be implemented as a way to monitor the geographical objects (GSAA) declared by the farmers. That monitoring will take place in close relationship with the Integrated

Administration and Control System inside the CAP Paying Agencies with a direct link between the farmers.

- Members of the SENSAGRI team have participate in several meeting with DGAGRI and JRC during last months. It is clear that CAP monitoring approach is based in agricultural practices identification using Copernicus (or similar data). Several SENSAGRI products have potential to be implemented as an agricultural practices' monitoring tools within DIAS services if input parameters are standardized. Examples such products are tillage detection, irrigation events detection, harvest detection (trough an analysis of Green and Brown LAI drop in time series) and crop identification.
- ITACyL, member of the SENSAGRI consortium, has participated in the first CAP monitoring implementation in 2019 in Spain. The SENSAGRI products have not been used in this exercise, made in the context of the ESA's SEN4CAP project. However, some of the SENSAGRI products (especially LAI brown and Tillage change) were positively evaluated for its potential integration in the monitoring algorithms.

2.4. Lessons learnt from the Living Lab

Outputs and main conclusions drawn from the latest LL implementation are described in D8.23. Particularly, final users' evaluation of the project outputs were reported based on the workshops' information collected from all SENSAGRI test sites. Different user requirements and services were identified depending on each test site.

2.4.1. CREA (Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria)

CREA's objective is to better reach water authorities' expectations (adapt water management and sales) and adapt, improve research topic (such as the elaboration of crop experimentations). Partly funded by regional funding, CREA has a strong relationship with regional and local water authority, who early in the SENSAGRI project ask for interaction about SENSAGRI products.

CREA set up a User centered Process to collect User requirements from six participants composed of local water authorities, agronomist and consultant. They have been involved in an Exploratory Workshop, where they identify needs of remote sensing information in their business activities and formulate user requirements about SENSAGRI products.

Table 2. Services and related SENSAGRI products identified over the Italian test sites.

Service	SENSAGRI product
Management of water resources and products	Surface Soil Moisture Map (SSM), Seasonal Crop Map (SCM)
Water management planning in contexts of scarcity	ACM (Advanced Crop Map), Tillage change map (TCM), SCM, SSM
Flood prevention and management	SCM, SSM,
Irrigation management on water demand dedicated for irrigation	SSM, SCM, Leaf area Index (LAI), Irrigation Map (IM)
Advise service on agronomic practices	LAI, SSM, TCM
Contribution to the planning of the development of the territory	SSM
Irrigation advice service	LAI, SSM, IM
Optimize nitrogen fertilization (durum wheat)	SSM, LAI
Optimize the crop productivity	SSM, LAI
Supply chain analysis and decision making.	Crop map (SCM or ACM)

2.4.2. Institute of Plant Protection (IPP)

IPP mobilized potential users, by setting up a scientific session and survey to identify potential participants of an exploratory workshop. The objective of the workshop was to support participants (agricultural actors: farmers, consultants, institution, etc.) to identify needs from remote sensing information in their activities and formulate user requirements.

Table 3. Services and related SENSAGRI products identified over the Polish test sites

Service	SENSAGRI product
Research on plant protection	SSM, LAI
Crop optimisation	SSM
Sowing operation Advise service to farmers	SSM
Improve crop efficiency for small farms	Crop map
Monitoring of agricultural crops on a region	SSM, Crop map (SCM or ACM)
Advisory service	SSM
Evaluation process of phenomena occurring in the field's experimental areas (cereal, rape, maize)	SSM, Cop map, LAI

2.4.3. Instituto Tecnológico Agrario de Castilla y León (ITACyL)

As one of the CAP paying agencies in Spain, the Castilla y Leon region is responsible for the payment management in this region (unlike in France where there is only one national agency). ITACYL is the department of this paying agency that is responsible for providing decision aids information to the payment delivery department (DG CAP that is internal to the payment agency Castilla y Leon).

Control process are made by human intervention, called « on the spot-check control », on 5% control on 100% on applicants. The aim of 100% control is promised by the means of remote sensing technology. OTSP check are too tough to be deployed on 100% applicants.

During the Introduction of Service Living Lab process, the participants (different team of the Castilla Y Leon (CYL) Paying Agency: LPIS Team (IT), ITACyL team (remote sensing), DGCAP team (Regional administration of Agriculture)) mapped a shared understanding of their services, objectives, difficulties and complementarities. Then, participants ideate on hypothesis of services-solutions to answer to shared difficulties. In the next day, we translated those hypotheses in need of information and EO data.

Table 4. Services and related SENSAGRI products identified over the Spanish test sites

Service	SENSAGRI product
Control Process	TCM, SCM, LAI, IM
Control Process in the case of "Environmental Aid" funding	IM, LAI
Aid Application process	SCM

2.4.4. CACG & AGROD'OC

Over the French test site, two mid-users were surveyed: AGROD'OC and CACG. Initially, the LL was carried out following two different LL approaches: *Service LL process* (based on the real relationship between a provider and a user) and *SENSAGRI user centered process* (users' requirements collection from technologic demonstrator). In both cases, the webGIS played an important role as tool to show the SENSAGRI prototype products. Feedback is received from a 2-step interaction (*Exploratory workshop* and *Service LL process*), used to obtain an overview of user requirements, regarding the offered SENSAGRI products. Results of the first LL implementation are extensively described in D8.12, while the last study of complete user requirements is reported in D8.23.

