My Sustainable Forest

Earth observation services for silviculture

D6.10 STAKEHOLDERS WORKSHOP 1 REPORT

MYSUSTAINABLEFOREST

Project no.	776045
Project title	MySustainableForest
Project acronym	MySustainableForest
Start date of project	1 November 2017
Duration of project	36 months
Deliverable	D07 D6.10
Due date of deliverable	30/03/2018
Actual submission date	30/04/2019
Organisation name of lead contractor for this deliverable	GMV
Dissemination level	Public

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776045

Code:	D07 D6.10
Version:	v2
Date:	30/04/2019
Internal code:	GMV 24682/17 V1/17 V2/19

TECHNICAL REFERENCES

Project Acronym	MySustainableForest
Project Title	Operational sustainable forestry with satellite-based remote sensing
Project Coordinator	Julia Yagüe GMV mjyague@gmv.com
Project Duration	1 Nov 2011 – 30 Oct 2021 (36 months)
Grant Agreement	No. 776045

Deliverable Number	D07 – D6.10
Dissemination Level	PU
Workpackage	WP 6 Outreach, Dissemination and Exploitation
Task	T6.2 End-Users Engagement and Stakeholders Board Coordination
Lead beneficiary	GMV
Contributing beneficiary (ies)	RAIZ CFRI UFE FORESNA FOAL CNPF MADERA+ FORA EFI GUK
Due date of deliverable	30/03/2017
Actual submission date	06/04/2018

DOCUMENT STATUS SHEET

Version	Date	Pages	Changes
V1	13/03/2018	27	First version of the document
V2	30/04/2019		Second version after M9 RV1 meeting

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. INTRODUCTION

1.1. PURPOSE

This document corresponds to **Deliverable D07 D6.10 Stakeholders Workshop-1 Report** of MySustainableForest H2020 Project.

The **Stakeholders Workshop-1** took place in in Brussels on the 13th of March 2018, hosted at The European Forestry House, 66, rue du Luxembourg, BE-1000 Brussels.

Workshop was announced and managed through a dedicated web page

The objectives of the workshop, agenda, attendants and minutes of the session are included in this report.

MySustainableForest seeks a new form of sustainable forest management that operatively incorporates satellite-derived information into the everyday decision-making processes of foresters, whatever management perspective they prioritize at each site (productive, conservational, recreational…).

1.2. SCOPE

This document is structured according to:

- Section 1, (present chapter) defines the purpose of the document and the project overview.
- Section 2, includes the list of applicable documents and additional references to be taken into account during the project life cycle. It also contains the list of acronyms used in this document
- Section 3, presents an overview of all the workshops to be carried out during the project life cycle
- Section 4, recalls Workshop 1 objectives, the agenda and the list of attendants.
- Section 5, registers and highlights the key subjects dealt with during the Workshop's discussions
  - The role of actors involved
  - The stakeholders needs and challenges
  - The regulatory Items
  - The Portfolio of services, to date
- Section 6, corresponds with Annex 1 which lists the metadata used by EARSC (European Association of Remote Sensing Companies) for the definition of EO based industrial services, assumed in the project portfolio of services

2. APPLICABLE AND REFERENCE DOCUMENTS

2.1. APPLICABLE DOCUMENTS

The following documents, of the exact issue shown, form part of this document to the extent specified herein. Applicable documents are those referenced in the Contract or approved by the Approval Authority.

Table 2-1. Applicable Documents

Ref.	Title	Code	Version	Date
[AD.1]	Grant Agreement Nº 776045—MySustainableForest	Ares(2017)5215238	1.0	25/10/2017
[AD.2]	D01_D1.1_Project Plan	D01_D1.1	1.0	30/11/2017

2.2. REFERENCE DOCUMENTS

The following documents, although not part of this document, amplify or clarify its contents. Reference documents are those not applicable and referenced within this document. They are referenced in this document in the form [RD.X]:

Table 2-2. Reference Documents

Ref.	Title	Code	Version	Date
[RD.1]				

2.3. ACRONYMS AND DEFINITIONS

The following acronyms have been used across this document:

Table 2-3. Acronyms

Acronym	Full term
AD	Applicable document
AOI	Area of Interest
API	Application programming interface
ASCII	American Standard Code for Information Interchange
DMP	Data management plan
DWH	European Space Agency Data Warehouse
EARSC	European Association of Remote Sensing Companies
EFH	European Forestry House
EO	Earth Observation
EOM	Earth Observation Merlyn Platform
EPS	Ecosystem Regulating Services (ERS)
ERS	Ecosystem Provision Services (timber production)
ESA	European Space Agency
EULA	End-User License Agreement
GDB	Geo Data Base
GIS	Geographic Information System
IPR	Intellectual Property Right
KOM	Kick-off meeting

Acronym	Full term
LIDAR	Light Detection and Ranging
MOM	Minutes of Meeting
MSF	MySustainableForest Project
ORDP	Open Research Data Pilot
OS	Open source
OTH	Other items (WRT the project's documentation nomenclature)
PDPA	Payload Data Processing and Applications Business Unit at GMV
PMP	Project Management Plan
PoC	Point of contact
PR	Progress Report
RD	Reference document
REA	EC Research Executive Agency
REDMINE	Flexible project management web application
RS	Remote sensing
RTD	Research Technology and Development
SAR	Synthetic Aperture Radar
SB	Stakeholders Board
SFM	Sustainable Forest Management
STKH	Stakeholder
TBC	To be confirmed
TBD	To be defined
ToR	Terms of reference
TRL	Technology rediness level
UNAC	União da Floresta Mediterrânica
VHR	Very High Resolution
WKS	Workshop
WP	Work Package
WRT	With Reference To

Table 2-4. Definitions

Concept/Term	Definition
Service	In the context of MySustainableForest project, a "service" is an assembled system of products that support Sustainable Forest Management (SFM) and good forest practices. The project focusses upon six SFM services : 1. Forest Site Characterization 2. Wood Characterization 3. Biomass and CO2 stocking 4. Forest Condition 5. Ecosystem vulnerabilities 6. Socioeconomic Functions and Conditions
Product	In the context of MySustainableForest project, a "product" is an independent and complete component of a service; products are complete in themselves and provide a full set of information. However, single products, however valuable, have a limited usage and scope within SFM practices. E.g.: Products correspondent to Service 1 "Forest site Characterisation" are: ▪ Forest mask ▪ Stand delineation ▪ Linear Infrastructures ▪ Polygon infrastructures ▪ Point infrastructures ▪ Main forest types ▪ Stand height ▪ Forest age year of reference ▪ Forest age biannual updates ▪ Burnt scars reference ▪ Burnt scars 6- months updates ▪ Clearcuts reference ▪ Clearcuts 6-months updates ▪ Altitude ▪ Slope ▪ Aspect
Building Block	In the context of MySustainableForest project, a "building block" is a partial input needed to achieve a product and, thereafter, a service; building blocks are: ▪ EO INPUT DATA ▪ NON-EO INPUT DATA ▪ AUXILIARY DATA ▪ SATELLITE-BASED MODELS ▪ LIDAR-BASED MODELS ▪ WOOD QUALITY MODELS ▪ SOCIO-ECONOMIC MODELS ▪ DERIVED PRODUCTS

3. STAKEHOLDERS WORKSHOPS PURPOSE

MySustainableForest envisages the realisation of four Stakeholder's Workshops. Locations dates and objectives are given in Table 3-1 below.

