



## D1.1 Use Case scenarios v1

### WP1 – Wildlife Scenarios

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## EO4wildlife Project Overview

EO4wildlife main objective is to bring large number of multidisciplinary scientists such as biologists, ecologists and ornithologists around the world to collaborate closely together while using European Sentinel Copernicus Earth Observation more heavily and efficiently.

In order to reach such important objective, an open service platform and interoperable toolbox will be designed and developed. It will offer high level services that can be accessed by scientists to perform their respective research. The platform front end will be easy-to-use, access and offer dedicated services that will enable them process their geospatial environmental simulations using Sentinel Earth Observation data that are intelligently combined with other observation sources.

Specifically, the EO4wildlife platform will enable the integration of Sentinel data, ARGOS archive databases and real time thematic databank portals, including Wildlifetracking.org, Seabirdtracking.org, and other Earth Observation and Met Ocean databases; locally or remotely, and simultaneously.

EO4wildlife research specialises in the intelligent management big data, processing, advanced analytics and a Knowledge Base for wildlife migratory behaviour and trends forecast. The research will lead to the development of web-enabled open services using OGC standards for sensor observation and measurements and data processing of heterogeneous geospatial observation data and uncertainties.

EO4wildlife will design, implement and validate various scenarios based on real operational use case requirements in the field of wildlife migrations, habitats and behaviour. These include:

- Management tools for regulatory authorities to achieve real-time advanced decision-making on the protection of protect seabird species;
- Enhancing scientific knowledge of pelagic fish migrations routes, reproduction and feeding behaviours for better species management; and
- Setting up tools to assist marine protected areas and management.

## Abbreviations and Glossary

A common glossary of terms for all EO4wildlife deliverables, as well as a list of abbreviations, can be found in the public document “EO4wildlife Glossary” available at [EO4wildlife.eu](http://EO4wildlife.eu).

In this case, it has been updated with the terminology used to describe the EO4wildlife system and service (Section 2).

## Executive Summary

The goal of this document is to describe the user's requirements of the EO4wildlife system as a result of the first phase of the task T1.1 Scenario requirement.

During this phase, representatives of final end users of different scientific communities have been interviewed in order to collect information and build dedicated scenarios. Each of those scenarios being later implemented in the EO4wildlife platform and validated.

The challenge was mainly to understand, compile and organize feedbacks from four Use Case Leaders. Although all of them are involved in wildlife tracking and animal behaviour, feedbacks could be heterogeneous. Thus, in order to guide them and with the objectives of being able to retrieve the common requests as well as keeping specific ones, a guideline was distributed at early stage of this phase.

This document is composed of two main parts: the first one is organized in verbal scenarios from each Use Case Leader while the second part is a system and service oriented translation of the user's requirements using the Unified Modelling Language use case.

It addresses the following main aspects of the use cases:

- What do users want to do?
- With which data?
- What type of results do they need?

In order to simplify the text in the following paragraphs, it is agreed that:

- the *bird scenario* is the one expressed by Birdlife International, representative of a wide community of ornithologists;
- the *marine turtle scenario* is the one expressed by University of Exeter, representative of a wide community of biologists involved in marine turtles studies;
- the *marine mammal scenario* is the one expressed by l'Agence des Aires Marines Protégées;
- the *fish scenario* is the one expressed by CLS, representative of an important community of scientists involved in light based geo location of pelagic species.

It is agreed as well that the marine mammal scenario will be developed further, during the second phase of task T1.1 in early 2017.

In terms of collaborative work, a preliminary version of the scenarios has been discussed during a project meeting session at mid phase. This document written by CLS - leader of the work package WP1 Wildlife Scenario and leader of the task T1.1 Scenario requirement - has been reviewed by all Use Case Leaders as well as other partners involved in the development of the platform and the tools for behaviour analytics.

# 1 Scenarios requirements

As mentioned above, a list of topics to be assessed was released to the Use Case Leaders, covering the following characteristics of the EO4wildlife platform:

- User objectives
- Data requirements
  - Must have
  - Nice to have
  - Geographical area
- Data discovery
- Data manipulation
  - Basic tools
  - Advanced functionalities
    - Advanced functionalities for gridded EO data
    - Functionalities for tracks and positions
    - Functionalities for any other data
- Fusion-Cross correlation
- Enrichment
- Extraction
- Thematic analytics
- Getting results
  - Downloading functionalities
  - Reports
  - Maps
- Visualisation

The feedbacks from topics “User Objectives” and “Thematic analytics tools” of the guideline were quite specific to each Use Case Leaders and constituted the most part of the scenarios to be implemented. Other topics will contribute to the scenarios as well but much more as common functionalities of the EO4wildlife platform.

The scenarios requirements are identified in brackets along the description by an identifier which nomenclature is Xn where X is the scenario identifier, B for bird, F for Fish, M for marine mammals, T for turtle.

## 1.1 Data requirements

A list of existing and available products has been prepared and released to help Use Case Leaders in the description of their requirements. This list is containing a description of the type of products (satellite, instrument, physical parameter retrieved), the provider, the geographical coverage and the temporal coverage available on the portals.

Preference was made for data from EU satellite missions, Sentinel’s mission, and from the EU Copernicus Services (Marine, Atmosphere or Land). Some specific data of interest were listed as well, available from owner data base or private operators.

This list of products and corresponding details is in Annex 2 of the document.

Below, the first table summarises the feedback from Use Case Leaders in terms of satellite EO data for the EO4wildlife platform. This is a compilation of physical parameters, usually retrieved directly from raw satellite measurements and derived products.

Parameter/scenario	Fish	Marine Turtles	Marine mammals	Birds
Sea surface temperature	X	X	X	X
Chlorophyll-a	X	X	X	X
Bathymetry	X	X	X	X
Sea Surface Height		X		X
Wind intensity				X
Wind pressure				X
Wind direction				X
Convergence zones		X		
Eddies	X	X		X
Frontal structures	X	X		X
Primary production	X	X	X	X
Salinity	X	X		
Dissolved Oxygen	X			
Chlorophyll persistence		X		X
Micronekton biomass	X			
Magnetic field intensity	X			
Ice coverage				X
Sea currents		X		X
HR optical imagery		X	X	X

**Table 1:** Earth observation data and derived products

The following table summarises the list of in situ observation data that are required from Use Case Leaders.

Observation/scenario	Fish	Marine Turtles	Marine mammals	Birds
ARGOS tracking data	X	X	X	X
Other tracking data		X	X	X
Aerial observations			X	X
Sighting observations		X		X

**Table 2:** In situ observation data

The following table resumes the list of areas of interest/delineations requested by Use Case Leaders.



Areas/scenario	Fish	Marine Turtles	Marine mammals	Birds
EEZ	X	X	X	X
MPAs		X	X	
Proposed protected sites		X		X
Marine renewable sites		X		X

**Table 3:** Areas of Interest

## 1.2 Geographical coverage

It is agreed between all Use Case Leaders that EO4wildlife platform must handle downloading and manipulation of all types of data at global scale (worldwide geographical coverage). Individual scenarios are implemented at regional scale mainly due to the availability of regional dataset of tracking data.

## 1.3 Wildlife scenarios

The following paragraphs describe the four wildlife scenarios implemented in the EO4wildlife platform, as expressed by the Use Case Leaders in this requirement phase.

Each scenario shows some specificity in terms of tracking data and locations data to manipulate, geographical area covered, Earth Observation parameters to correlate and models to implement (species orientated). Besides those specificities, many functionalities as well as output results to produced are common to all scenarios and are described further in part 2 of the document.

Interoperability of EO4wildlife platform with other platforms (SeaTurtle.org, SeabirdTracking.org, ARGOS, Track&Loc, PELAGIS) is required and thus mentioned below. Discussions have already started on what is expected and a White Paper will state in details expectations from users respectively with commitments, led by ATOS Fr.

### 1.3.1 Bird scenario

General objective of this scenario is to be able to predict distribution [B1] and abundance [B2] of species of birds in order to develop effective management frameworks taking into consideration threats and pressure. To reach this goal, it is crucial to understand the factors that influence their distribution and habitat preferences [B3], and thus be able to detect change over space and time.

In terms tracking data, it is expected to manipulate ARGOS tracking data of course but as well other data from different technologies (geo locators from data logger, GPS/GSM locator) [B4]. While ARGOS database can be interoperable with EO4wildlife platform, the other sources of tracking data must be uploaded by scientists on EO4wildlife platform.

Another option to consider is to launch processing from SeaBirdTracking platform hosting those tracking data [B5].



**Figure 1:** Bird scenario

The Bird Model Application is the result of the above workflow [B6], which shows the different phases of model development. At each stage decisions are required to help achieve the best model output.

The bird scenario will focus on the Atlantic ocean where extensive single species tracking datasets are available. These include about 10 years of data and tens of thousands of bird locations [B7]. Potential study species include the Cory’s Shearwater and Black-browed Albatross. This scenario will then experiment **big data solutions for scientists involved in wildlife tracking and animal behaviour analysis**. Corresponding space and time satellite Earth Observation dataset should be available in order to assess EO4wildlife performance on big dataset.

A range of models [B8] to analyse animal behaviour should be explored and implemented in EO4wildlife platform:

- Kernel analysis to identify areas of greatest use and significance
- Time spent per cell (AOI) as a measure of importance
- State Space Model to determine different behaviours based on track characteristic

B1	B2	B3	B4	B5	B6	B7	B8
Distribution	Abundance	Habitat preferences	Non Argos birds geolocation data	Services accessible from SeabirdTracking.org	Bird workflow	Big data	Models

**Table 4:** Bird scenario keywords

### 1.3.2 Marine mammal scenario

This scenario takes place in some of the Marine Protected Areas in French EEZ. The final objective of the scenario is not yet decided and will be ready for task WP1.2.