As an illustrative example, Figure 1 and Figure 2 show the overview of AGROD'OC and CACG user requirements during *Service Living Lab process*, respectively. A list of the characteristics of the products demanded by AGROD'OC and CACG, are listed in Table 2 and Table 3, respectively.

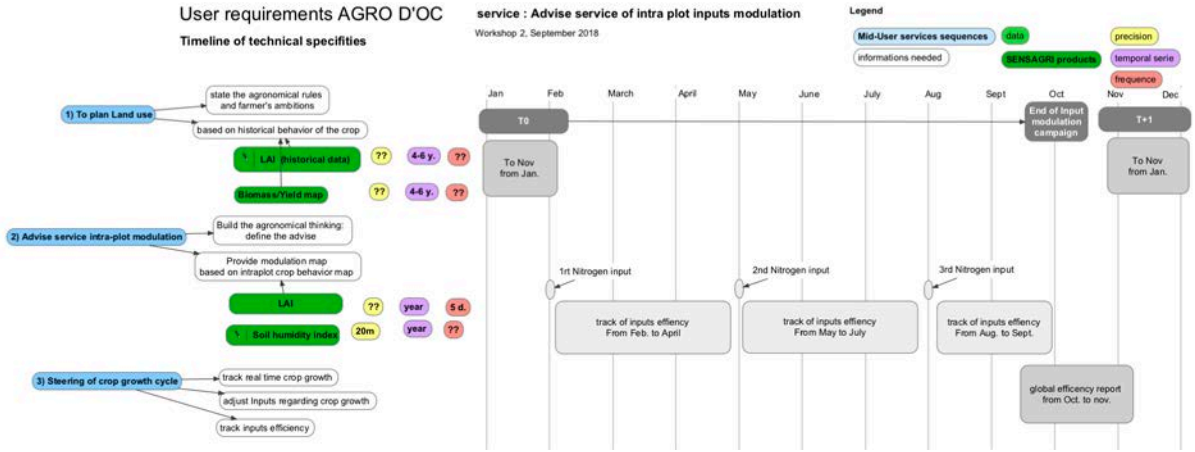

Figure 1. Overview of AGROD'OC User requirements during Service Living Lab process

Table 5. Product requirement of AGROD'OC

Purpose	EO products	Precision	Temporal series (nb as month)	Frequency
Plan land use based on historical behavior of the crop	LAI (historical)	Plot level With data quality index	1 year From 01 to 09	10 d.
	Biomass/Yield map	Plot level With data quality index	Min. 4 y. From 02 to 06	1 time
Provide modulation map based on intra-plot crop behavior map	LAI	Plot level With data quality index	1 year From 02 to 10	From 2 d. to 5 d.
	SSM	Plot level with data quality index	1 year From 02 to 10	1 time

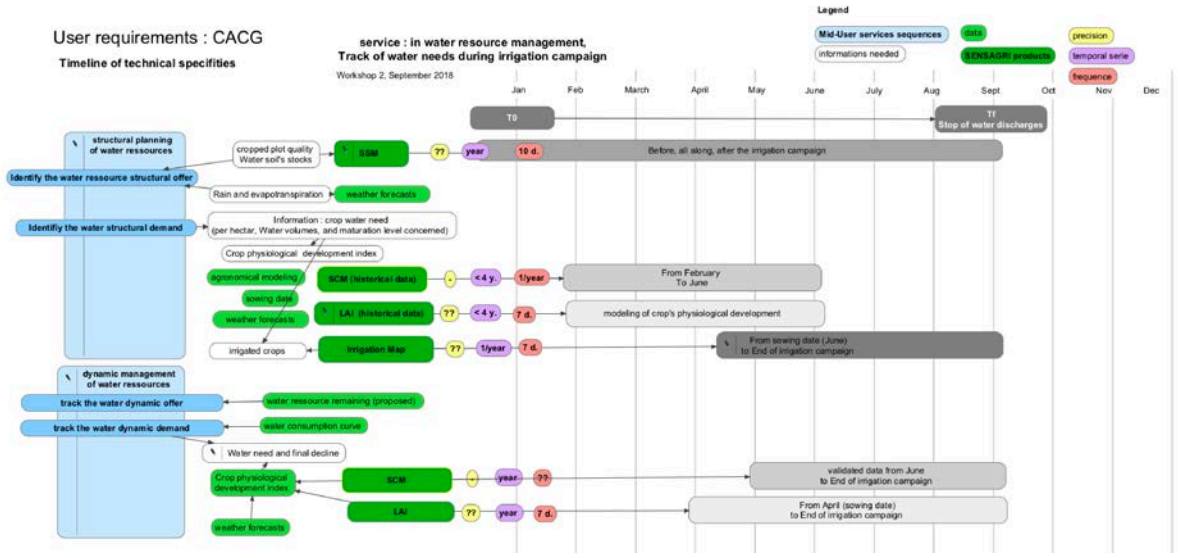

Figure 2. Overview of CACG User requirements during Service Living Lab process

Table 6. Product requirement of CACG.

Purpose	EO products	Precision	Temporal series (nb as month)	Frequency
Estimate soil's water stock	SSM	Not identified yet	1 year From 01 to 09	10 d.
Crop water need	SCM	Plot level With data quality index	Min. 4 y. From 02 to 06	1 time.
	LAI	Not identified yet	Min. 4 y. From 02 to 06	7 d.
	Irrigation map	Not identified yet	1 year From 06* to 10**	7 d.
Water need and final decline	SCM	Plot level With data quality index	From 04*** to 10**	Not identified yet
		Not identified yet	From 04*** to 10**	7 d.

