

A Taxonomy for the EO services market

enhancing the perception and performance of
the EO service providers



Rationale

EARSC's extensive engagement with Earth observation user communities has highlighted the need for a common language to help services providers and users arrive at a mutual understanding of the types of services that can be offered and the benefits that can be delivered. We have developed an Earth observation taxonomy that is not only a process of naming and classifying the EO services but additionally a tool to improve the understanding between these communities.

Under this context, this document presents a reduced version of the Del 4.3. from the CopHub.AC H2020 project, which outlines the third update of the EARSC taxonomy. The EARSC taxonomy has been carefully reviewed and includes for the first time a generic definition of available products and how those form the basis for the delivery of the EO services (the combination of e.g. EO products, in-situ data, modelling etc. to deliver contextualized knowledge to a service user). This taxonomy update, from both the market and thematic perspectives, has been conducted in close collaboration with the research community through the CopHub.Ac project.

Inside this taxonomy, each catalogue of services contains specific services offered to citizens, business, government and other organisations. The taxonomy should be continuously updated to ensure its continued relevance in a fast-changing sector. We have made every effort to ensure that the structure is sufficiently robust to accommodate future market segments and thematic topics; as the market changes and grows, these changes will need to be incorporated in future taxonomy updates.

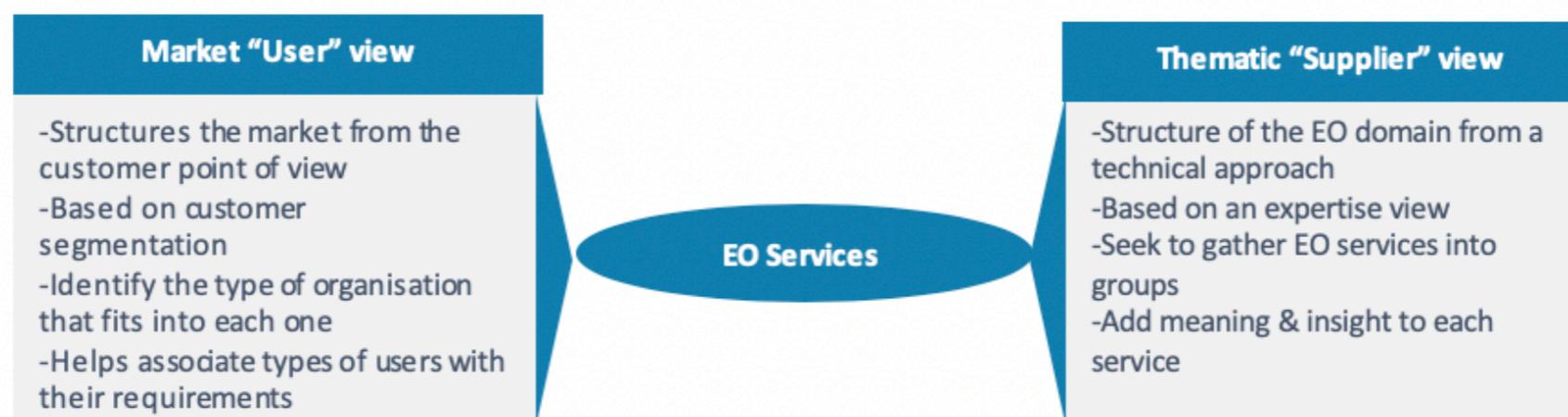
We look forward to receiving stakeholders' feedback and working with stakeholders in continuing this exciting evolution of the description and structuring of EO services.

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Executive Summary

For any sector providing services, reaching a community consensus on terminology is a prerequisite for ensuring a common understanding of the information exchanged among different stakeholders. Knowledge exchange among users of geo-information services presents many challenges and the development of a “knowledge-driven” approach is considered by the Earth Observation (EO) sector to be one of the milestones for embracing its diverse group of stakeholders. This update of a user-oriented taxonomy focuses on the translation between the world of the providers of EO services and the world(s) of their users. It provides a structured view of the uptake for EO services; it brings together the products and services which are offered by suppliers and maps those to the market sectors and needs to which those products apply.

Taxonomies, ontologies, inventories, different types of body of knowledges (BoK) or controlled vocabularies are the preferred means to achieve such a “common understanding” by identifying the terms of the domain and structuring the sector through semantic relationships, preferably with a focus on the end “user”. Under this foundation, the European Association of Remote Sensing Companies (EARSC) recognised a need to structure the “offer” of the sector, its products and services for the actual use of the communities from whom these offers are intended, the “uptake”. EARSC prepared and issued a first version of the Taxonomy for the EO Services Market in February 2012 and revisited the document in August 2015. This taxonomy provided guidelines of clear and common descriptions of products and services helping suppliers and users arrive at a common understanding of what can be offered.