Table 3-1. Stakeholder's workshops planned in the GA

Workshop Nº	Location	Date	Objective
1	Brussels	M4 (February 2018)	Raising awareness in the market
2	Zagreb	M13 (November 2018)	Debate the technological benefits shown in demonstrations
3	Portugal	M27 (January 2020)	Debate the technological benefits shown in demonstrations
4	Lithuania	M34 (August 2020)	Boosting the adoption of the MySustainableForest results through the analysis of strategic enablers and barriers.

The workshops are expected to support the project evolution for what concerns the following aspects

- To gather user requirements
- To progressively develop a customer base able to act as local ambassadors in their respective EU Forestry region.
- To obtain qualified information to overcome market barriers, expected when introducing the planned technological innovation in the EU market, i.e: economic and regulatory, competitors and customers demand barriers
- To interact with the training material development, as a test-bed and improvement ground

The budget distribution –with no specific assignation costs for the 4 stakeholder's workshops- led partners, since the KoM, to the organisation of local-national stakeholder's workshops, covered by the effort accounted for the dissemination outreach activities. As a result, the impact of the Workshops has had a multiplying effect: the 4 workshops planned in the proposal and listed in Table 3-1 above have been (or will be) complemented with the workshop s listed in Table 3-2 below.

Table 3-2. Stakeholders workshops planned at local/national level, to reach out stakeholders unable to attend workshops abroad

Workshop Nº	Location	Date	Objective
1	Pamplona	M6	Present products and services. Debate the technological benefits shown in demonstrations
2	Ourense	M9	Present products and services. Debate the technological benefits shown in demonstrations
3	France	M23	Present products and services. Debate the technological benefits shown in demonstrations
4	Barcelona	M30	Present products and services. Debate the technological benefits shown in demonstrations

5	Oxford	M36	Present products and services. Debate the technological benefits shown in demonstrations

4. STAKEHOLDERS WORKSHOP 1 OBJECTIVES, AGENDA, ATTENDANTS

4.1. OBJECTIVES PRESENTED TO THE STAKEHOLDERS

European forests are structured among private and public ownership almost in a 50/50 relationship. Therefore, the mobilization of both public and private forestry is key for the utilization of Coordinatestainable supply of wood resources through sustainable forest management.

Some challenges forest stakeholder's operations face are:

- Lack of information from private forest owners;
- Lack of updated and sufficiently accurate data from forest inventories suitable for sustainable forest management at local/regional levels, which implies that spatial analysis is still done mainly manually in many situations; and
- Growing importance of climate change related impacts especially coupled to the long term timing of forestry and its investment horizon

Satellite images facilitate addressing these challenges. Satellite Earth Observation (EO) provides information on different forest and tree stand parameters. EO data is exploited and managed at various spatial and temporal resolutions. These technologies support the definition of forestry operations and long term planning.

MySustainableForest is featuring six EO based services to manage forests in a more sustainable and efficient manner; services are:

1. Forest Site Characterization: Forest geometric and typology characterization
2. Wood Characterization: Looking at parameters such as wood stiffness and density
3. Biomass and CO2 stocking: Generating above ground biomass and CO2 stock estimations in view of the
4. Forest Condition
5. Ecosystem vulnerabilities: Flood risk, fire risk, erosion, habitat fragmentation, cultural values…
6. Socioeconomic Functions and Conditions

Each service shall be provided by means of a chain of operational blocks, handling multiple data sources, algorithms, a viewing interface, query systems, etc.

Services shall be implemented for areas of interest located in Portugal, France, Spain, Croatia, Czech Republic and Lithuania, see Figure 4-1. Local stakeholders linked to the forest industrial production shall take part in this and future project workshops as authorised voices of the expectations and goals to achieve with the services for an enhanced economic production in the sector.

The objective of the Stakeholders Workshop 1 is double fold:

From the side of the producers, the goal is to raise awareness of the EO based services and Products amongst the stakeholders

From the side of the forest stakeholders, the goal is to express their management needs, problems and expectations of introducing EO based management products into their daily silvicultural procedures