Table 7. Services and related SENSAGRI products identified over the French test sites (D8.23).

CACG Service	SENSAGRI product
Estimate the demand and structural and dynamic supply of water demand	SSM, IM, SCM, TCM, Vegetation Index (NDVI)

AGROD'OC Service	SENSAGRI product
Modulation of Intra plat inputs during Advice service	LAI, Biomass/Yield map, SSM

3. Exploitation approach at M36

This section describes the exploitation strategy for the last year of the H2020 project, focused in the transfer of the LL to Spain, Italy and Poland. It also describes the interaction with the CEE and EC DGs; as well as with other related H2020 projects. The perspectives for potential DIAS implementations and the tools for exploitation and dissemination are also outlined.

3.1. Transfer of the Living Lab process

During the last year of the project, the LL process was transferred to new SENSAGRI test sites: Spain, Italy and Poland. The LL implementation in Castilla y León and Italy followed the mid-user approach, taking ITACyL and Water Authorities of the Foggia irrigation district, respectively, as testing actors. The interest of ITACyL participation relies on its role as regional paying Agency. This LL allowed to identify the needs and requirements of a very promising target mid-user for the SENSAGRI services: the CAP paying agencies. In Poland, both mid-users (agronomic and plant protection institutions) and end-users (representatives of precision farming companies) were targeted. More detailed information can be found in Section 2.4 and extensively D8.23.

3.2. Interaction with EC, CEE and other mid-users

The new opportunities and perspectives for the exploitation of the SENSAGRI services in the context of the CAP monitoring, recommend strengthening the contacts with the EC DGAgri and JRC, as responsible entities for the design and definition of the CAP policies, as well as with the Paying Agencies, as responsible for the implementation of these policies. The interaction with the ESA project SEN4CAP will be also pursued, since this project is specifically centred in the implementation and validation of services for CAP monitoring.

The most efficient way to foster the interactions with these mid-users is to attend related workshops, conferences and events, in which the participation of these mid-users is expected or foreseen. Some examples, listed below in section 3.5.4, were the JRC 2019 IACS workshop, the ESA Living Planet Symposium 2019 and the Panta Rhei Symposium. The deliverable D8.16 (*Fifth Report to the Copernicus Entrusted Entities*) summarizes the main interactions and conclusions from those meetings

In addition, the preparation and/or attendance to joint meetings or workshops with other related H2020 projects (convoked independently or concurrently with the above-mentioned conferences) is a very useful tool for this interaction. In this respect, the SENSAGRI consortium co-organized the *Copernicus for agri-environmental applications* workshop, held in Madrid on October 17th 2019, which was an excellent opportunity to present the results and achievements of the project to more than one hundred potential mid-users, as well as stakeholders and CEE representatives. The deliverable D8.21 (*Sixth Report to the Copernicus Entrusted Entities*) summarizes the main outcomes and conclusions from that workshop.

3.3. Interaction with DIAS

The contacts with the different DIAS are essential to explore the possibilities for the implementation of the SENSAGRI services in these platforms, to get an evaluation, as accurate as possible, of the conditions and costs related with this implementation.

In this context, through the H2020 project EO4CAP and encouraged by the REA, CESBIO interacted with the service provider company ATOS, main responsible for the Mundi web services DIAS. In this iteration, they carried out:

- An analysis on the requirements for the implementation of the crop classification processing chain of CESBIO
- An assessment of the resources needed for a typical operation scenario
- From this evaluation, ATOS issued a services' offer, attached below (click to open).

DIAS has been identified as a powerful and suitable tool for implementing the SENSAGRI products in an operational way. However, the possibilities for exploring the ways of implementing SENSAGRI services in the DIAS could not go further than the above-mentioned experience. The costs of these cloud platforms largely exceed the budgetary capabilities of a RIA project as SENSAGRI for carrying out a pilot study. This should be explored in a different context and with the sufficient financial support.

3.4. Tools for exploitation and dissemination

This section summarizes and describes the main tools that will allow SENSAGRI to implement and follow its exploitation activities. Including feasibility analysis and "white papers".

3.4.1. Web page

The SENSAGRI web page displays updated public content related to the project such as publications, disseminations activities, news, and general information of the project. The partners' private area is continuously being updated with available deliverables and the status of actions and milestones. In addition, there is a downloading section, which includes material of interest for the partners. Any user can access the project twitter account, and to the SENSAGRI products via link to the webGIS. Before the project ending a new section will be enabled containing project public deliverables as an open-access content.

3.4.2. WebGIS

The status and implementation plan of the webGIS was described in detail in D8.12.

The webGIS was developed to visually and interactively present the SENSAGRI products. Any user can access it (via the web page) for browsing, visualization and information extraction. The initial release is still being improved according to the consortium partners' feedback, regarding technical features. This tool plays an important role in the exploitation and dissemination plans, and has already successfully served as a facilitation tool during the LL *User Centered Process*.

The WebGIS is designed to introduce, to present, and to give access to the products developed by SENSAGRI's scientific partners. This WebGIS serves as a showcase of SENSAGRI project, to link with further related research works and publications. It also serves as a facilitation tool during the User Centered Process.

The WebGIS collected feedback from SENSAGRI partners who requested several changes. Some of those features have been already planned and implemented and allow a simple experience of SENSAGRI products. The list of WebGIS current features devised mainly for communication purposes are: Shortcut to test sites; products overlay; pixel information; time slider; distance and area measurement tools; quality information of products; Scale; publications references; Show Living Lab aspects (Mid-users, experimentation sites).