An important dataset of tracking data from ARGOS system and other technologies could be available for the scenario. It will mainly be tracks of marine mammals. Once again ARGOS database will be interoperable [M1] with EO4wildlife platform while other tracking data should be uploaded by scientists on the platform. Interoperability with a public platform from French University of La Rochelle might be evaluated [M2].

It is expected in this scenario to manipulate data of marine mammals' observations from aerial survey campaigns [M3] (positions) and Very High Resolution optical images [M4] thanks to additional dataset being available for EU projects.

In terms of satellite Earth Observation data and derived product, sea surface temperature, primary production and micronekton might be the most relevant parameters for studying marine mammals behaviour related to food presence.

The challenge of this scenario will be **heterogeneity of data to handle and the multi technology approach** [M5] to analyse behaviour of marine mammals.

M1	M2	M3	M4	M5
ARGOS database interoperability	Public database interoperability	In situ aerial observations	Very high resolution images	Marine mammal workflow

**Table 5:** Marine mammal scenario keywords

### 1.3.3 Marine turtle scenario

The final objective of this scenario is to support scientists involved in marine turtles studies in predicting turtles' distribution (define habitat preferences [T1] and environmental niches [T2]) using environmental data to inform dynamic management scenarios [T3].

An important point is to set interoperability with SeaTurtle.org platform[T4], which is gathering most of these scientists spread over the entire world and offer most of the functionalities proposed by SeaTurtle.org (described further in part 2). The main step forward expected with EO4wildlife platform is to **handle multiple tracks approach/project approach** [T5]. This will make an important difference with other existing facilities available for scientists.

This scenario requests implementation of a set of home range and behaviour analysis models [T6]:

- Minimum Convex analysis
- Alpha-hulls
- Local Convex hull
- Kernel Density Estimator
- Brownian bridge movement model
- State space model [1]
- ChangePoint analysis [2]

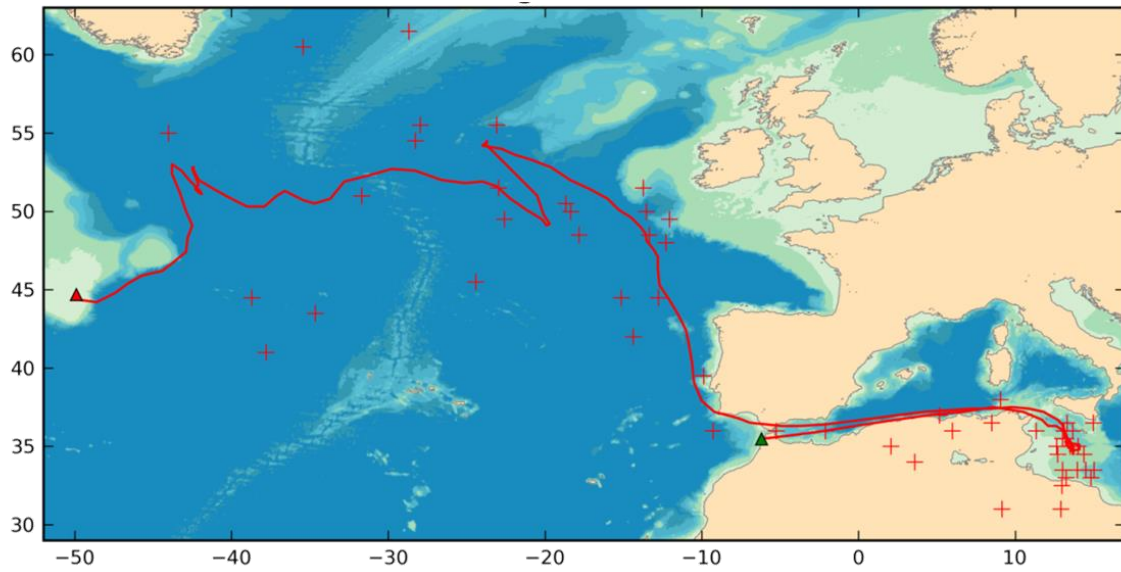
T1	T2	T3	T4	T5	T6
Habitat preferences	Environmental niches	Dynamic management	Interoperability with Seaturtle.org	Multi track approach	Models

**Table 6:** Marine turtle scenario keywords

### 1.3.4 Fish scenario

The first objective of this scenario enables fish scientists to track pelagic species with light based geo localization devices and to get a state of the art estimation of the fish trajectory.

For this, the scientists either provide or have access via the platform to data recorded by the device attached to the fish. Data recorded by the tag are observation data. The fish locations are estimated via the measurement of the light level, and errors of positioning can be huge.



**Figure 2:** From the estimated locations (crosses) to the track

A range of correlations, constraints, models and filters associated to comparative data from satellite Earth Observation enable to optimize the estimation of the fish trajectory. The purpose of this scenario is to provide to the scientists the **possibility to run such algorithms themselves directly from the EO4wildlife platform** [F1] and to generate a set of results. Such algorithms will be provided by CLS to EO4Wildlife platform.

For this, the platform needs to access and manipulate daily satellite Earth Observation data of sea surface temperature, as well as a high resolution bathymetry file and a magnetic field intensity model output [F2]. Users of the platform for this scenario will have to provide some essential parameters [F3] online via a dedicated interface to compute the processing.

The second objective of this scenario is to enable analysing and understanding blue fin tuna behaviour [F4] or appearance [F5] correlated to environmental of salinity, primary production and sea surface temperature during spawning season in the Mediterranean Sea (summer season). An important dataset of tagged blue fin tunas is available during the project in order to implement and validate relevance of a range of dedicated models [F6] such as:

- Kernel analysis: areas of greatest use
- Time spent per cell/highest density cell
- Home range estimation methods

A list of references is available in References ([3] to [10]).

F1	F2	F3	F4	F5	F6
Automation of service	Parameters	Fish behavior	Interoperability with Seaturtle.org	Fish appearance	Models

**Table 7:** Fish scenario keywords

## 2 System and service description

The UML method is used for the functional and dynamic modelling of the EO4wildlife system.

In this context a use case is like a function of a system.

There are four sub sections:

- Presentation of the actors of the EO4wildlife system, users who are interacting with the system
- Presentation of the use cases: the main functions of the system
- Presentation of the dynamic modelling of product/service metadata and service deployment
- Traceability matrix between scenarios and user requirements

### 2.1 Actors

Here below are identified the actors of the EO4wildlife system:

**User:** is any user of the different scientific communities (biologists, ecologists, scientists, ornithologists, etc) who has an access to the EO4wildlife system. The access to the system is the same for all users, whether they are specialized in certain field or not.

**Service provider:** describes and uploads services into the EO4wildlife system

**Product provider:** describes the product he makes available in the system and the services to access them.

**Administrator:** validates the product and service metadata and tests the uploaded services. He also monitors the EO4wildlife system and users.

It should be noted that the service provider, the product provider and administrator are also users.

### 2.2 Use cases

#### 2.2.1 Use cases overview

The main purpose of the EO4wildlife system is to improve existing services, to create new ones and share them by facilitating the access of new technologies for the analysis of animal behaviours.

The description of a service is required to make it understandable and attractive to users. The way a service provider describes a service is standardized through a service metadata model. All services process the specific input product, the ARGOS positions of animals, and generate added value information which has also to be described.

Services can also use additional products, such as Sentinel Earth Observations, bathymetry or whatever biological or physical values. These additional products are called auxiliary data in this document. To be complete, the service description requires also the description of these associated auxiliary data. The product description has to be done by the product provider who gets the best skills to describe the auxiliary data he is in charge of. To make homogenous the product description, a product metadata model is also defined in the EO4wildlife system. The delivery times of the product description and of the service descriptions are not correlated. Nevertheless, the administrator will ensure the consistency of the descriptions.

Once the definition of a service is complete, the service provider can develop it, and test it on its own before the upload of the service in the EO4wildlife system.

All services are validated by the EO4wildlife administrator to ensure the quality of the EO4wildlife system.

Thus 'Description and upload' use cases are the preliminary steps required before a user can go ahead in the use of the EO4wildlife system.

The user can then discover the services and the associated auxiliary data, and brings new intelligence by defining a new service as a combination of existing services, and run several times a service to fine-tune the expected result. The 'Discover, run and display' use case describes in details how is realized this possibility.

The functional modelling of the system is decomposed in 3 main parts:

1. First we have the integration of products and services in the EO4wildlife system, which contains 3 use cases:
  - The description of a product: that means the creation of the metadata product
  - The description of a service: that means the creation of the metadata service
  - The upload of a service in the EO4wildlife platform
2. Then we have the main functions of the platform concerning all users: discovery, service run and display:
  - Discover product : the search of a product in the catalogue of products
  - Discover service : the search of a service in the catalogue of services
  - Run Service : define and run of a service, or a set of services
  - Display and on-line tools: the display of products and service outputs
3. Finally we have the administrative functions of the EO4wildlife system:
  - Validate or invalidate the product or service metadata
  - Test and uploaded service
  - Invalidate a service
  - Manage the users : create/modify/delete

We consider the possibility for the user to register to the EO4wildlife system through a registration form out of the scope of system since it is not a valuable function for EO4wildlife business model. Be aware that it could be of interest for an operational implementation of the EO4wildlife system.