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776045

Areas of Interest

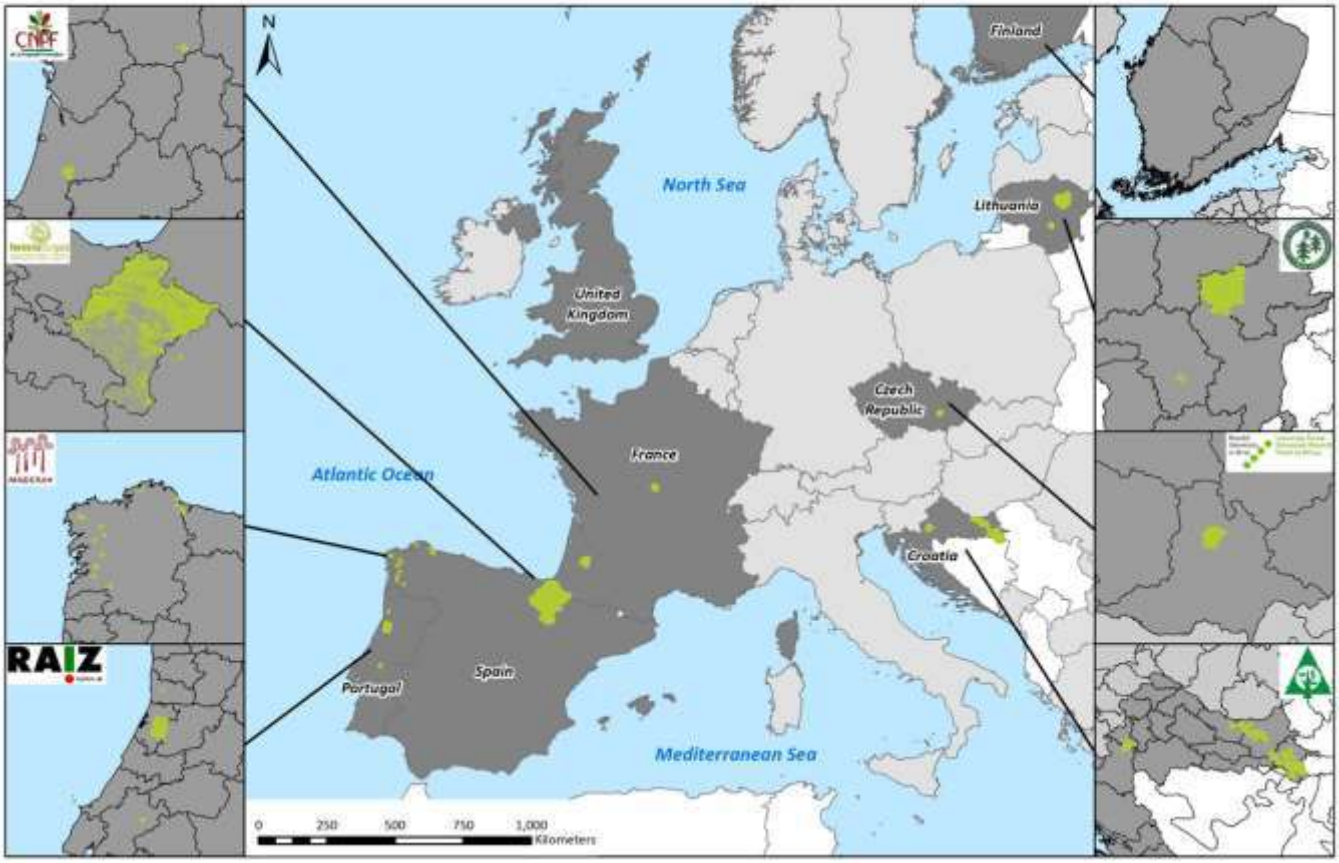


Figure 4-1. MySustainableForest AOIs chosen as service demonstration sites

4.2. AGENDA

Table 4-1. Agenda

10.00	Welcome, presentations and objectives Review of project status and open management issues
10.45	Presentation and Review of the Services definition level reached to date (per site) 1. Forest Site Characterization 2. Wood Characterization 3. Biomass and CO2 stocking 4. Forest Condition 5. Ecosystem Vulnerabilities 6. Socioeconomic Functions and Conditions Specifications per AOI: Croatia, Czech Republic, France, Lithuania, Portugal, Spain. Dialogue with guest stakeholders in terms of economic revenue for the exploitation processes and plans , Q & A
12.00	Review of the building blocks components per service chain
13.00	In-house finger lunch break
14.00	Presentation of the high-level architecture of the platform. Discussion of needs and requirements from the service chains and building blocks WRT the platform architectural needs
15.45	Proposals for the Stakeholders Board members. Per country member
16.45	Conclusions
17.00	End of meeting