In the last year of the project, SENSAGRI's WebGIS aimed at evolving towards a more interactive platform. This Interactive version will include some advanced and ergonomic features, such as: Vector manipulation (draw, save, clip & download, etc.); Import vector files (shapefile format); average product information tool; WMS fed with SENSAGRI products and integration of other existing Copernicus Products.

3.4.3. Living Lab process

The LL, as the central instrument in the exploitation strategy of SENSAGRI, has been described earlier in this document (in section 2.4) and in the corresponding deliverables (D8.1, D8.8, D8.12 and D8.23).

3.4.4. Conferences, workshops and events

During the last year of the project, the presentation of SENSAGRI, as a whole or by services was promoted in several events. All partners tried to strength the presence of SENSAGRI in order to get maximum outreach. More information on the attendance of project partners to conferences, workshops and events can be checked in the website news or in D8.18. As outlined in section 3.3 of this document, the conferences or workshops related with the implementation of agricultural monitoring are especially relevant. Five of the more relevant are listed below, although the list is not exhaustive.

- 2019 JRC workshop on checks and management of agricultural land in IACS
- Panta Rhei conference 2019
- ESA Living Planet Symposium 2019
- IGARSS 2019
- Copernicus for agri-environmental applications workshop 2019

3.4.5. Other dissemination and communication tools

A divulgation brochure of the SENSAGRI project was published in the journal *Impact* in November 2018. SENSAGRI joined twitter in October 2018. Both dissemination and communications tools are available through the SENSAGRI web page.

4. Exploitation scenarios beyond the project ending

Depending on the level of maturity of the services developed in SENSAGRI, different exploitation alternatives could be envisaged once the project is ended. These exploitation alternatives could involve individual services or a combination of services, and the intensity of the links with the Copernicus programme could vary. This section describes the main alternatives proposed for the exploitation of the services beyond the project life.

4.1. Standalone software

In this exploitation scheme, the software would be distributed under an individual license. The user could download/ install the software in any computer and would be able to use it for a limited number of images, so that after the initial license expires, the user would need to update it.

The software could not be used for commercial activities. The license agreement would have an explicit condition that the software is not for resale.

Because the software is licensed free of charge, there is no warranty of the program to the extent permitted by applicable law.

When the software was fully developed with a Proprietary programming language (such as the case of LAI prototype, with MATLAB), the whole code could be compiled and prepared to be executed as a standalone. In this case, the user would not need to have the Proprietary software installed.

In case the user is publishing or communicating some output obtained from the software, he/she should acknowledge both SENSAGRI project and the EU funding.

4.2. DIAS

The initial exploitation approach of SENSAGRI was centred in the preparation of prototypes that would be integrated in the Copernicus operational processing chains, as new core services in its Land Pan-European component.

However, especially after the announcement of the new orientation of the Common Agricultural Policy monitoring, to be implemented from 2020 on, an exploitation based on the implementation of the prototypes in user tailored toolboxes (namely through the Copernicus DIAS) arises as a very promising approach, which deserves to be explored within the SENSAGRI timeline.

DIAS are online platforms which would be able to allow users to obtain SENSAGRI products for specific areas and time frameworks. CESBIO has started an initial negotiation with ATOS (in the framework of H2020 EO4AGRI), to explore the possibility to implement their crop mapping prototype (SCM) in the Mundiwebservices DIAS . Some key points need to be addressed and or clarified:

- To what extent all software and algorithms will be freely and openly provided by the beneficiaries?
- How much does this service costs?
- If the algorithm/software will be exploited, meaning that the DIAS will take economic profit, consider protection of the algorithms and products before exploitation (obligation as mentioned in Grant Agreement, Article 27).

4.3. Other mid-user platforms

Besides the main goal, which is the operationalisation in the context of Copernicus, the SENSAGRI prototypes could be integrated in other mid-user platforms. The LL experience has shown the potential for an integration of SENSAGRI processing chains in stakeholders' platforms and tools. One example could be the integration of the SSM processor in the hydrologic modelling tools of the *Consorzio per la Bonifica de la Capitanata* (CBC), the water authorities of the irrigation district of the Foggia province (Italy).

This type of integration would require specific exploitation agreements with the corresponding institutions.

4.4. Copernicus core services

In case the SENSAGRI prototypes were selected as new Copernicus core services (in the Land Pan European component), a contract in terms of exploitation and property rights should be arranged for that purpose with the Copernicus Entrusted Entities.

4.5. Potential for downstream applications

The SENSAGRI prototypes could be the base for the development of different types of applications. Some of these potential applications are listed in Table 4.

The use of SENSAGRI processing chains in the framework of commercial applications will require to set exploitation agreements with the companies implementing the application, in one of the licensing terms described in section 5 of this document.

Table 8. Potential downstream applications based on SENSAGRI services.

SENSAGRI services	Innovation potential/concepts	Market Target groups	Impact
• SSM service • LAI service • Crop type mapping service • Tillage change service • Irrigated/not-irrigated maps • Crop rotation maps • Dry biomass/yield service	• Precision irrigation system • Precision fertilizer system • Precision seedling system • Pest risk warning system • Crop status monitoring system • Drought warning system • Harvest/yield forecasting service • Field crop monitoring system	• Companies and farms in the business of Precision/smart farming • Agri-Food Industries that manage their supply directly from the field (e.g., sugar companies, winery, chips manufacters, frozen vegetable companies). • Software houses and apps developer companies • Rate variable equipment technology industries	• Sensing apps • Monitoring appsIntegration with other farm sensors: smart farm systems • Integration into agribots, tractors

5. IPR and knowledge management

This section describes the IPR and knowledge management strategy proposed for the SENSAGRI prototypes, for its exploitation beyond the project end.