## 2.2.2 Nomenclature

### 2.2.2.1 Use case Nomenclature

The following nomenclature, **UC-XXX-NNN** is used in the use cases description:

- **UC** means Use Case
- **XXX** is the abbreviation of the use case name
- **NNN** is optional and is a scenario identifier for the use case: BIRD for birds, FISH for fishes, TURT for turtles, AAMP for marine protected areas

The use cases and their abbreviation are:

- DiscProd for Discover Product
- DiscServ for Discover Service
- RunServ for Run Service
- Display for Display and on-line tools
- DescProd for Describe Product
- DescServ for Describe Service
- UplServ for Upload Service
- ValMeta for Validate Product or Service Metadata
- InvMeta for Invalidate Product or Service Metadata
- TestServ for Test the uploaded Service

- InvServ for Invalidate a Service
- ManUser for Manage the Users

### 2.2.2.2 Requirement nomenclature

The requirements will have the following nomenclature: **sss-ttt-xxx-yyyy/V**

- **sss** = System, EO4, for EO4WildLife System
- **ttt**: Type of the requirement
  - INT: Interface
  - FCT: Functional
  - IMP: Design / Implementation
  - PRF: Performance
  - DFM: Availability/Reliability/Maintainability
  - SEC: Safety
  - OPE: operational
- **xxx**: the use case abbreviation, or GEN if the requirement is general with the system
- **yyyy**: number with 4 digits which is allocated to a requirement when created and never modified nor used for any other requirement.
- **V**: mode requirement verification method: (**T** = Test, **A** = Analysis or **I** = Inspection)
  - **Test**: a test of validation makes it possible to check the requirement

For the requirements which cannot be checked by a test:

  - **Inspection**: activity of control per examination, observation or audit (example: the data access path is customizable)
  - **Analysis**: activity which requires a study to validate the respect of the requirement. For example calculation of performance.

### 2.2.3 General requirements

#### EO4-FCT-GEN-0010/T

The user has to be connected to the EO4wildlife system with credentials before any interaction with it.

#### EO4-FCT-GEN-0020/T

There are 4 user profiles in the EO4wildlife system: user, product provider, service provider and administrator. Each one has access authorization as mentioned in the use cases.

The administrator has access to all functionalities.

The product provider has access to the user rights, plus specific rights for product provider

The service provider has access to the user rights, plus specific rights for service provider

#### EO4-FCT-GEN-0030/T

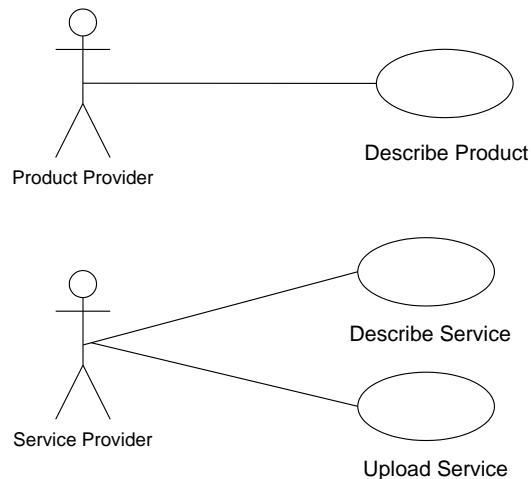
During the description of a product or a service, the user can save temporarily its form, and complete it later in another session.

## EO4-FCT-GEN-0040/T

In case of an error on a field (bad format, mandatory field missing, etc), an error message is displayed and the error field is marked in red

### 2.2.4 Description and upload Use cases

The following use cases allow the users to describe a product and a service and to upload a service in the EO4wildlife system. The description is stored as metadata for the product or service. This metadata is then used by the discovery function.



**Figure 3:** Description and Upload Use case diagram

#### 2.2.4.1 Use case Describe Product: UC-DescProd

**Summary:** this use case describes the way to make a product description available in the EO4wildlife system through a metadata model.

**Trigger:** The product provider activates this use case on demand through the EO4wildlife user interface.

**Actor:** product provider

**Description:**

There are two possibilities to generate a product description. The first one is to create it from scratch:

The product provider selects the 'product description' option, then the 'create' option

The system displays the different fields of the EO4wildlife metadata product model. The following information are required to describe a product in the EO4wildlife system: (all fields are mandatory)

- Product ID: this is the EO4wildlife unique identifier
- Product name: this is the product name the end user is familiar with
- Overview: brief description of the product
- Full description: full description of the product
- Product Provider Identifier: Organization and Name
- Category: a predefined list allows the user to select 'Ocean, Atmosphere or Sea Ice'
- Download URL: access point to extract the product. The user can validate it by selection of a 'validate' button.



- Display URL: access point to display the product, when available. The user can validate it by selection of a 'validate' button.
- GetDescription: access point to get the dataset description, when available. The user can validate it by selection of a 'validate' button. If the response is successful, the system asks the product provider if he wants to import automatically the description: variables, time coverage, temporal resolution, geographical coverage, spatial resolution. If the product provider services do not expose such a service, the product provider has to complete manually the product description.
- Product level: L2, L3, L4, ..
- The projection, when needed.
- The updating frequency and time if any
- GetSize: access point to get the estimated size of an extraction. If such an URL does not exist, the product provider enters a default typical size for an extraction.
- Credentials: login and password to extract product (when required)

The product provider has also to upload a quicklook

The product provider validates the creation and the product metadata is pushed into the product catalogue.

The second option is to retrieve the product description from an existing catalogue. In such case:

The product provider selects the 'harvest' option,

The product provider enters the catalogue URL to harvest and the product identifier for the product, with credentials when required

The product provider validates the request to the external catalogue and gets the available information in the form which includes all the fields of the creation from scratch described just above.

The product provider completes the missing information when not available in the external catalogue

The product provider validates the information and the product metadata is pushed by the system into the product catalogue

The system generates automatically a creation date/time of the metadata. The update date/time of the metadata is equal to the creation date/time the first time. The metadata product status is set to 'To validate' (see Metadata State Diagram chapter 2.3.1). It is not accessible by the product discovery.

When a product is updated according to a predefined frequency and time, the system updates automatically the time coverage of the product in the metadata.

### **Variations**

The product provider can modify the product metadata: all fields can be modified. The metadata returns to the state "to validate" and the modification date is updated in such case. The update is possible if the product provider has the required access rights (either the creator of the metadata, or a product provider of same organization).

The product provider cannot delete a metadata product since he cannot be aware of all the services that are processing the product. But he can turn it to 'invalid'.

### **Requirements**

**EO4-FCT-DescProd-0050/T**

The product provider can describe a new product in the EO4wildlife system, according to the EO4wildlife metadata product model

**EO4-FCT-DescProd-0060/T**

There are 2 options for the metadata product creation: creation from scratch (entry fields manually), or creation from an existing catalogue (harvest from an external catalogue and complete the creation manually)

**EO4-FCT-DescProd-0070/T**

Once the metadata product is created, the system set it to the “to validate” state.

**EO4-FCT-DescProd-0080/T**

The product provider (creator, or same organization) can modify the metadata product.

**EO4-FCT-DescProd-0090/T**

The product provider can turn the metadata state to ‘invalid’.

**EO4-FCT-DescProd-0100/T**

The system updates automatically the time coverage information when the product is regularly updated.

**2.2.4.2 Use case Describe Service UC-DescServ**

**Summary:** this use case describes the way to make a service description available in the EO4wildlife system through a service metadata model.

**Trigger:** The service provider activates this use case on demand through the EO4wildlife user interface.

**Actor:** service provider

**Description:**

The service provider selects the ‘service description’ option, then the ‘create’ option

The system displays the different fields of the EO4wildlife service metadata model. The following information are required to describe a service in the EO4wildlife system: (all fields are mandatory)

- Service ID: this is the EO4wildlife unique identifier
- Service name: this is the service name the end user is familiar with
- Input product: ARGOS or in situ locations (CSV or XML file, or URL for extraction)
- Parameters: Any value required to process the input product (threshold values for a filter, interpolation step or selection of the ARGOS location class to consider for a track computation for instance),
- Available output products and associated formats:
  - File: CSV, netcdf, KML, PDF report
  - URL: HTTP/WMS, HTTP/WFS, HTTP/WCS to visualize the result,

- Auxiliary data: identifier of any additional product with a list of:
  - Protocol used to access the service
  - URL access when dynamic auxiliary data have to be loaded by the service
  - Login/password to access the product
  - If an auxiliary data is static, as a configuration file, it could be just mentioned in the description of the service.
- Overview : The service provider describes briefly the service steps, inputs and outputs,
- Full description: the service provider details the steps of the process and the auxiliary data
- Category: predefined values from the catalogue (turtle, birds, marine mammals, fish, protected areas TBC )
- Type of service: track processing, filter, behaviour monitoring, thematic (TBC).
- Required Resources
  - Physical resources required to run the service: memory, disk, OS, software
- Operational service level : on demand, on line, replicated
  - On demand: when a user runs the service
  - On line: the service is deployed to be accessible quickly
  - Replicated: a high level of availability is required
- Target : EO4wildlife platform or server URL (Scientist server) where is deployed the service
- Nominal duration in seconds: this information provides the nominal elapsed time for a typical amount of input.
- Service Provider Identifier: Organization and Name

Once the user validates the creation, the system generates automatically a creation date/time of the metadata. The update date/time of the metadata is equal to the creation date/time. The service metadata status is set to 'To validate' (See Metadata State Diagram chapter 2.3.1). The service metadata is saved in the service catalogue. It is not accessible by the service discovery.

The service provider uploads the service in an independent way in the EO4wildlife system (described in "upload service" use case).

### **Variations**

The service provider can modify the service metadata: all fields can be modified. The service metadata returns to the state "to validate" and the modification date is updated. The update is possible if the service provider has the access rights to do so (either the creator of the metadata, or a service provider of a same organization).

The service provider cannot delete a metadata service but can turn it to 'invalid' if he detects any issue in the service execution.

### **Requirements**

#### **EO4-FCT-DescServ-0110/T**

The service provider can describe a new service in the EO4wildlife system, according to the EO4wildlife service metadata model.

**EO4-FCT-DescServ-0120/T**

Once the service metadata created, its state is “to validate”.

**EO4-FCT-DescServ-0130/T**

The service provider (creator, or same organization) can modify the service metadata.

**EO4-FCT-DescServ-0140/T**

The service provider cannot delete the service metadata but can turn it to ‘invalid’.