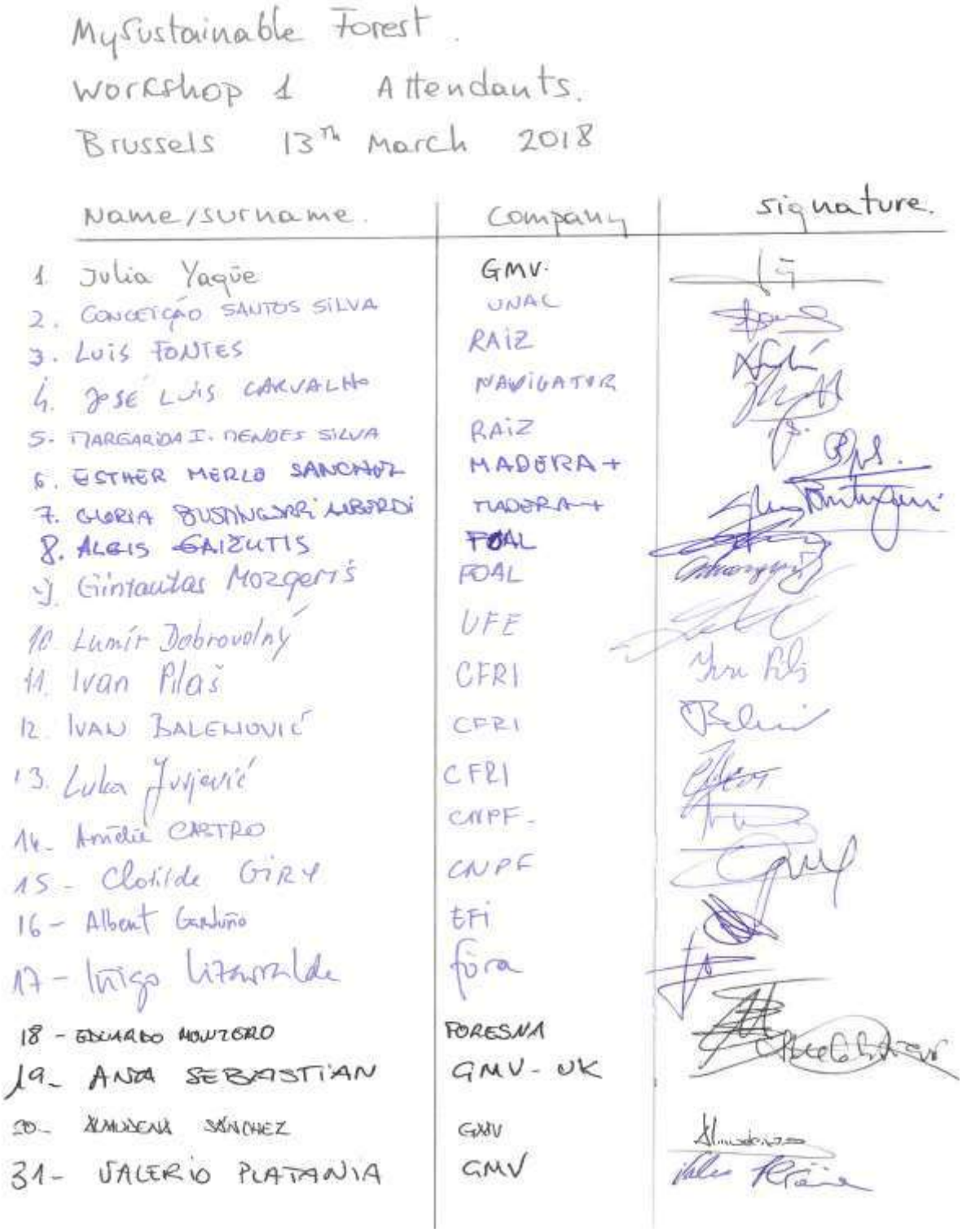
4.3. ATTENDANTS

Table 4-2. List of Attendants

Name	Surname	Filiation	Contact
1. Luka	Jurjevic	CFRI	lukaj@sumins.hr
2. Ivan	Balenović	CFRI	ivanb@sumins.hr
3. Ivan	Pilas	CFRI	ivanp@sumins.hr
4. Clotilde	Giry	CNPF	clotilde.giry@cnpf.fr
5. Amélie	Castro	CNPF	amelie.castro@crpf.fr
6. Albert	Garduño	EFI	albert.garduno@efi.int
7. Gintautas	Mozgeris	FOAL	gintautas.mozgeris@gmail.com
8. Algis	Gaižutis	FOAL	algis@forest.lt
9. Iñigo	Lizarralde	föra	inigo.lizarralde@fora.es
10. Eduardo	Montero	FORESNA	eduardomontero@foresna.org
11. Julia	Yagüe	GMV	mjyague@gmv.com
12. Almudena	Sánchez	GMV	asanchez@gmv.com
13. Ana	Sebastian	GMV-UK	asebastian@gmv.com
14. Gloria	Bustingorri	Madera +	gbustingorri@gmail.com
15. Esther	Merlo	Madera +	maderaplus@maderaplus.es

Name	Surname	Filiation	Contact
16. Jose Luis	Carvalho	Navigator	jose.luis.carvalho@thenavigatorcompany.com
17. Luis	Fontes	RAIZ	Luis.Fontes@thenavigatorcompany.com
18. Margarida	Silva	RAIZ	margarida.silva@thenavigatorcompany.com
19. Lumír	Dobrovolný	UFE	lumir.dobrovolny@slpkrtiny.cz
20. Conceição	Santos Silva	UNAC	mcssilva@unac.pt
21. Valerio	Platanía	GMV	vplatania@gmv.com

Table 4-3. Evidence of attendance. Signatures.



MySustainable Forest.
Workshop 1 Attendants.
Brussels 13th March 2018

	Name/surname.	Company	signature.
1.	Julia Yagüe	GMV.	
2.	CONCEIÇÃO SANTOS SILVA	UNAC	
3.	LUIS FONTES	RAIZ	
4.	JOSÉ LUIS CARVALHO	NAVIGATOR	
5.	MARGARIDA I. NEVES SILVA	RAIZ	
6.	ESTHER MERLO SANCHOZ	MADERA+	
7.	GLORIA BUSTINGORRI LIBORDI	MADERA+	
8.	ALGIS GAIŽUTIS	~~FOAL~~	
9.	Gintautas Mozgeris	FOAL	
10.	Lumír Dobrovolný	UFE	
11.	Ivan Pilaš	CFRI	
12.	IVAN BALENOVIĆ	CFRI	
13.	Luka Jurjević	CFRI	
14.	Amélia CASTRO	CNPF.	
15.	Clotilde GIRY	CNPF	
16.	Albert Garduño	EFI	
17.	Iñigo Liziarraide	fora	
18.	EDUARDO MONTERO	FORESNA	
19.	ANA SEBASTIAN	GMV-UK	
20.	ALMUDENA SÁNCHEZ	GMV	
21.	VALERIO PLATANIA	GMV	

5. STAKEHOLDERS WORKSHOP 1 REPORT

Actors Involved

The first ***MySustainableForest*** Stakeholders workshop, held at the **European Forestry House** in Brussels, gathered two action and complementary groups, introduced by the Project Manager Dr. Julia Yagüe:

First, the group of technology providers; namely IT companies that have developed advanced forest services based on remotely gathered data (satellite, LiDAR, sound wave non-invasive, statistic); the combination of these data with new processing and geo-spatial display platforms can be of great help for the territorial management of forests**. Project IT companies are**:

- GMV, that shall provide satellite based product;
- Föra Forest Technologies, that shall provide LIDAR based products;
- MADERA PLUS, that shall provide non-invasive wood quality products;
- EFI (European Forest Institute) that shall provide the socioeconomic analytical products.

Second, the project **forest stakeholders**, representing an array of actors who could eventually benefit from the project outcomes: forest owners associations, transformation industries, research centres, national forest policy centres, public administrations with forest reporting responsibilities, etc. Specifically, the following partners will test and validate the products issued by the IT companies:

- RAIZ, a large industrial wood producer and pulp transformer, they shall validate products for Portugal, in the context of Mediterranean forests and eucalypt plantations.
- CNPF, the French National Center of Forest Proprietors, that shall validate products for France, in the context of Atlantic and Mediterranean forests
- CFRI, the Croatian Forest Institute that handles the National Forest Policy shall validate the products for Croatia in the context of Mediterranean and waterlogged oak forests
- FORESNA, the forest owners association of Navarre that shall validate the products in Navarre, a strategic geolocation that joins Mediterranean, Atlantic and continental forests.
- UFE, the Faculty of Forestry and Wood Technology of the Mendel University in Brno shall validate the products for the Czech Republic in the context of continental forests
- FOAL, the Forest Owners Association of Lithuania shall validate the products for Lithuania in the context of continental forests

As **guest stakeholder,** RAIZ invited a most relevant Portuguese forest stakeholder: **UNAC - União da Floresta Mediterrânica,** represented by **Conceição Santos Silva.** UNAC represents the interests of forest owners in the Portuguese Mediterranean area. Through UNAC the forest owner organizations can adopt common positions concerning matters of strategic importance. UNAC's objectives are: Promotion of the Mediterranean's forest protection and rural development; Promotion and defense of the economic and social interests of the forest owners' organizations in the Mediterranean area; Coordination of the different association structures. The main areas of activity include: Technical and political action; Intervention in the cork sector; Forest fire defense; Technical support to the forest owners associations; Dissemination and provision of information; Forest certification; Investigation, development and research. This relationship and engagement action is an excellent sample of the impacting activities sought by ***MySustainableForest.***

UNAC representative pointed out how remote sensing could support forest stakeholders as well governments and public authorities in Portugal in addressing some of the challenges of information gathering around forests. Specifically, new geospatial technologies are needed to combat the wildfires tendency increase forest fires in Portugal and across the Mediterranean basin. She referred to pilot projects on habitat conservation in Natura 2000 sites using remote sensing on cork forests have been carried out in Serra de Monchique in Portugal.