5.1. CNR – WP3: SENSAGRI SSM service – IPR in proposed exploitation scenarios

The main outcomes that would be subject to a software license agreement are the SSM retrieval algorithms and software (hereinafter Software), which allow the automatic processing and retrieval of Surface Soil Moisture from Sentinel S1 and S2 images. Sentinel images are provided in an open/free basis. As previously mentioned, CNR holds the intellectual property rights and ownership of the Software.

The Software consists of two parts, the core (written in IDL language) and the add-on (auxiliary scripts written in Bourne shell language).

A software license is an agreement between developer/owner and user on how a software product can be used. This convention/contract acts as an explicit statement of the owner's will, defining in one hand (1) the permitted uses and restrictions of the software, and on the other hand (2) grants the user the legal rights to use the software.

What follow are the terms of the license for the core and the add-on part of the software.

Core part

Core software exploitation or distribution should be under the terms and conditions defined in the license agreement, which should be outlined so that the protection of the results would not be compromised (according to Article 27 GA). Currently, the software output is unique on the market and potentially profitable for CNR. Due to the innovative and operational applicability of the SSM software, it is reasonable and justifiable to protect the software. Also, protecting the software for an appropriate period of time would ensure its use in further research activities, developing an improved SSM product, and the later exploitation of the results. Following the GA guidelines concerning the exploitation and protection of the results, CNR proposes to keep the core software **close-source**, meaning that in the license agreement the copyright belongs exclusively to CNR. Therefore, no access or modification of the code would be allowed.

Add-on part

The add-on part is distributed under the terms of an open source BSD license as follows:
Copyright 2017-2019 CNR IREA <giuseppe.satalino@cnr.it>

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At the same time and in line with the objective of the SENSAGRI proposal, any user who previously accept the terms and conditions of the license agreement, can **freely** download and execute the software, as long as a proper use is made, which excludes commercial distribution or derivative uses.

Three possible exploitation scenarios are proposed:

1. *DIAS*

The DIAS are cloud computing service providers, which distribute, through an online platform, all the open-free Sentinels data made available by the Copernicus programme. In addition, they offer users the possibility to obtain added-value products, based on Sentinel data, on a commercial basis. The users can use the cloud service to implement and execute their own processing chains, paying for a certain allocation of resources (memory, storage, processing time…), under two exploitation schemes: either an *Infrastructure as a Service* (IaaS), in which the user has a higher control on resources usage, or a *Platform as a Service* (PaaS), in which the user uses an interface and does not need to worry on resources management.

A third exploitation scheme in the DIAS is the *Software as a Service* (SaaS), in which the platform does have already a built-in software for obtaining added-value products from Copernicus data. In this case the user could connect to the application software through the Internet on a subscription basis.

The exploitation of SENSAGRI SSM service in the DIAS is envisaged as a SaaS. An agree needs to be reached with the companies owning the DIAS, to establish the exploitation terms of the software, respecting the IPR policy defined for a standalone use of the software. In other words, the terms and conditions applicable must be defined in the contractual agreement between the developer/owner of the software (CNR), who has conceptualized and developed the retrieval software, and the company/entity in charge of the exploitation.

The company shall accept that CNR will hold all intellectual property rights in the software. Therefore, the company shall not claim any ownership. Regarding the confidentiality, the company shall not disclose to any third-party details of the software's code or any other relevant specifications.

The company may demand distribution conditions or user requirements to access the service. In this regard, the company may charge the user for using such service. These charges should be based on their usage of services (allocated memory, computing time…). By no means, the user would pay for the software application.

2. *Standalone (direct downloading)*

The core software would be distributed under an individual license. The user could download/ install the software in any computer and would be able to use it for a limited number of images, so that after the initial license expires, the user would need to update it.

The software could not be used for commercial activities. The license agreement would have an explicit condition that the software is not for resale.

Because the software is licensed free of charge, there is no warranty of the program to the extent permitted by applicable law.

The software was fully developed within IDL (Proprietary programming language and the user will need to have IDL or IDL VM installed to execute.

In case the user is publishing or communicating some output obtained from the software should acknowledge both SENSAGRI project and the EU funding.

3. *Copernicus core service*

In this case, the terms and conditions for the exploitation of the service, must be agreed with the EC, in the context a procurement issued with that purpose.

5.2. UVEG – WP4: SENSAGRI LAI service – IPR in proposed exploitation scenarios

The main outcomes that would be subject to a software license agreement are the LAI retrieval algorithms and software (hereinafter Software), which allow the automatic processing and retrieval of LAI*green* and LAI*brown* from S2 images. S2 images are provided in an open-free basis. As previously mentioned, UVEG holds the intellectual property rights and ownership of the Software.

A software license is an agreement between developer/owner and user on how a software product can be used. This convention/contract acts as an explicit statement of the owner's will, defining in one hand (1) the permitted uses and restrictions of the software, and on the other hand (2) grants the user the legal rights to use the software.