**EO4-OPE-DescServ-0150/A**

Services level agreements are defined according to the service level:

- On demand : 99% of runs are successful
- On line : 95% availability over one month
- Replicated : 99% availability over one month

**2.2.4.3 Use case Upload Service UC-UpIServ**

**Summary:** this use case describes the way to upload a service in the EO4wildlife system.

**Trigger:** the service can be uploaded independently of its description. Generally, the service is described first (use case UC-DescServ), and then uploaded. But it is also possible to upload it first (for example for testing purposes), and then to describe it.

**Actor:** service provider

**Description:**

The service provider describes the deployment plan of the service in the EO4wildlife system, provides the service implementation (software delivery package).

Then, the system deploys automatically the uploaded service.

If the upload is run without error, the service switches to the “uploaded” state. (see Service deployment State Diagram chapter 0).

The service provider also describes a test case and uploads the input product to test with and the expected outputs products so that the administrator can run the service and validate it (see Test the uploaded service UC-TstServ).

**Requirements****EO4-FCT-UpIServ-0160/T**

The service provider can upload a new service in the EO4wildlife: if the upload is run without error, the service switches to the “uploaded” state.

**2.2.5 Discover, run and display use cases**

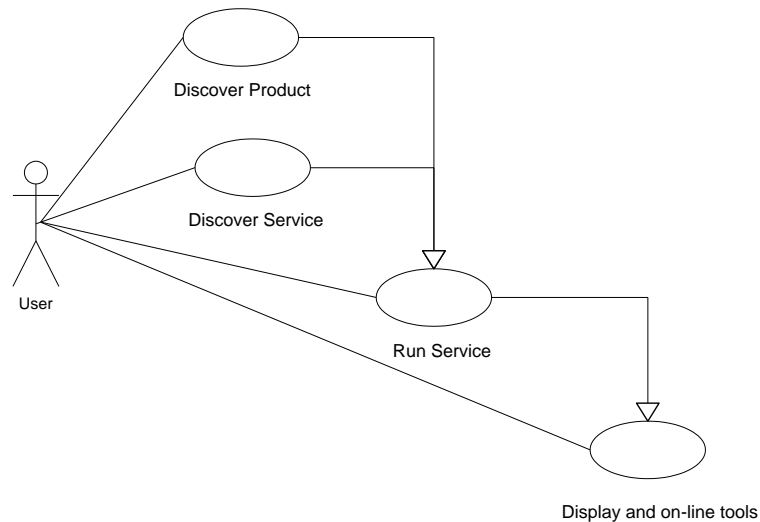
Any user (user, service provider, product provider, administrator) has access to the ‘discover, run and display’ use cases.

The user browses the catalogue via the discover functions. He can consult a product or a service via the display function.

He can run a service in the catalogue but can also create and run its own service defined by a combination of a set of services. He can then access not only to the final outputs but also to intermediate results or

auxiliary data implied in the service with the display function. He can also use on-line tools to improve the quality of the display or post-process the results.

The use cases are shown in the following picture.



**Figure 4:** Discover, run and display Use case diagram

#### 2.2.5.1 Use case Discover Product UC-DiscProd

**Summary:** this use case describes the way to discover a product in the EO4wildlife system catalogue.

**Trigger:** The user activates this use case on demand through the EO4wildlife user interface

**Actor:** Any actor

**Description:**

The user can enter one or several criteria to request the product catalogue:

- Product type: ocean, atmosphere, sea ice
- Variable: physical or biological identifier
- Temporal resolution: frequency at which are computed the product instances
- Geographical resolution: product grid resolution
- Product level: L2, L3, L4, etc
- Period: begin and end dates
- Geographical area: min/max longitude, min/max latitude

Only the validated products are displayed in the results of the search query. The search results consist in the display of the search criteria and number of matching products, and for each matching product:

- The product name
- A brief description of the product
- The time coverage
- A quick look of the product if available
- The Display option to display the product

- The download option to access the product
- A “More Info” option gives access to the full description of the product

A sort function by time coverage or by product name is available.

The system will provide a single extraction interface which is in charge of the extraction management. The user can then save the extracted product locally or in the platform with a retention duration

The user can visualize the product: see “Display and on-line tool” use case.

### **Requirements**

#### **EO4-FCT-DiscProd-0170/T**

Any user of the EO4wildlife system can discover products by selection of search criteria: product type, variable, temporal resolution, geographical resolution, product level, period, geographical area. The results of the search query are display in a friendly way to allow sorts by name, time coverage.

#### **EO4-FCT-DiscProd-0180/T**

Only the validated products of the catalogue are available to the users

#### **EO4-FCT-DiscProd-0190/T**

After the discovery, the user can extract part of the data product and display it.

#### **EO4-FCT-DiscProd-0200/T**

The extracted data should be less than 1 Gb.

### 2.2.5.2 Use Case Discover Service UC-DiscServ

**Summary:** this use case describes the way to discover a service in the EO4wildlife system.

**Trigger:** The user activates this use case on demand through the EO4wildlife user interface

**Actor:** user

**Description:**

Only the validated services are available to the users.

The user can enter one or several fields:

- Category: turtle, birds, marine mammals, fish, protected marine area
- Service type: track processing, filter, behaviour monitoring, thematic (TBC)
- Service Provider: body in charge of the delivery of the service: IT Innovation, CLS, ATOS, ...
- Output Protocol/Formats : wms, wfs, ftp, netcdf, pdf

The results are displayed in a list with the search criteria and the number of matching services.

For each service are displayed:

- The service ID and name
- The description of the service
- The target to access the service: EO4wildlife platform or server URL

- A “More Info” button to access to the detailed description of the service

The user can select one or several service he would like to run: see “run service” use case and save them into a cart or as a bookmark.

### **Requirements**

#### **EO4-FCT-DiscServ-0210/T**

Any user of the EO4wildlife system can discover service by choosing one or several selection criteria: category, type, provider, output protocol

#### **EO4-FCT-DiscServ-0220/T**

Only the validated services of the catalogue are available to the users

#### **EO4-FCT-DiscServ-0230/T**

The user can save a service in a cart or in a bookmark.

### 2.2.5.3 Use Case Run Service UC-RunServ

**Summary:** this use case describes the way to run a service in the EO4wildlife system

**Trigger:** The user activates this use case on demand through the EO4wildlife user interface

During the “product and services discovery” use cases, the user has already identified the services of interest he would like to run putting them into his cart.

**Actor:** user

#### **Description:**

If the user discovered the right service to run and put it in his cart, he just has to run the service by selecting from the cart.

Otherwise the user can also create a workflow for a selection of services in his cart. The user orders the selected services according to the process he defines. At each step of this workflow definition, the user enters the parameters required by the current selected service. The system checks that the output of a current step is compliant as an input of the following steps, otherwise an error message is displayed.

Once all the steps of the workflow are validated, the user can save it as a new service, so as to reuse the workflow definition for any new run. The user can **add this new service to his list of bookmarks**.

The user can also select the service to run from his bookmarks. In such case, the system asks him if he wants to update the parameters. If yes, all the parameters are displayed for any update. If no, the current values of the parameters are used in the run.

Then, the user runs the service for an instance of the input ARGOS data product. The time of interest is computed by the system as the time period made of the timestamp of the first ARGOS location and the latest one. The area of interest is processed automatically by the system as a rectangular area including all the ARGOS locations.

Then the system checks the availability of auxiliary data. If several instances of the same auxiliary data (radar scenes for instance) are available for the run within the time of interest and the area of interest, the system displays them to the user and the user has to select the one to process with. If any auxiliary data is missing, no matching between the criteria of interest (AOI, TOI) and the available auxiliary data, the user is not entitled to go further in the workflow execution and the missing auxiliary data are listed. If any product or service is no more valid in the catalogue, a specific error message is also displayed. When everything is

ready, the user confirms the execution of the run. A typical execution time is displayed to the user as the sum of the nominal durations of the involved services.

Once executed, the user can **save the results of the run with a run identifier**. He can easily adjust any parameter and process a new run for the input data.

When all the required auxiliary data are selected, the user selects the 'run workflow' button to start the execution. At the end of the execution, the user receives a mail describing the status of execution for each step of the workflow and including the way to access to the steps outputs he selected (WMS, PDF report...). When several auxiliary data are used during the process, the EO4wildlife platform allows the user to select and display them in distinct layers. If the user wants to display several auxiliary data at the same time, he can use transparency options (see "display and on-line tools" use case).

A **history of all executions** is available so that the user can quickly visualize the different runs he made and results he got.

Typical steps of a workflow definition can be thematic or global.

The identified global steps are (TBC):

Filter ARGOS product:

- By ARGOS location class,
- By speed from previous point
- By distance from previous point,
- By change of direction
- Landmask to select or unselect position on land
- Daily best locations
- Clean and transform process

Track processing:

- Kalman filtering
- Spline filtering
- Interpolate missing positions using different algorithms

Distance to

- Compute the distance to the shore
- Compute the distance to area ( e.g the colony area, a thermal front for instance)

Behaviour monitoring:

- Compute speed, angle and distance between successive locations

The thematic steps are (TBC):

Calculate density maps:

- Number of animal, (tracked vs extrapolation to wider population)
- Number of animal days, in a specified time period (e.g. days hours, weeks, months)
- Average of animal per area
- Kernel analysis: area of greatest use

Fusion-Cross correlation:

- Calculate time within physical parameter window (temperature, depth, chlor-a, barometric level...)



Behaviour monitoring:

Behaviour per location

Behaviour changes

Home range,

Habitat

Delta between travel direction and current direction

Calculate time spent per cell/AOI

Minimum displacement rate

Movement monitoring / alarm trigger

Compute fish location algorithm

**Scenario**

Any thematic platform can call for a service of the EO4wildlife system.