To wrap up the introduction, Ana Sebastian and Julia Yagüe noted how, in the context of the European Commission, new EO-derived information on forests could serve multiple policies and strategies, e.g.

- Compliance assurance with EU Timber Regulation or the EU Nature Directives,
- The EU Bioeconomy Strategy which calls for operating the bioeconomy within safe ecological limits,
- The implementation of the forest objectives of the EU Biodiversity Strategy, or
- The monitoring of relevant objectives of the EU Forest Strategy.

Indeed, there are many technological advances in relation to data needs on forest structures and condition, forest biodiversity, forest carbon stocks and flows, and forest biomass – to name but the most policy relevant fields.

These examples show the promising developments of remote sensing and how new geospatial technologies can fill some of the major knowledge gaps on what is happening to the EU's forests. They would be to the benefit of Member States too, as there is the potential of getting reliable, up-to-date, fully harmonized and comparable information with limited resources ('in a cost-efficient way').

MySustainableForest services shall be provided through a Web Platform to the stakeholders. To this purpose, **Valerio Platania (GMV)** presented the high level architecture of **MySustainableForest** Processing Platform. Items referred include:

- In relation to the platform concept and features it consists of an online platform for data processing and visualization. Modules
  - Web Application
  - Multi-tenant: different organizations can have a "private" instance of the platform. Can be used for different Projects
  - Multi-user, users can be grouped per tenant
  - Hosted processing: some available processors + API for new development
  - Local data archive + Access to remote archives. Private cloud for user data access
  - Local Catalogue including processors, EO data products and non-space datasets
  - Integration of non-space data. Visualization and analysis of geo-tagged data
- Platform Funcionalities are:
  - Processing engine
  - User data visualization
  - EO products catalogue
  - Private cloud
  - Project home page
- Hosted Processing will be developed at a later stage In the project. Basic design assumptions include:
  - Processors are executables that run on a single machine in form of Docker containers
  - Pieces of data to be processed (e.g. a single EO product) must fit o a single machine
  - Data is shared between all the nodes
  - Parallelism is achieved by processing several products at the same time on different machines (nodes)
  - Two key components:
    - An orchestrator scheduler, running on each processing node, that is in charge of launching processors
    - A cluster manager, that abstract the hardware resources on the different processing nodes and manage them, assigning them to the processing scheduler
  - Approach of the platform in the project: Algorithms encapsulation, workflow definition, Integration in the platform, visualisation. Detailed explanation of the "docker-hub" functionalities.
- Special attention is given to the data specifications that affect the Service Platform architecture:
  - Input / Validation / Output

- File format
- Current volume of data and Yearly data volume expected increase
- Geographic system
- Spatial accuracy fields: Cartographic scale, sampling scale, sampling method, Pixel size (meters), Measurement / sampling density.
- Acquisition date
- Data owner
- Data territorial coverage
- Data licence/use terms
-

In the last five to seven years, **big-data platforms** have enabled the processing of EO data at unprecedented scales; an example worth noting is the Global Forest Cover data set (hosted at www.globalforestwatch.org) which maps forest cover losses annually at 30 m resolution for the entire globe. To a much humble scale, ***MySustainableForest*** platform looks to a reasonable position and credit in the world of forest managers.

As new satellite data, primarily from the Copernicus programme, become available and image analysis gets less costly through cloud-based platforms, we expect more EO-derived data sets on forest parameters to be released. New EO data sets and processing platforms present new opportunities to generate and assimilate these data sets and derive policy-relevant indicators on the state of Europe's forest.