Software's exploitation or distribution should be under the terms and conditions defined in the license agreement, which should be outlined so that the protection of the results would not be compromised (according to Article 27 GA). Currently, the software output is unique on the market and potentially profitable for UVEG. Due to the innovative and operational applicability of the LAI software, is reasonable and justifiable to protect the software. Also, protecting the software for an appropriate period of time would ensure its use in further research activities, developing an improved LAI product, and the later exploitation of the results. Following the GA guidelines concerning the exploitation and protection of the results, UVEG proposes to keep the software **close-source**, meaning that in the license agreement the copyright belongs exclusively to UVEG. Therefore, no access or modification of the code would be allowed.

At the same time and in line with the objective of the SENSAGRI proposal, any user who previously accept the terms and conditions of the license agreement, can **freely** download and execute the software, as long as a proper use is made, what excludes commercial distribution or derivative uses.

Three possible exploitation scenarios are proposed:

1. *DIAS*

The DIAS are cloud computing service providers, which distribute, through an online platform, all the open-free Sentinels data made available by the Copernicus programme. In addition, they offer users the possibility to obtain added-value products, based on Sentinel data, on a commercial basis. The users can use the cloud service to implement and execute their own processing chains, paying for a certain allocation of resources (memory, storage, processing time…), under two exploitation schemes: either an *Infrastructure as a Service* (IaaS), in which the user has a higher control on resources usage,

or a *Platform as a Service* (PaaS), in which the user uses an interface and does not need to worry on resources management.

A third exploitation scheme in the DIAS is the *Software as a Service* (SaaS), in which the platform does have already a built-in software for obtaining added-value products from Copernicus data. In this case the user could connect to the application software through the Internet on a subscription basis.

The exploitation of SENSAGRI LAI service in the DIAS is envisaged as a SaaS. An agree needs to be reached with the companies owning the DIAS, to establish the exploitation terms of the software, respecting the IPR policy defined for a standalone use of the software. In other words, the terms and conditions applicable must be defined in the contractual agreement between the developer/owner of the software (UVEG), who has conceptualized and developed the retrieval software, and the company/entity in charge of the exploitation.

The company shall accept that UVEG will hold all intellectual property rights in the software. Therefore, the company shall not claim any ownership. Regarding the confidentiality, the company shall not disclose to any third-party details of the software's code or any other relevant specifications.

The company may demand distribution conditions or user requirements to access the service. In this regard, the company may charge the user for using such service. These charges should be based on their usage of services (allocated memory, computing time…). By no means, the user would pay for the software application.

2. *Standalone (direct downloading)*

The software would be distributed under an individual license. The user could download/ install the software in any computer and would be able to use it for a limited number of images, so that after the initial license expires, the user would need to update it.

The software could not be used for commercial activities. The license agreement would have an explicit condition that the software is not for resale.

Because the software is licensed free of charge, there is no warranty of the program to the extent permitted by applicable law.

The software was fully developed within MATLAB (Proprietary programming language). However, the whole code could be compiled and prepared to be executed as a standalone. In this case, the user would not need to have MATLAB installed.

In case the user is publishing or communicating some output obtained from the software should acknowledge both SENSAGRI project and the EU funding.

3. *Copernicus core service*

In this case, the terms and conditions for the exploitation of the service, must be agreed with the EC, in the context a procurement issued with that purpose.

5.3. UPS-CESBIO – WP5: SENSAGRI Crop Mapping service – IPR in proposed exploitation scenarios

The main outcomes that would be subject to a software license agreement are the crop mapping algorithms and the classification processing chain software (hereinafter Softwares), which allow the automatic classification of Sentinel's images. UPS-CESBIO holds the intellectual property rights and ownership of the Softwares. The classification software is centralized around a command line interface coded in python that pilots several modules coded in C++. Those modules make an intensive use of the Orfeo Tool Box (OTB) library developed by the CNES. The software can be installed on a Linux platform with the following dependencies:

- gcc (4.8.5)
- cmake (3.9.1)
- python (2.7.5 with numpy, scypyi, matplotlib and gdal libraries.)
- mpirun (3.0.4)
- pdflatex

The given versions correspond to the ones tested during the software development. Slightly lower versions for those dependencies might still work but have not been tested. The OTB library is not part of the dependencies because it comes as part as the Sensagri Classification Chain Software and it is installed with it. Therefore, the IPR of the OTB also need to be respected.

A software license is an agreement between developer/owner and user on how a software product can be used. This convention/contract acts as an explicit statement of the owner's will, defining in one hand (1) the permitted uses and restrictions of the software, and on the other hand (2) grants the user the legal rights to use the software.

Software's exploitation or distribution should be under the terms and conditions defined in the license agreement, which should be outlined so that the protection of the results would not be compromised (according to Article 27 GA). Currently, the software output is unique on the market and potentially profitable for UPS-CESBIO. Due to the innovative and operational applicability of the classification processing chain, is reasonable and justifiable to protect them. Also, protecting the software for an appropriate period of time would ensure its use in further research activities, developing an improved crop mapping products, and the later exploitation of the results.

Following the GA guidelines concerning the exploitation and protection of the results, UPS-CESBIO proposes to keep the softwares **close-source**, meaning that in the license agreement the copyright belongs exclusively to UPS-CESBIO. Therefore, no access or modification of the code would be allowed.

At the same time and in line with the objective of the SENSAGRI proposal, any user who previously accept the terms and conditions of the license agreement can **freely** download and execute the softwares, as long as a proper use is made, what excludes commercial distribution or derivative uses.