**Requirements**

**EO4-FCT-RunServ-0240/T**

The user can run a service, providing parameters, input and a selection of auxiliary products

**EO4-FCT-RunServ-0250/T**

The user can create a service as a workflow, which is an ordered combination of services, providing parameters required for each service. This new service can be saved in his bookmark.

**EO4-FCT-RunServ-0260/T**

The EO4WildLife system checks the validity of the workflow:

- The output of a step has to be compliant with the input of the following step
- All required parameters and auxiliary data should be available
- All auxiliary data and service steps should be declared as valid in the catalogue.

**EO4-FCT-RunServ-0270/T**

Typical steps of a workflow definition can be thematic or global.

**EO4-FCT-RunServ-0280/T**

The user can run a workflow (instance ready to run): a complete status of execution is sent to the user. The user can access to the step outputs and the auxiliary data involved in the process

**EO4-FCT-RunServ-0290/T**

The user can save the run results with a run identifier.

**EO4-FCT-RunServ-0300/T**

The user can easily reuse a workflow definition and execute new runs changing inputs products or parameters.

**EO4-FCT-RunServ-0310/T**

The user can visualize a history of all the runs he made

**EO4-FCT-RunServ-0320/T**

Any thematic platform can call for a service of the EO4wildlife system

**EO4-PRF-RunServ-0330/T**

A run can be executed for 100 millions of input positions (TBC).

#### 2.2.5.4 Use Case Display and on-line tools UC-Display

**Summary:** this use case describes the way the user can display the process outputs and use additional on-line tools to be able to prepare the next service definitions or new runs to perform.

**Trigger:**

The display function is available after the discovery of product (use case “Discover product”, or after the run of service (use case “run Service”).

In the case of a service run, the user has received a mail with links to access to the display of the inputs, outputs and auxiliary data of the run. He can also look for a run in the history of run, select one of them to display the mail content of the run to access to the associated results.

**Actor:** user

**Description:**

The outputs of the service can be displayed in a web interface. The user selects the results to display. He can ask a display in distinct tabs, or in a single tab with an overlay of layers.

For each layer, additional tools can be used to perform the following actions:

- Select a colour map for the display
- Adjust automatically the min-max value of the colour map to the displayed data
- Use a linear or logarithm scale in the colour map
- Define the transparency level
- Select a location and retrieve the physical value for the layer on this location
- Draw a transect polyline when 3D data are displayed, and get the associated transect
- Draw polylines when 2D data are displayed and get the associated curve
- Define a mask with a min max value definition. All mismatching data will be made transparent

The ARGOS input product can be displayed as a track for an animal. The user has the possibility to select a maximal duration of the display of the track, for instance, display the track only for the last 24 hours. When several mobiles are included in the input, the user can select the mobile or set of mobiles to display. The user can ask for an animation of the mobiles along a time bar and can define the track duration of the mobile to optimize the displayed information. For instance, if a position at a one hour rate over a month is provided for 10 mobiles, only the last 6 hours of each track are displayed for all animals during the animation.

When the location errors of the positions are provided, the user can activate the display of the elliptic error along the track. The user can also apply filters on the track and see the filtered track.

The user can also ask for an extraction of the displayed data:

- along the complete or a part of a track
- in the area defined by the elliptic errors around the track
- over an area he creates as a rectangle

For the extraction of data, the user has to define the expected spatial resolution. The system will interpolate if necessary the values. The export can generate:

- a netCDF grid with a variable per layer. During the extraction, an interpolation will be performed when the input data is at a lower resolution
- a CSV export of each variable
- A KML/KMZ output of each variable
- A PNG/JPEG output of each variable
- A PDF report including all the results

The user can also apply thematic tools to:

Determine convergence zones/frontal zones for the displayed layer

Determine front for the displayed layer

Filter the input locations on line thanks to the different track processing services

Then the user can also use generic tools to:

Measure the distance between 2 locations, or to an area

Generate an area from a pattern created thanks to a wizard tool and compute a surface of this area

## **Requirements**

### **EO4-FCT-Display-0340/T**

The user can visualize products, auxiliary data and service outputs in a web interface. He can ask a display in distinct tabs, or in a single tab with an overlay of layers.

### **EO4-FCT-Display-0350/T**

For each layer, the user can be configure the display selecting a specific colour map, a linear or logarithmic scale, a transparency level, assign the dynamic of the colour map to the min-max displayed values.

### **EO4-FCT-Display-0360/T**

The user can apply a mask on data to make transparent all data out of a min-max interval

### **EO4-FCT-Display-0370/T**

The system can display data values on a location, along the track, along a polyline, along a transect for 3D data

### **EO4-FCT-Display-0380/T**

The user can display the track of a mobile or set of mobiles, he can apply filters on the track, he can ask for an animation of the mobiles.

**EO4-FCT-Display-0390/T**

When the location error of the positions are provided, the user can activate the display of the elliptic error along the track

**EO4-FCT-Display-0400/T**

The user can ask for an extraction of data values along the track, by definition of a polyline, within the elliptic error or by definition of an area.

**EO4-FCT-Display-0410/T**

The user can generate a report of a complete or a part of the displayed data in different formats: netCDF, CSV, KML/KMZ, PNG/JPEG, PDF

**EO4-FCT-Display-0420/T**

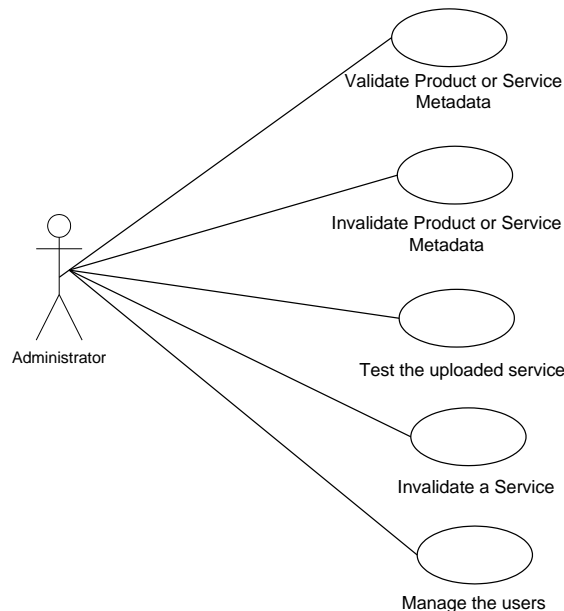
Generic tools are used to compute the distance between two points or to an area.

**EO4-FCT-Display-0430/T**

More specific tools allow the user to identify areas of interest such as fronts and convergences

**2.2.6 Administration use cases**

The following diagram shows the functionalities accessible only to administrators.



**Figure 5:** Administration Use case diagram

The administrator has all the rights on the EO4wildlife system. He has to validate product or service metadata before their publication in the catalogue. He has to test the uploaded service, which becomes validated and thus accessible in the catalogue. He is the only actor who can invalidate metadata and service. He manages the users and their profile.

### 2.2.6.1 Use case Validate Product or Service metadata UC-ValMeta

**Summary:** this use case describes the way to validate a product or service metadata in the EO4wildlife system.

**Trigger:** The EO4wildlife system administrator activates this use case on demand through the EO4wildlife user interface. The metadata has been created by the product or service provider (use case “describe product” and “describe service”). The metadata is in the state “to validate”.

The administrator can also validate a metadata which is in a state “invalid” (see metadata state diagram chapter 2.3.1)

**Actor:** administrator

**Description:**

The EO4wildlife system displays the list of metadata to validate. The administrator can access to the content of the metadata. If everything is ok for him, he validates the metadata, which switches to the state “validated”. If not, he does not validate and the metadata returns to the state “in progress”.

If the metadata is validated, it is then automatically added to the EO4wildlife catalogue and available to any user.

**Requirements**

**EO4-FCT-ValMeta-0440/T**

Only the administrator can validate the product or service metadata: it is then available to any users.

**EO4-FCT-ValMeta-0450/T**

The administrator will check the use of shared vocabularies, like skos vocabularies, and conventions, like COARDS-CF to insure the coherence in descriptions.

### 2.2.6.2 Use case Invalidate Product or Service metadata UC-InvMeta

**Summary:** this use case describes the way to invalidate a product or service metadata in the EO4wildlife system.

**Trigger:** The EO4wildlife system administrator activates this use case on demand through the EO4wildlife user interface. The metadata has been validated (use case “validate product or service metadata”). The administrator has the possibility to invalidate it for example if a critical issue was raised and not yet fixed in a service.

The metadata state diagram is described in chapter 2.3.1.

**Actor:** administrator

**Description:**

The administrator has access to the list of all metadata validated of the EO4wildlife system. He can select one and invalidate it. The metadata switches to the state “invalid”. The product or service is then not accessible by others users.

**Requirements**

**EO4-FCT-InvMeta-0460/T**

Only the administrator can invalidate a product or service metadata: it is then not available to others users.

### 2.2.6.3 Use case Test the uploaded service UC-TstServ

**Summary:** this use case describes the way to test a service uploaded by a service provider.

**Trigger:** The EO4wildlife system administrator activates this use case on demand through the EO4wildlife user interface. The service provider has uploaded a service in the EO4wildlife system (use case upload service)

The administrator can also validate a service which has been invalidated (in the state “invalid”)

See service deployment state diagram in chapter 0.

**Actor:** administrator

**Description:**

The administrator access to the service and input products: he can run the service and compare results with results provided by the service provider. If the execution is OK and if the service metadata is also validated, the service is ready and available in the catalogue service to be run by users.

**Requirements**

**EO4-FCT-InvMeta-0470/T**

The administrator test a service uploaded in the EO4wildlife system. Once the test is OK, and the service metadata is validated, the service is ready for run.

### 2.2.6.4 Use case Manage the users UC-ManUser

**Summary:** this use case describes the way to create/modify/delete a user of the EO4wildlife system.

**Trigger:** The EO4wildlife system administrator activates this use case on demand through the EO4wildlife user interface.