Stakeholders Needs

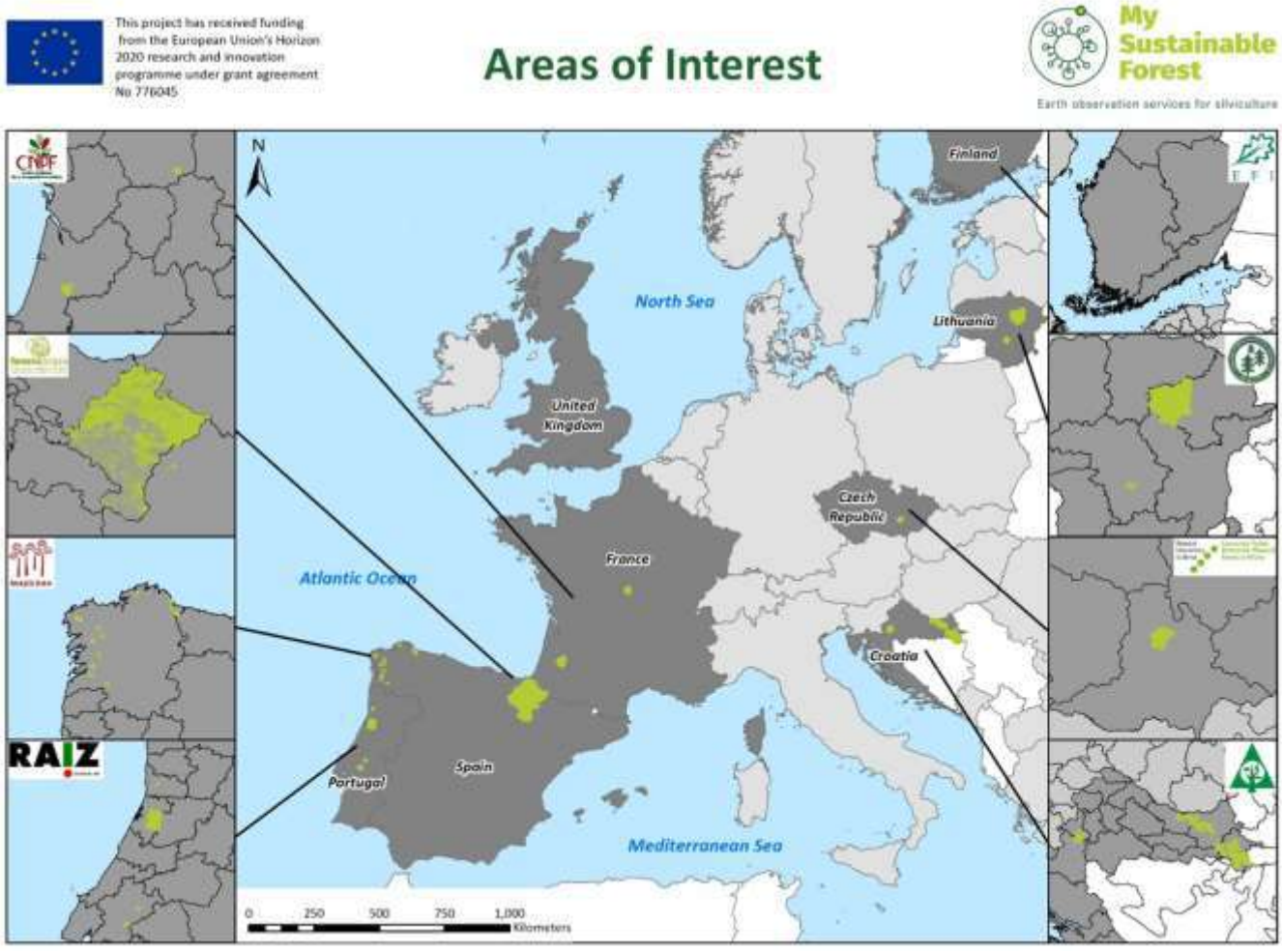


Figure 5-1 Location of AOIs per Stakeholder

A **"round the table" discussion** was elicited by the Project Manager, Julia Yagüe, across the **stakeholders to review the specific forest managerial needs** or service requirements found in their chosen Areas of Interest (AOIs).

Each stakeholder expressed their service needs in reference to the challenges they face, natural, socio-economic, technological, and biological or any other type:

Dr. Ivan Pilas, from **CFRI**, **the Croatian Forest Institute,** pointed out the needs for the two test sites in Croatia, namely:

The need to monitor and control the high quality timber Production at the Pokupsko River Basin through holistic **Ecosystem Provisioning Services**. The interest is set on the **technological support to forest inventories** in Croatia which are carried out every 10 years through time-consuming and labour-intensive field sampling. More frequent updated and spatially explicit information on forests (e.g. growing stock) is vital for the sustainable management as well as additional information (e.g. biomass, CO2 stock) that currently are not encompassed in inventories.

The need to **manage and regulate the climate and hydrological changes** resulting from climate change, specifically in the Našice lowland forest and Spačva Basin. In this respect, Dr. Pilas pointed out theexpectations set on multi-temporal radar measurements from Sentinel 1 and the sensitivity of polarimetry/interferometry data to **detect changes in forest stand and soil water dynamics** at intra seasonal scale. Dr. Pilas noted that this scenario is also ideal to assess the **potential Sentinel 1 and 2**, in the regular yearly forestry procedure of **thinning and removal of the dried trees**. SAR and optical EO can ascertain **forest stand disturbances**, a baseline information for better planning the yearly routines in the forest silvicultural chain.

Luis Fontes and Margarida Silva from **RAIZ** noted the challenges from the practical point of view of intensive *Eucaliptus globulus* production for pulp, in the context of **National territorial handicaps** such as land **abandonment, depopulation, forest overgrowth, wildfires and pests**. Moreover, land cover and forest **information** is frequently unavailable in quantity and quality to support sustainable forest management. Forestry companies and forest owners need accurate and up-to-date information, to **support** conventional **forest management and issues from climate change, FSC and PEFC forest certification** requirements.

Traditional forest data collecting methods relative to timber production, water resources, soil quality, biodiversity or other ecosystem services are expensive, time consuming and have a limited spatial distribution. Remote sensing technologies amend scarce land quality information. These technologies have recently been applied to the forestry sector although the impact has not changed the operational silvicultural processes.

Challenges faced by ***MySustainableForest*** in the Portuguese AOIs are:

- The wide biogeographic **diversity**;
- High forest **estate fragmentation**, with a mean areas smaller than 1 hectare;
- The lack of forest and management plans.
- In the case of forest plantations, the water and biodiversity conservation areas associated to riparian formations, are very narrow (<10 m). In this scenario, data resolution is a key challenge: Portuguese forest management requires **VHR data**, which is costly and more difficult to obtain than e.g. Copernicus Sentinel.

Clotilde Giry and Amelie Castro from **CNPF** referred the challenges found in the two French sites chosen.

The first site is located in the Cher Department, in the Center Region the interests of EO based products is set on the **technological support to forest inventories,** just as in Croatia; the dominant specie is also oak and the availability of forest inventories is also decennia. In the case of Central France, however, the targeted AOI groups both private and communal properties, in contrast with the Croatian case, where state property is dominant. **Private forest property** introduces a challenging variety of silvicultural processes while enlarging the possible future consumer market.

The second French AOI is located in New Aquitaine, at the heart of the Landes forest –Maritime pine-; it is managed by a private foundation gathering public/private stake holders, aiming to use the site as a "forest school". The needs look into the possibilities of **monitoring the stands forest age**, **soil fertility** and introducing the **remote data in the silvicultural techniques across the life cycle**.

The Lithuanian Stakeholder, **FOAL**, the Forest Owners Association of Lithuania represented by Gintautas Mozgeris and Algis Gaižutis, also referred their interest in the **technological support to forest inventories:** current Lithuanian forest legislation mandates stand-wise forest inventory for all country forests, which is financed by the state. However, such **inventory in private estates suffers from serious information gaps**, requiring additional data to elaborate the forest management plan.

However, since 2018, the state has **stopped financing inventories** and is now introducing **compensation** mechanisms for private forest owners **for providing updated stand-wise forest data to State Forest Cadastre**. FOAL handles a planning platform which still lacks full functionality; therefore the interest for products facilitating stand information up-to-date. Remote sensing seems to be cost efficient for monitoring private forests, including **change detection, updating stand boundaries and meeting State requirements regarding the sharing of forest inventory information.** FOAL is seeking to build a public image of private forestry and management, using EO products to inform the general public on the status and activities in private forests, ant to integrate the crowdsourcing opportunities for field data collection and validation. FOAL has selected 2 AOIs to validate the following goals:

The **first site** covers a Regional area with several private forest in the Anykščiai municipality, North-Eastern part of Lithuania. The focus is set on

- Enabling stand-wise forest inventory and forest management planning, including delineation and characterization of stands,
- Updating the private forest inventory databases (through the potential of remote sensing.

The second site corresponds with Šimonių forest. The focus is set in a more desirable balance between timber supply and cultural services. The focus is set on:

- LULC EO based information used to **evaluate the index of environmental stability**, and
- Parameters for modelling biodiversity and habitat suitability, potential for recreation, water and soil protection.