Three possible exploitation scenarios are proposed:

1. *DIAS*

The DIAS are cloud computing service providers, which distribute, through an online platform, all the open-free Sentinels data made available by the Copernicus programme. In addition, they offer users

the possibility to obtain added-value products, based on Sentinel data, on a commercial basis. The users can use the cloud service to implement and execute their own processing chains, paying for a certain allocation of resources (memory, storage, processing time…), under two exploitation schemes: either an *Infrastructure as a Service* (IaaS), in which the user has a higher control on resources usage, or a *Platform as a Service* (PaaS), in which the user uses an interface and does not need to worry on resources management.

A third exploitation scheme in the DIAS is the *Software as a Service* (SaaS), in which the platform does have already a built-in software for obtaining added-value products from Copernicus data. In this case the user could connect to the application software through the Internet on a subscription basis.

The exploitation of SENSAGRI crop mapping processing chain in the DIAS is envisaged as a SaaS. An agree needs to be reached with the companies owning the DIAS, to establish the exploitation terms of the software, respecting the IPR policy defined for a standalone use of the software. In other words, the terms and conditions applicable must be defined in the contractual agreement between the developer/owner of the software (UPS-CESBIO), who has conceptualized and developed the retrieval software, and the company/entity in charge of the exploitation.

The company shall accept that UPS-CESBIO will hold all intellectual property rights in the software. Therefore, the company shall not claim any ownership. Regarding the confidentiality, the company shall not disclose to any third-party details of the software's code or any other relevant specifications.

The company may demand distribution conditions or user requirements to access the service. In this regard, the company may charge the user for using such service. These charges should be based on their usage of services (allocated memory, computing time…). By no means, the user would pay for the software application.

2. *Standalone (direct downloading)*

The core software would be distributed under an individual license. The user could download/ install the software in any computer and would be able to use it for a limited number of images, so that after the initial license expires, the user would need to update it.

The software could not be used for commercial activities. The license agreement would have an explicit condition that the software is not for resale.

Because the software is licensed free of charge, there is no warranty of the program to the extent permitted by applicable law.

Assuming the software is installed on a platform that fulfils the required dependencies, it can be executed as a standalone. In case the user is publishing or communicating some output obtained from the software should acknowledge both SENSAGRI project and the EU funding.

3. *Copernicus core service*

In this case, the terms and conditions for the exploitation of the service, must be agreed with the EC, in the context a procurement issued with that purpose.

5.4. UPS-CESBIO – WP6: SENSAGRI Biomass and yield service – IPR in proposed exploitation scenarios

The main outcomes that would be subject to a software license agreement are the biomass and yield retrieval algorithms and softwares (hereinafter Softwares), which allow the automatic processing and retrieval of biomass and yield from S2 images but also to CO_2 fluxes and C budgets. UPS-CESBIO holds the intellectual property rights and ownership of the Softwares. Two versions of the Softwares exists; SAFY-CO2 that allows estimates of biomass, yield and of the components of the C budget of croplands (i.e. photosynthesis, plant & soil respiration, net CO_2 flux, C exports at harvest) and SAFYE-CO2 that allows retrieval of the previous variables as well as evapotranspiration and soil water content. This later version allows accounting of soil water stress on biomass and yield production.

A software license is an agreement between developer/owner and user on how a software product can be used. This convention/contract acts as an explicit statement of the owner's will, defining in one hand (1) the permitted uses and restrictions of the software, and on the other hand (2) grants the user the legal rights to use the software.

Software's exploitation or distribution should be under the terms and conditions defined in the license agreement, which should be outlined so that the protection of the results would not be compromised (according to Article 27 GA). Currently, the software output is unique on the market and potentially profitable for UPS-CESBIO. Due to the innovative and operational applicability of the SAFY-CO2 and SAFYE-CO2 softwares, is reasonable and justifiable to protect them. Also, protecting the software for an appropriate period of time would ensure its use in further research activities, developing an improved biomass and yield products, and the later exploitation of the results.

Following the GA guidelines concerning the exploitation and protection of the results, UPS-CESBIO proposes to keep the softwares **close-source**, meaning that in the license agreement the copyright belongs exclusively to UPS-CESBIO. Therefore, no access or modification of the code would be allowed.

At the same time and in line with the objective of the SENSAGRI proposal, any user who previously accept the terms and conditions of the license agreement, can **freely** download and execute the softwares, as long as a proper use is made, what excludes commercial distribution or derivative uses.

Three possible exploitation scenarios are proposed:

4. *DIAS*

The DIAS are cloud computing service providers, which distribute, through an online platform, all the open-free Sentinels data made available by the Copernicus programme. In addition, they offer users the possibility to obtain added-value products, based on Sentinel data, on a commercial basis. The users can use the cloud service to implement and execute their own processing chains, paying for a certain allocation of resources (memory, storage, processing time…), under two exploitation schemes: either an *Infrastructure as a Service* (IaaS), in which the user has a higher control on resources usage, or a *Platform as a Service* (PaaS), in which the user uses an interface and does not need to worry on resources management.

A third exploitation scheme in the DIAS is the *Software as a Service* (SaaS), in which the platform does have already a built-in software for obtaining added-value products from Copernicus data. In this case the user could connect to the application software through the Internet on a subscription basis.

The exploitation of SENSAGRI biomass and yield service in the DIAS is envisaged as a SaaS. An agree needs to be reached with the companies owning the DIAS, to establish the exploitation terms of the

software, respecting the IPR policy defined for a standalone use of the software. In other words, the terms and conditions applicable must be defined in the contractual agreement between the developer/owner of the software (UPS-CESBIO), who has conceptualized and developed the retrieval software, and the company/entity in charge of the exploitation.