**Actor:** administrator

**Description:**

The user has

- An identifier and a name
- An organization : company, or association
- A profile : user or service provider or product provider or administrator
- A unique login/password

The administrator can create a user.

He can modify one of the attributes of a user: for example he can change the profile of a user. A user can become a service provider for example.

He can delete a user.

**Requirements**

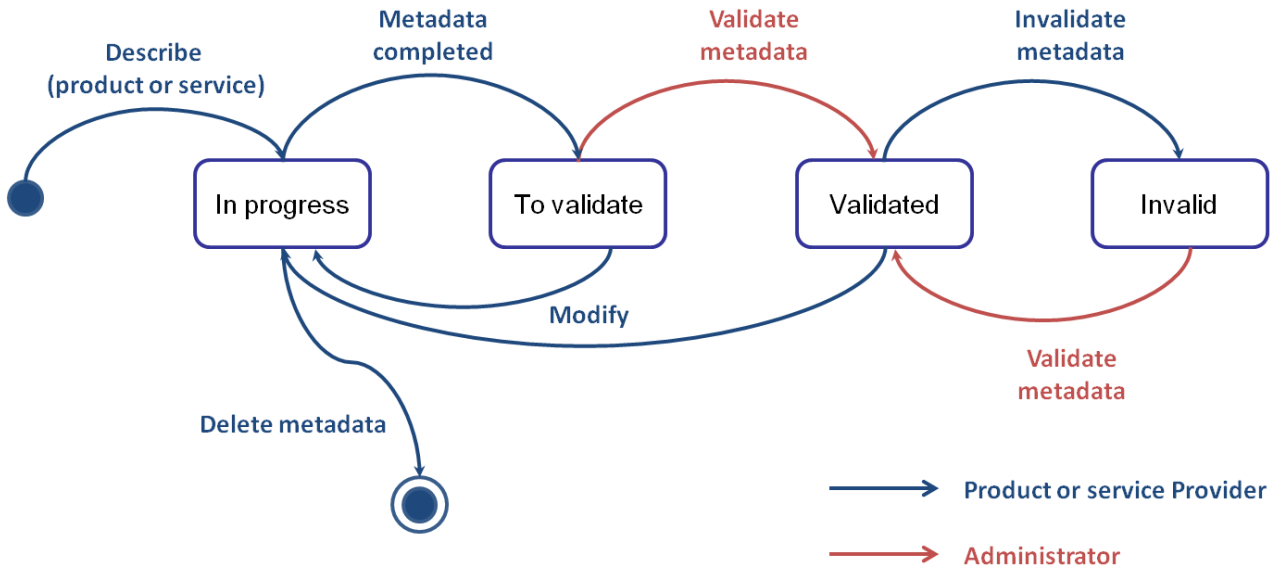
**EO4-FCT-manUser-0480/T**

The administrator manages (create/modify/delete) the users in the EO4wildlife platform. A user has an identifier, a name, an organization, a profile (ID, Name, Organization, Profile, login/Password)

## 2.3 Metadata and Service State diagram

### 2.3.1 Metadata state diagram

The following figure presents the state diagram of a metadata, whether for a product or service.



**Figure 6:** Metadata state diagram

The transitions authorized for product or service provider are in blue, the transitions only accessible to the administrator are red. Notice that administrator has also access to the Product or Service Provider transitions.

When a product or service provider begins to describe a product or service, the metadata is in the “In progress” state, and remains in this state while it is not completed: all fields have to be fulfilled, with correct format. Then the metadata pass into the state “to validate”: only the administrator can validate the metadata.

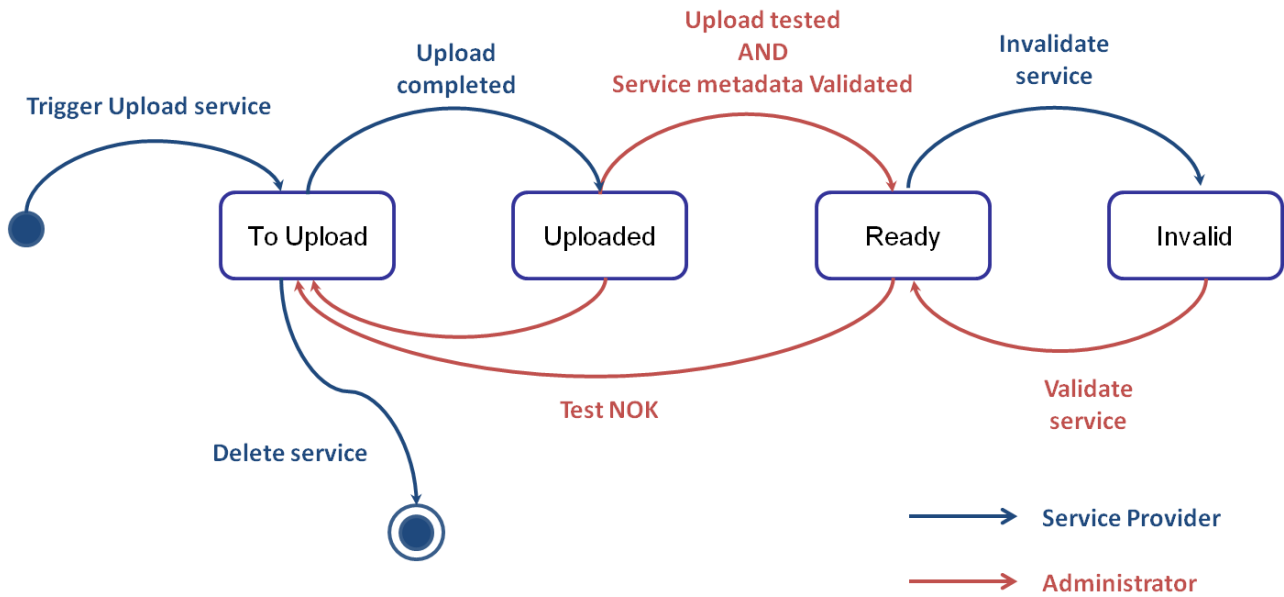
Once validated, the metadata is accessible through the catalogue by all users.

The administrator or the product/service provider can invalidate the metadata, but it is better to keep the metadata for historical reasons. The metadata pass into the state “Invalid” and is not visible by the users except the administrator, who can modify it and validate it again.

When the metadata is modified, it comes back to the “in progress” state, and has to be validated again to be available to all users.

A definitive delete is only possible during the metadata is in progress.

### 2.3.2 Service deployment state diagram



**Figure 7:** Service deployment state diagram

When the service provider ask to upload a service, the service is in the “to upload” state. Then the service pass into the state “uploaded”.

The administrator has to test it by running it. The service is ready for run once the metadata is validated by the administrator and once the service run is OK.

The administrator or the service provider can invalidate a service, which pass into the state “Invalid” and is not visible by the users except the administrator, who can modify it and validate it again.

If the test is not OK, the service comes back to the “to upload” state, and has to be uploaded and tested again to be available to all users.

A definitive delete is only possible during the service is “to upload”.



## 2.4 Traceability matrix

Scenarios coverage is linked to user requirements in the matrix below.

Dynamic management (alerts) is not considered yet.

Identifier	Description	Scenario Requirement
EO4-FCT-GEN-0010/T	The user has to be connected to the EO4wildlife system with credentials before any interaction with it.	
EO4-FCT-GEN-0020/T	There are 4 user profiles in the EO4wildlife system: user, product provider, service provider and administrator. Each one has access authorization as mentioned in the use cases.	
EO4-FCT-GEN-0030/T	During the description of a product or a service, the user can save temporarily its form, and complete it later in another session.	
EO4-FCT-GEN-0040/T	In case of an error on a field (bad format, mandatory field missing, etc.), an error message is displayed and the error field is marked in red	
EO4-FCT-DescProd-0050/T	The product provider can describe a new product in the EO4wildlife system, according to the EO4WildLife metadata product model.	B4, M1, M2, M3, M4, F2
EO4-FCT-descProd-0060/T	There are 2 options for the metadata product creation: creation from scratch (entry fields manually), or creation from an existing catalogue (harvest from an external catalogue and complete the creation manually).	
EO4-FCT-DescProd-0070/T	Once the metadata product is created, the system set it to the "to validate" state.	
EO4-FCT-DescProd-0080/T	The product provider (creator, or same organization) can modify the metadata product.	
EO4-FCT-DescProd-0090/T	The product provider can turn the metadata state to 'invalid'.	
EO4-FCT-DescProd-0100/T	The system updates automatically the time coverage information when the product is regularly updated.	
EO4-FCT-DescServ-0110/T	The service provider can describe a new service in the EO4wildlife system, according to the EO4WildLife service metadata model.	B4, M1, M2, M3, M4, F1, F3
EO4-FCT-DescServ-0120/T	Once the service metadata created, its state is "to validate".	
EO4-FCT-DescServ-0130/T	The service provider (creator, or same organization) can modify the service metadata.	
EO4-FCT-DescServ-0140/T	The service provider cannot delete the service metadata but can turn it to 'invalid'.	
EO4-OPE-DescServ-0150/A	Services level agreements are defined according to the service level: On demand : 99% of runs are successful On line : 95% availability over one month Replicated : 99% availability over one month	
EO4-FCT-UpI Serv-0160/T	The service provider can upload a new service in the EO4wildlife: if the upload is run without error, the service switches to the "uploaded" state.	F1