Eduardo Montero, representing **FORESNA**, the forest owners association of Navarre, explained the important role the association has had in the past 10 years in re-organising the interest for the forest exploitation across a generation of **young proprietors** who have **inherited forest properties but have no real connexion with the land** and the silvicultural methods, due to the land abandonment in the Pyrenees during the 1980's. For FORESNA, the two key interests placed in the EO products to be developed in the project are:

- **Biomass quantification** products which may help to estimate tree biomass stocks ever y 5 years or so, with updated information on volume/growing stock. Other important information for proprietors but not available at present concerns **biomass and CO2 stocks using satellite data** (LiDAR is excellent but expensive). All this information will be of great relevance to stakeholders in decision making to provide sustainable forest management for **the energy market**.
- **Monitoring and evaluating forest damages** from biotic damages (pests) and extreme weather conditions, particularly wind-thrusts and flash rains. It is important to evaluate the impacts in due time which means struggling against the pests reproductive calendar or reacting in rush-mode to extreme natural events in order to evaluate the impacts in an effective time period. Information on **forest health condition** is only punctual or outdated in the form of impact reports; for this reason, satellite forest health products could significantly change the interest and credibility of this technology in the forestry domain. All this information will be of great relevance to stakeholders in decision making to manage their forest and **quantitative assessment** for **assurance purposes**.

Service providers will have to keep in mind some challenges found in the Pyrenees AOI: **high slopes**, which from the point of view of spectral analysis and orthorectification of terrain data introduces difficulties; for this reason, **products informing of forests infrastructures** are valuable: maintenance of forest tracks is expensive but

essential in order to **mechanize the silvicultural treatments**. This illustrates why up-dated information on the status of the forest condition is so important for decision making and sustainable forest management.

Lumír Dobrovolný as stakeholder of **UFE** in the Czech Republic, expressed clear but complex needs for the selected AOI: 10.000 has. of oak forest stands, north-east from Brno city.

- Verification of a satellite-based method of **forest inventory**
- Forest vitality evaluation – **bark beetle** trees (esp. *Picea abies*) detection
- **Drought risk detection**

A dialogue was opened amongst stakeholders on the subject of forest pests, which increasingly hits all Europe. Experience shows that **early detection of pests** is crucial for their successful eradication (strongly pointed out by the Portuguese members) and to limit their spread within a territory. Under the European Plant Health Law, annual survey programmes will become compulsory for the Union quarantine pests that qualify as priority pests based on their economic, environmental, and social impact on the European Union. ***MySustainableForest*** Biotic services should be most welcome in this respect

However, the success of the **early detection of pests** depends on a number of factors, including the financial and administrative capacity to develop and implement programs especially on a large territorial scale.

Despite the positive results of EO campaigns for plant health monitoring, stakeholders still perceive critical barriers for the uptake of this technology, perhaps due to unfamiliarity with the technology, the associated analytical methods in plant health services, operational costs and scale.

Conventional forest data collection methods for **wood quality** parameters are expensive, time consuming and have a limited spatial distribution. Special attention was given to the needs related to wood quality. Esther Merlo, from **Madera Plus** commented the challenges they will tackle with the specific products to be developed, with non-invasive sound wave measuring techniques.

There is a growing interest to develop **tools that predict wood fibre quality attributes in standing timber**. Thus, the need to model and map wood fibre attributes, characterising the **timber's Basic Density**, particularly for *Eucalyptus globulus* commercial species, which is related to pulp paper production. In the project, this parameter will be sought combining Satellite multi-temporal parameters in combination with forest attributes obtained from LIDAR data, climatic data series and physiographic data.

To date, several models have been developed for predicting wood density in Stika spruce and Eucalyptus. Those studies showed links between fibre attributes and structural, climatic and geographic variables. Different studies demonstrate the interest to combine stand structure obtained with remote sensing technologies and airborne laser scanner with environmental parameters for this purpose

Based on contrasted scientific results, the challenge for Madera Plus in an AOI in Galicia, is to develop a model of basic wood density, for *Eucalyptus globulus,* as key pulp productive specie.

Regulatory Items

Ana Sebastian highlights **the relevance of the chapter on the regulatory items at EU level and per country**, which also justifies a reason of being for the project goals.

An important dialogue is open on this issue across partners. The following comments are recalled as showcases of the relevance of referring to the administrative and legal framework in each European country of the consortium **in relation to the access to the forest data, ground data**, standardisation of products, access to Copernicus missions data as well as to the Copernicus contributing missions, etc..

- Ivan Pilas (CFRI, Croatia) and Gintautas Mozgeris (FOAL, Lithuania) point out the existing legal constraints in using remote sensing data (LIDAR), which is not accepted by the state regulators.
- Amelie Castro notes that in France no LIDAR data exist and data are open

- Luis Fontes and Conceição Santos comment that the situation in Portugal is the same with LIDAR and WRT the acceptance of RS data.

Julia Yagüe recalls the relevance of bearing in mind the number of EU policies this project is bridging. To mention just a few:

- The Common Agricultural Policy (including the rural development component and the the expenditure related to forestry measures
- Climate adaptation strategy
- REGULATION (EU) on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry into the 2030 climate and energy framework
- Infrastructure for Spatial Information in the European Community (INSPIRE)
- EU compromises with REDD MRV
- EU compromises with UN SDG
- Disaster risk prevention and management considerations of key EU policies, such as cohesion, environment, agriculture, energy, and research and innovation.
- Promotion of the use of energy from renewable sources
- Instruments for the environment and climate action
- Resource materials and raw materials

Preliminary Services' Portfolio

Partners involved in the development of EO based products presented the preliminary lay-out the Services portfolio, subject to evolution, reviews adjustments and corrections.