The company shall accept that UPS-CESBIO will hold all intellectual property rights in the software. Therefore, the company shall not claim any ownership. Regarding the confidentiality, the company shall not disclose to any third-party details of the software's code or any other relevant specifications.

The company may demand distribution conditions or user requirements to access the service. In this regard, the company may charge the user for using such service. These charges should be based on their usage of services (allocated memory, computing time…). By no means, the user would pay for the software application.

5. *Standalone (direct downloading)*

The core software would be distributed under an individual license. The user could download/ install the software in any computer and would be able to use it for a limited number of images, so that after the initial license expires, the user would need to update it.

The software could not be used for commercial activities. The license agreement would have an explicit condition that the software is not for resale.

Because the software is licensed free of charge, there is no warranty of the program to the extent permitted by applicable law.

The software was fully developed within MATLAB (Proprietary programming language). However, the whole code could be compiled and prepared to be executed as a standalone. In this case, the user would not need to have MATLAB installed.

In case the user is publishing or communicating some output obtained from the software should acknowledge both SENSAGRI project and the EU funding.

6. *Copernicus core service*

In this case, the terms and conditions for the exploitation of the service, must be agreed with the EC, in the context a procurement issued with that purpose.

5.5. Strategy for knowledge management and protection

Data management and dissemination of knowledge are important to nurture collaboration, to accelerate innovation and to involve the final users that are interested in Copernicus services.

Intellectual property rights (IPR) ownership and user rights were initially discussed among partners in terms of identifying how the consortium intends to protect, share, manage and exploit IPR, since the beginning and throughout the entire duration of the project. The management of the Intellectual Property Rights (IPR) in the SENSAGRI project is a specific activity in WP8, where a consortium IPR Strategy and Protocol needs to be developed.

The main activities that are subject to the IPR strategy are the development of algorithms/software and methodologies (WP 2-6). For all of them, the respective proprietary of software and algorithms will be controlled and protected accordingly through Copyrighting and Patenting. Initially, SENSAGRI agreed to provide the software modules developed in the frame of the project under free and open

source license to non-commercial uses. However, as already addressed before, protection of results is indeed essential in Horizon 2020, since an effective exploitation depends on it. Thus, beneficiaries must assess the possibility of protecting their results once these are generated. In this line, still need to be discussed if this may compromise the exploitation plan and the protection of the results. Users can benefit from the project outcomes, by obtaining freely the remote sensing derived products without accessing to the core software modules. Main options are summarized in Table 5.

Table 9. Options for accessing background and results (modified from IPR H2020 guidelines)

Project stage	Access to background	Access to results
Implementation of project	Royalty-free, unless otherwise agreed by participants before their accession to the grant agreement	Royalty-free
Exploitation of owned project results		Subject to agreement, access rights shall be granted under fair and reasonable conditions (which can be royalty-free)

The conditions for making available, for exploitation (commercial use), the results to the contractors and service providers will be stated case by case. As a general statement it should be noted that the results of the SENSAGRI project will as much as possible be made available to the external community as public domain material so that the EU and a wider audience can benefit from the outcomes of the project.

Regarding the Web Mapping Service, maps are already available through the website using standard, Copernicus-compatible Open Geospatial Consortium (OGC) interfaces for Web Map Service. The webGIS provides a time series collection of the available up-to-date SENSAGRI products over the four SENSAGRI test sites.

5.6. Policy options for field data exploitation

The field data, obtained by the different partners within the SENSAGRI project, needs to be treated with a specific policy, considering its potential exploitation beyond the project end, especially in the framework of its scientific use. The SENSAGRI Consortium adopted an open license for all data produced by the Consortium during the project term. The standard license chosen is the well-known CC BY-NC 4.0, whose legal terms are described in [W4]. This license cover only data produced or derived by the project Consortium and each partner retains its authorship about the data (s) they produced for attribution to be used. An embargo period of 12 (twelve) months from the end of the project for general distribution outside the project Consortium partners is considered to be fair, in order to allow completion of the reviewing processes of peer-reviewed publications. Access to all data by partners is not subjected to any embargo or limitation, but for respecting the above license terms or any other specific license adopted. Distribution of data through the project data repository without an accompanying license is not admitted, and the default CC BY-NC 4.0 will be considered as automatically adopted. Specifications on the data management plan for each SENSAGRI product and dataset type are described in D2.07.

Several aspects of the data exploitation policy need to be defined:

1. Dataset custodianship after project end:
The data will be accessible in accordance with the data policy agreed within SENSAGRI and reported in D2.07.

2. Data access:
Field data could be accessible to registered users in accordance with agreed data policies. Data access for registered users could be provided through a web-GIS portal. The prospective user could be required to provide justification for the data request.

3. Data storage and protection:
So far, the data is stored in SENSAGRI CNR-IREA repository and it is only available through user credentials. It should be clarified if the SENSAGRI data repository will be kept in the project repository, held and maintained by CNR-IREA. In any case it should be stored in a secure database and in line with European General Data Protection Regulations.

4. License options:
SENSAGRI users must fully acknowledge the use of SENSAGRI data and the original data provider(s) in any publications arising from the use of the data. Email requests will be sent to the owner before release. The use of data is limited to non-commercial activities. Also, interested users should contact the original data provider for approval at an early stage where there is an intent to use their data in publications. Co-authorship is not strictly required, but should be offered particularly where a publication draws heavily on data from one or more providers. This license option is the best way to safeguard a proper acknowledgement of the intense work done in ground data collection and quality control.

Reference documents

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