<b>EO4-FCT-DiscProd-0170/T</b>	Any user of the EO4wildlife system can discover products by selection of search criteria: product type, variable, temporal resolution, geographical resolution, product level, period, geographical area. The results of the search query are display in a friendly way to allow sorts by name, time coverage.	
<b>EO4-FCT-DiscProd-0180/T</b>	Only the validated products of the catalogue are available to the users	
<b>EO4-FCT-DiscProd-0190/T</b>	After the discovery, the user can extract part of the data product and display it.	
<b>EO4-FCT-DiscProd-0200/T</b>	The extracted data should be less than 1 Gb.	
<b>EO4-FCT-DiscServ-0210/T</b>	Any user of the EO4wildlife system can discover service by choosing one or several selection criteria: category, type, provider, output protocol	
<b>EO4-FCT-DiscServ-0220/T</b>	Only the validated services of the catalogue are available to the users	
<b>EO4-FCT-DiscServ-0230/T</b>	The user can save a service in a cart or in a bookmark.	
<b>EO4-FCT-RunServ-0240/T</b>	The user can run a service, providing parameters, input and a selection of auxiliary products	F1, F3
<b>EO4-FCT-RunServ-0250/T</b>	The user can create a service as a workflow, which is an ordered combination of services, providing parameters required for each service. This new service can be saved in his bookmark.	B6, M5
<b>EO4-FCT-RunServ-0260/T</b>	The EO4wildlife system checks the validity of the workflow: The output of a step has to be compliant with the input of the following step All required parameters and auxiliary data should be available All auxiliary data and service steps should be valid.	
<b>EO4-FCT-RunServ-0270/T</b>	Typical steps of a workflow definition can be thematic or global.	B1, B2, B3, B8,T1,T2,T6,F4,F5,F6
<b>EO4-FCT-RunServ-0280/T</b>	The user can run a workflow (instance ready to run): a complete status of execution is sent to the user. The user can access to the step outputs and the auxiliary data involved in the process	
<b>EO4-FCT-RunServ-0290/T</b>	The user can save the run results with a run identifier.	
<b>EO4-FCT-RunServ-0300/T</b>	The user can easily reuse a workflow definition and execute new runs changing inputs products or parameters.	
<b>EO4-FCT-RunServ-0310/T</b>	The user can visualize a history of all the runs he made	
<b>EO4-FCT-RunServ-0320/T</b>	Any thematic platform can call for a service of the EO4wildlife system	B5, T4
<b>EO4-PRF-RunServ-0330/T</b>	A run can be executed for 100 millions of input positions (TBC).	B7, T5
<b>EO4-FCT-Display-0340/T</b>	The user can visualize products, auxiliary data and service outputs in a web interface. He can ask a display in distinct tabs, or in a single tab with an overlay of layers.	
<b>EO4-FCT-Display-0350/T</b>	For each layer, the user can be configure the display selecting a specific colour map, a linear or logarithmic scale, a transparency level, assign the dynamic of the colour map to the min-max displayed values.	
<b>EO4-FCT-Display-0360/T</b>	The user can apply a mask on data to make transparent all data out of a min-max interval	
<b>EO4-FCT-Display-0370/T</b>	The system can display data values on a location, along the track, along a polyline, along a transect for 3D data	

<b>EO4-FCT-Display-0380/T</b>	The user can display the track of a mobile or set of mobiles, he can apply filters on the track, he can ask for an animation of the mobiles.	
<b>EO4-FCT-Display-0390/T</b>	When the location error of the positions are provided, the user can activate the display of the elliptic error along the track	
<b>EO4-FCT-Display-0400/T</b>	The user can ask for an extraction of data values along the track, by definition of a polyline, within the elliptic error or by definition of an area.	
<b>EO4-FCT-Display-0410/T</b>	The user can generate a report of a complete or a part of the displayed data in different formats: netCDF, CSV, KML/KMZ, PNG/JPEG, PDF	
<b>EO4-FCT-Display-0420/T</b>	Generic tools are used to compute the distance between two points or to an area.	
<b>EO4-FCT-Display-0430/T</b>	More specific tools allow the user to identify areas of interest such as fronts and convergences	
<b>EO4-FCT-ValMeta-0440/T</b>	Only the administrator can validate the product or service metadata: it is then available to any users.	
<b>EO4-FCT-ValMeta-0450/T</b>	The administrator will check the use of shared vocabularies, like skos, and conventions	
<b>EO4-FCT-InvMeta-0460/T</b>	Only the administrator can invalidate a product or service metadata: it is then not available to others users.	
<b>EO4-FCT-InvMeta-0470/T</b>	The administrator test a service uploaded in the EO4wildlife system. Once the test is OK, and the service metadata is validated, the service is ready for run.	
<b>EO4-FCT-manUser-0480/T</b>	The administrator manages (create/modify/delete) the users in the EO4wildlife platform. A user has an identifier, a name, an organization, a profile (ID, Name, Organization, Profile, login/Password)	

**Table 8:** Traceability matrix

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## Annex 1: EO data description

parameter	product name	coverage	satellite	date-start	date-end	granularity	frequency	resolution	type	catalogue/URL		
Ocean	Sea surface height	Absolute Dynamic Topography (aka Sea Surface Height above geoid)	Global: 72S - 72N, 180W - 180E	multi ( soon Sentinel-3)	01/01/1993	11/09/2015	daily	quarterly	0.25°x0.25°	grid	FTP, WMS	<a href="http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html">http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html</a>
Ocean	Sea surface height	Absolute Dynamic Topography (aka Sea Surface Height above geoid)	Global: 72S - 72N, 180W - 180E	multi ( soon Sentinel-3)	08/04/2014	-	daily	daily	0.25°x0.25°	grid	FTP, WMS	<a href="http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html">http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html</a>
Ocean	bathymetry	Bathymetry ETOPO1	Global: 90S - 90N, 180W - 180E	N/A (some altimetry in it)	-	-	-	-	1'	grid		<a href="https://www.ngdc.noaa.gov/mgg/global/global.html">https://www.ngdc.noaa.gov/mgg/global/global.html</a>
Ocean	Chlorophyll Concentration	Global Ocean, Ocean Colour Chlorophyll (daily observation)	Global: 90S - 90N, 180W - 180E	MODIS/AQUA, VIIRS/Suomi-NPP	01/01/2012	-	daily	daily	4 km	L3	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=OCEANCOLOUR_GLO_CHL_L3_NRT_OBSERVATIONS_009_032</a>
Ocean	Chlorophyll Concentration	Global Ocean, Ocean Colour Chlorophyll (Optimal Interpolation)	Global: 90S - 90N, 180W - 180E	MODIS/AQUA, VIIRS/Suomi-NPP	06/03/2013	-	daily	daily	4 km	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033</a>
Ocean	Chlorophyll Concentration	Global Surface Chlorophyll Concentration from Satellite observations (daily average)	Global: 90S - 90N, 180W - 180E	MERIS/Envisat, MODIS/AQUA, VIIR	04/09/1997	31/07/2012	daily	annual	4 km	L3	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=OCEANCOLOUR_GLO_CHL_L3_REP_OBSERVATIONS_009_065</a>
Ocean	ocean biology	Net Primary Production	Global: 90S - 90N, 180W - 180E	derived								CLS ? Or <a href="http://www.science.oregonstate.edu/ocean.productivity/standard.product.php">http://www.science.oregonstate.edu/ocean.productivity/standard.product.php</a>
Ocean	ocean currents	*Filaments* (convergence/divergence)	Global: 72S - 72N, 180W - 180E	derived	01/01/1993	22/10/2014	3-daily	annual	0.04°	Grid	FTP	<a href="http://www.avisio.altimetry.fr/en/data/products/value-added-products/fsle-finite-size-lyapunov-exponents.html">http://www.avisio.altimetry.fr/en/data/products/value-added-products/fsle-finite-size-lyapunov-exponents.html</a>
Ocean	ocean currents	currents (geostrophic) from Sea Level Anomalies	Global: 72S - 72N, 180W - 180E	derived multi ( soon Sentinel-3)	01/01/1993	11/09/2015	daily	quarterly	0.25°x0.25°	grid	FTP, WMS	<a href="http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/msla-uv.html">http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/msla-uv.html</a>
Ocean	ocean currents	currents (geostrophic) from Sea Level Anomalies	Global: 72S - 72N, 180W - 180E	derived multi ( soon Sentinel-3)	08/04/2014	-	daily	daily	0.25°x0.25°	grid	FTP, WMS	<a href="http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/msla-uv.html">http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/msla-uv.html</a>
Ocean	ocean currents	currents (geostrophic) from Absolute Dynamic Topography	Global: 72S - 72N, 180W - 180E	derived multi ( soon Sentinel-3)	01/01/1993	11/09/2015	daily	quarterly	0.25°x0.25°	grid	FTP, WMS	<a href="http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html">http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html</a>
Ocean	ocean currents	currents (geostrophic) from Absolute Dynamic Topography	Global: 72S - 72N, 180W - 180E	multi ( soon Sentinel-3)	08/04/2014	-	daily	daily	0.25°x0.25°	grid	FTP, WMS	<a href="http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html">http://www.avisio.altimetry.fr/en/data/products/sea-surface-height-products/global/madt-h-uv.html</a>
Ocean	ocean currents, Sea surface s	Global Observed Ocean Physics Temperature Salinity and Currents Reprocessing (1)	Global: 90S - 90N, 180W - 180E	derived multi techniques	01/01/1993	31/12/2012	weekly	weekly	0.25°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=GLOBAL_REP_PHYS_001_013">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=GLOBAL_REP_PHYS_001_013</a>
Ocean	ocean currents, Sea surface s	Global Observed Ocean Physics Temperature Salinity Heights and Currents Process	Global: 90S - 90N, 180W - 180E	derived multi techniques	01/10/2014	-	weekly	weekly	0.25°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=GLOBAL_ANALYSIS_PHYS_001_016">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=GLOBAL_ANALYSIS_PHYS_001_016</a>
Ocean	Ocean Temperature	Global Ocean OSTIA Diurnal Skin Sea Surface Temperature	Global: 90S - 90N, 180W - 180E	multi IR satellites (AVHRR from NC	24/02/2015	-	Hourly	daily	0.25°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L4_NRT_OBSERVATIONS_010_014">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L4_NRT_OBSERVATIONS_010_014</a>
Ocean	Ocean Temperature	Global Ocean OSTIA Sea Surface Temperature and Sea Ice Analysis	Global: 90S - 90N, 180W - 180E	multi techniques	01/01/2007	-	daily	daily	0.05°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L4_NRT_OBSERVATIONS_010_001">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L4_NRT_OBSERVATIONS_010_001</a>
Ocean	Ocean Temperature	Global Ocean OSTIA Sea Surface Temperature and Sea Ice Reprocessed (1985-2007)	Global: 90S - 90N, 180W - 180E	multi techniques	01/01/1985	31/12/2007	daily		0.05°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L4_REP_OBSERVATIONS_010_011">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L4_REP_OBSERVATIONS_010_011</a>
Ocean	Ocean Temperature	Global Ocean Sea Surface Temperature L3 Observations	Global: 90S - 90N, 180W - 180E	multi (IR and MW satellites: (NOA	30/08/2010	-	daily	daily	0.1°	L3	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L3S_NRT_OBSERVATIONS_010_010">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SST_GLO_SST_L3S_NRT_OBSERVATIONS_010_010</a>
Ocean	Ocean Winds	Blended Level 4 Gridded Mean Wind Fields	Global: 80S - 80N, 180W - 180E	multi	01/04/2004	22/11/2009	6-hourly		0.25°	Grid	FTP, WMS	<a href="http://products.cersat.fr/details/?id=CER_WIND_GLO_6H_025_BLD_QS">http://products.cersat.fr/details/?id=CER_WIND_GLO_6H_025_BLD_QS</a>
Ocean	ocean winds	Global Ocean Daily Gridded Sea Surface Winds from Scatterometer	Global: 80S - 80N, 180W - 180E	ASCAT on MetOp-A and MetOp-B	01/04/2007	-	daily	daily	0.25°	Grid	FTP, WMS	<a href="http://products.cersat.fr/details/?id=CER_WIND_GLO_1D_025_MWF_MA">http://products.cersat.fr/details/?id=CER_WIND_GLO_1D_025_MWF_MA</a>
Ocean	ocean winds	Global Ocean Wind L4 Near real Time 6 hourly Observations	Global: 80S - 80N, 180W - 180E	multi	15/11/2012	-	6-hourly	daily	0.25°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=WIND_GLO_WIND_L4_NRT_OBSERVATIONS_012_004">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=WIND_GLO_WIND_L4_NRT_OBSERVATIONS_012_004</a>
Ocean	Sea surface height	Sea Level Anomalies (aka Sea Surface Height above a mean sea surface)	Global: 72S - 72N, 180W - 180E	multi	24/03/2014	-	daily		0.25°x0.25°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEALEVEL_GLO_SLA_MAP_L4_NRT_OBSERVATIONS_008_026">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEALEVEL_GLO_SLA_MAP_L4_NRT_OBSERVATIONS_008_026</a>
Ocean	Sea surface height	Sea Level Anomalies (aka Sea Surface Height above a mean sea surface)	Global: 72S - 72N, 180W - 180E	multi	01/01/1993	22/04/2015	daily	~4 months	0.25°x0.25°	grid	FTP, WMS	<a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEALEVEL_GLO_SLA_MAP_L4_REP_OBSERVATIONS_008_027">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEALEVEL_GLO_SLA_MAP_L4_REP_OBSERVATIONS_008_027</a>
Atmosphere	winds	10 metre U wind component	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/</a>
Atmosphere	winds	10 metre V wind component	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/</a>
Atmosphere	pressure	Mean sea level pressure	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/</a>
Atmosphere	winds	U wind component at pressure levels	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=pl/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=pl/</a>
Atmosphere	winds	V wind component at pressure levels	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=pl/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=pl/</a>
Atmosphere	winds	U wind component at model levels	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=ml/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=ml/</a>
Atmosphere	winds	V wind component at model levels	Global: 90S - 90N, 180W - 180E	ECMWF ERA-interim model	01/01/1979	31/12/2015	daily	2 months		grid		<a href="http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=ml/">http://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=ml/</a>
		Optical image	specific areas	sentinel-2								<a href="https://peps.cnes.fr/">https://peps.cnes.fr/</a>