Concerning the definition of MySustainableForest services, Julia Yagüe notes that the **Service definition follows** the criteria and metadata noted by the European Association of Remote Sensing Companies (**EARSC** http://earsc.org/) that is currently pushing the homogeneisation of satellite based services in numerous application domains. The complete list of metadata elements to define Industrial EO services is listed in Annex 1 below

Table 5-1 MySustinableForest Portfolio at M4, discussed at Stakeholders Workshop 1

SERVICE	PRODUCTS (TBD)
Service 1 Forest Site Characterization	1. Forest mask 2. Stand delineation 3. Forest infrastructures 4. Main forest types 5. Stand height 6. Forest age year of reference 7. Forest age biannual updates 8. Burned scars reference 9. Burned scars 6- months updates 10. Clear cuts reference 11. Clear cuts bi-annual update 12. Elevation 13. Slope 14. Aspect 15. Site Index
Service 2 Wood Characterization	16. Wood Density Ranking 17. Wood Stiffness 18. Strength Class 19. Stand Density
Service 3 Biomass Characterization	20. AGB

SERVICE	PRODUCTS (TBD)
	21. AGB Increment 22. CO2 Stock 23. CO2 Stock Increment
Service 4 Forest Condition	24. Biotic Damages 25. Drought Estimation 26. Wind-Damages 27. Snow-Damages 28. Forest Vitality 29. Frost Damages
Service 5 Ecosystem Vulnerabilities	30. Watershed Delineation 31. Stream Network 32. Biodiversity Indicator 33. Habitat Fragmentation Indicator 34. Flood Risk Indicator 35. Soil Erosion Risk Indicator
Service 6 Socioeconomic Functions and Conditions	36. Physical wood accounts 37. Monetary wood accounts 38. Physical supply and use of wood 39. Monetary supply and use of wood 40. Land Physical Asset Account

6. ANNEX 1 EARSC METADATA FOR THE DEFINITION OF EUROPEAN EO BASED INDUSTRIAL SERVICES

Table 6-1. EARSC metadata for EO based services definition

Common fields	Description	Evaluation	Sample for an EO based Bathymetry Service
Service_ID	Global unique and persistent identifier of a specific service	Required	
Service_Provider	Organisation that manages and delivers the service	Required	[Company's name]
Service_Name	Brief name of service as assigned by the service provider [text]	Required	Satellite Derived Bathymetry
Service_Category	List: Imagery(Intermediate service) / Software / Added Value	Required	Added Value
Service_SubCategory	List: Imagery (UAV / Airborne / Spatial) / Software (Remote Sensing / GIS) / Added Value (Mapping / Feature extraction/Monitoring)	Required	Mapping and Monitoring
Service_Description	High-level description of what the service offers. It may provide some element about the processing, cover the value provided by the service, in fairly non-technical terms. Definition of the delivrable.	Required	Mapping of water depths in shallow waters
Service_Tags	List of keywords including based on the EARSC taxonomy	Required	Coastal; bathymetry; water depths
Commercial_Level	List (commercial / free)	Required	commercial
Service Life Cycle Status	List (planned / alpha / beta / production)	Required	production
Link_Sample	List of sample (could be a sample of data, a map, a temporary licence, …)	Required	can be provided upon request
Link_CaseStudy	List of Case studies	Required	can be provided upon request
Link_SuccessStory	List of SuccessStory	Required	can be provided upon request
Service_Locator	List of URLs providing access to the service	Required	http://www.dhi-gras.com/products/bathymetricmapping
Service_Language	Language of the user interface	Required	English
Metadata_Language	Language of the metadata	Required	English
Date of publication	publication of the service	Required	
Intermediate services			
Taxonomy_IntermediateServices	Level of intermediate service, based on the EARSC taxonomy	Required	
Spatial Resolution	Data resolution value [m]	Required	2m / 10m
Accuracy_Horizontal	Value of the horizontal accuracy [m]	Required	2m/10m CE90 horizontal accuracy
Accuracy_Vertical	Value of the vertical accuracy [m]	Required	10% depth of water column +/- 0.5m vertical accuracy (LE
Date of acquisition	Data of the acquisition of the data [yyyy-mm-dd gregorian calendar]	Required	running
Level of processing	RAW/Geocoded/Orthorectified	Required	Orthorectified
Deliverable_Format	*List of format available*	Required	xyz, netCDF, GeoTiff
Deliverable_NbBands	Number of bands (wavelenght)/ layers	Required	4/lat, lon, depth, uncertainty
Service_Place	List of regions/countries or geographic coordinates where the data is available	Required	Global
Deliverable_Datum	Geodesic reference of the service by default	Required	LAT
Status	list : Archive / Programmation	Required	Both

Common fields	Description	Evaluation	Sample for an EO based Bathymetry Service
Software			
Licence type	List (stand alone / server / cloud)	Required	
OpenSource	Boolean: yes/no	Required	
Licence duration	Duration of the licence (Week/Month/Year/Perpetual)	Required	
Added Value			
Taxonomy_eoService	List of eoservice(s), based on the EARSC list of eoservices,proposed by the Company	Required	Map water depth or charting, Monitor marine habitats
Taxonomy_Market	List of market segments, based on the EARSC thematic taxonomy, for which the Company proposes service(s) or has reference(s)	Required	Oil&Gas, Modelling, Fisheries, Engineering, Energy, Mariti
Taxonomy_Thematic	List of thematic areas, based on the EARSC thematc taxonomy, for which the Company proposes service(s) or has reference(s)	Required	Coastal; bathymetry; water depths
Service_Place	List of regions/countries or geographic coordinates where the data is available	Required	Global
Deliverable_SpatialResolution	Data resolution value [m]	Required	2m / 10m
Deliverable_RasterLayers	List of raster layer in the deliverable	Required	2 layers: water depth map + quality layer
Deliverable_VectorLayers	List of fields contained in the attribute table	Required	XYZ, Uncertainty
Deliverable_AccuracyHorizontal	Value of the horizontal accuracy [m]	Required	2m/10m CE90 horizontal accuracy
Deliverable_AccuracyVertical	Value of the vertical accuracy [m]	Required	10% depth of water column +/- 0.5m vertical accuracy (LE
Deliverable_Format	List of format available	Required	XYZ ASCII, GeoTIFF or any other format
Deliverable_Datum	Geodesic reference of the service by default	Required	LAT
Service status	List (automatic processing / on the shelf / bespoke)	Required	on the shelf / bespoke
Business information			
Service_LevelAgreement	information about the levels of performance that a service provider is expected to achieve	Required	A dedicated EULA must be accepted
T&C	Text describing the rules and condtions the user must agree to in order to use the product or service	Required	Described in EULA
Licence	Text describing how a product or service can and can't be used	Required	Described in EULA
Delivery_mode	List of delivery mode proposed by the company	Required	ftp, email download
Service_PaymentModel	list (Free / pay-as-you-go / subscription / membership to corporate customers / Indirect funding)	Required	pay-as-you-go
Service_Price	cost in euros	Required	2m: 100 USD/sqkm, 10m: 10 USD/sqkm

END OF DOCUMENT

My Sustainable Forest

Earth observation services for silviculture

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776045

www.mysustainableforest.com