Table 9: List and details of most requested EO data

	parameter	product nam	coverage	satellite	date-start	date-end	granularity	frequency	resolution	type	catalogue/URL
Ocean	bathymetry	Bathymetry	Global: 90S - 90N, 180W -	-	-	-	-	-	30", 1'	Grid	WMS <a href="http://www.gebco.net/">http://www.gebco.net/</a> <a href="https://www.bodc.ac.uk/data/online_delivery/gebco/gebco_30_second_grid/">https://www.bodc.ac.uk/data/online_delivery/gebco/gebco_30_second_grid/</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	10-daily		1°x1°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-SSS-GLO-10D-100-CAT-SMOS">http://products.cersat.fr/details/?id=CER-SSS-GLO-10D-100-CAT-SMOS</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	10-daily		0.5°x0.5°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-SSS-GLO-10D-050-CAT-SMOS">http://products.cersat.fr/details/?id=CER-SSS-GLO-10D-050-CAT-SMOS</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	10-daily		0.25°x0.25°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-SSS-GLO-10D-025-CAT-SMOS">http://products.cersat.fr/details/?id=CER-SSS-GLO-10D-025-CAT-SMOS</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	monthly		0.5°x0.5°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-SSS-GLO-1M-050-CAT-SMOS">http://products.cersat.fr/details/?id=CER-SSS-GLO-1M-050-CAT-SMOS</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	monthly		1°x1°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-SSS-GLO-1M-100-CAT-SMOS">http://products.cersat.fr/details/?id=CER-SSS-GLO-1M-100-CAT-SMOS</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	monthly		0.25°x0.25°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-SSS-GLO-1M-025-CAT-SMOS">http://products.cersat.fr/details/?id=CER-SSS-GLO-1M-025-CAT-SMOS</a>
Ocean	Sea surface	Sea Surface	Global: 90S -	SMOS	01/01/2010	31/12/2014	weekly		0.5°x0.5°	Grid L3	<a href="http://products.cersat.fr/details/?id=CER-L4A-SSS-GLO-7D-050-CAT-SMOS">http://products.cersat.fr/details/?id=CER-L4A-SSS-GLO-7D-050-CAT-SMOS</a>
Ocean	Ocean Wave Significant W	Global: 72S -	multi				daily		1°x1°	grid	FTP, WMS <a href="http://www.aviso.altimetry.fr">www.aviso.altimetry.fr</a>
sea ice	Sea Ice conc	Global Ocean	Global: 90S -	multi	25/10/1978	31/10/2009	daily	annual	10 km	polar-stereo	FTP, WMS OSI SAF <a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_GLO_SEAICE_L4_REP_OBSERVATIONS_011">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_GLO_SEAICE_L4_REP_OBSERVATIONS_011</a>
sea ice	Sea Ice conc	Sea-Ice conc	Arctic	SSM/I	03/12/1991	-	daily	< 24 h	1°	Grid	<a href="http://products.cersat.fr/details/?id=OCF_ICE_GLO_1M_100_MGD_SSMI">http://products.cersat.fr/details/?id=OCF_ICE_GLO_1M_100_MGD_SSMI</a>
sea ice	Sea Ice conc	Sea-Ice conc	Arctic	SSM/I	03/12/1991	-	daily	< 24 h	12.5 km	Polar Grid	<a href="http://products.cersat.fr/details/?id=CER_PSI_ARC_1D_012_PSI_SS">http://products.cersat.fr/details/?id=CER_PSI_ARC_1D_012_PSI_SS</a>
sea ice	Sea Ice conc	Sea-Ice conc	Antarctic	SSM/I	03/12/1991	-	daily	< 24 h	12.5 km	Polar Grid	<a href="http://products.cersat.fr/details/?id=CER_PSI_ANT_1D_012_PSI_SS">http://products.cersat.fr/details/?id=CER_PSI_ANT_1D_012_PSI_SS</a>
sea ice	Sea Ice Conc	Global Ocean	Global: 90S -	multi	01/03/2005	-	daily	daily	10.0 km	polar stereo	FTP, WMS OSI SAF, <a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011</a>
sea ice	sea ice drift	Arctic Ocean	Arctic	multi	01/10/1999	30/04/2012	Weekly mea	annually	0.5°	grid	FTP, WMS <a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_ARC_SEAICE_L3_REP_OBSERVATIONS_011_010">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_ARC_SEAICE_L3_REP_OBSERVATIONS_011_010</a>
sea ice	sea ice drift	Global Ocean	Global: 90S -	Sentinel-1 S	03/09/2010	-	irregular	daily	10 km	polar-stereo	FTP, WMS <a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011_006">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011_006</a>
sea ice	sea ice edge	Global Sea Ice	Edge								<a href="http://osisaf.met.no/p/ice/">http://osisaf.met.no/p/ice/</a>
sea ice	sea ice temp	Arctic Ocean	Arctic	AVHRR on M	10/12/2014	-	daily	daily	0.05°	grid	FTP, WMS <a href="http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_ARC_SEAICE_L4_NRT_OBSERVATIONS_011_008">http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&amp;view=details&amp;product_id=SEAICE_ARC_SEAICE_L4_NRT_OBSERVATIONS_011_008</a>
Ocean	ocean currer eddy detecti	Global: 72S -	derived								to be published on <a href="http://www.aviso.altimetry.fr">www.aviso.altimetry.fr</a> in 2016; currently on <a href="http://cioss.coas.oregonstate.edu/eddies/nc_data.html">http://cioss.coas.oregonstate.edu/eddies/nc_data.html</a>

Table 10: List and details of complementary EO data