EARSC representation of “User” and “Supplier” view

Executive Summary

This report presents and explains the rationale for the proposed EO taxonomy update and to address the common products and services from two perspectives: the market view and the supplier view.

The **market view** provides a tool to help classify and understand the markets for EO services as well as to define the type of customer. The representation of market stakeholders in the use of value-added services and applications is the core of this section. It focuses on user needs and the use of Earth observation from the users' point of view.

The “market taxonomy” has been upgraded reflecting the evolution of the sector and how the user groups are structured. One of the developments is the split of the market “public and international bodies” into other sectors. Within these organizations, their employees provide or make use of the EO services for sector-specific applications such as public administration activities assisting “environmental, climate change or health security” policy making decisions or actions in the “defence & security” sector, especially under emergency and social protection. Our latest findings on the “survey into the state & health of the sector” revealed a significant increase in the activities specific for different groups of users. Such was the growth in the “defence and security” segment, that even if we consider it explained by the weight of big contracts from big players in this sector, we decided to consider it in this revision as an independent sector. Other new independent market segments recently incorporated include “urban planning”, supporting the activities of many service providers in the public sector, and “citizens & society” with so many people now carrying a mobile application in their pockets able to visualise applications based on EO data. The latest has not been reflected in the previous taxonomy but gained relevance being a direct “user” of special EO services available through Apps. The Figure below represents the upgraded taxonomy with the Market (User) perspective.

Executive Summary



Executive Summary

The **thematic view** provides a tool to help describe and classify the services and products that are offered by the service providers. The “thematic perspective” deals unambiguously with a thematic application area (i.e. agriculture), which is not linked *per se* to the processing or acquisition of EO (or indeed, other kinds of) data or, quite naturally, to activities further upstream (i.e. satellite and sensor design or manufacture), instead the source focuses on concepts, challenges and applications in a specific domain (e.g. agriculture) or thematic segment (agriculture monitoring).

During the upgrade of the taxonomy, the structure of the thematic perspective was reviewed. The updated structure of the taxonomy thematic viewpoint allows for 4 levels/tiers in the description of EO services from the supplier side point of view. The Table below presents the EO services structure.

Level 1	Thematic classes (DOMAIN)	Single block of knowledge (big category of objects)	Largest conceptual category (typically nouns) covering all known areas of EO services from the supplier’s point of view. The EARSC taxonomy contains 6 classes.
Level 2	Thematic segment (AREA)	Set of EO services (greater detail of objects)	Classifies concepts in greater detail, i.e. different segments. The upgrade proposes 31 areas compared with the 25 in the previous taxonomy. Description is tackled in the thematic section .
Level 3	EO Service (SERVICE)	Purpose of the information	EO services (sometimes considered applications by service providers) propose an action or a sequence of actions (specific events appropriate in a given situation, e.g., “assess the environmental impact of farming”. For example, it unifies major entities such as environment, agriculture or deeper in granularity such as crops. The range today covers more than 80 services (see the section “ Structuring the EO services ” and the thematic taxonomy at the EARSC portal ⁹)
Level 4	EO Application	Specific for a geographical area, timeline, etc.	This level presents set keywords which in effect define the products which make up a service (key words are also considered in our taxonomy to represent products, parameters or essential variables).
	Products	Describe tangible satellite-based data products	
	Parameters & Essential Variables for the land, atmosphere and ocean	Information elements derived from EO data key <i>parameters</i> of the <i>Earth</i> and the environment	

While the major classes of the thematic taxonomy have not been adapted (**Level 1**: Six major thematic classes: atmosphere & climate, built environment, disasters & geohazards, land, marine & ocean, security & safety), the thematic areas in the **Level 2** have been slightly adapted through the addition of “climate change” under atmospheric a climate section, the specification of “biodiversity and ecosystems” for both marine and land segments, “food production” under defence and security, and adding, under the built environment thematic classes, dedicated segments on “networks” and “waste”. **Level 3** includes a revision in the thematic areas adding a description of EO Services, based on the feedback from thematic experts who have been consulted. For example, under “climate change” we have integrated elements related to “climate change monitoring, mitigation and adaptation”. In “built environment” domain we added a dedicated item on “urban settlements assessment”. The area dedicated to “multi-hazard assessment” was included as an EO service at the request of experts in the “disasters & geohazards” domain. Better descriptions and additions complement the **Level 4**; provision of keywords such as monitoring risk factors, fire weather index, flood map exposure and inclusion of “early warning”, at the “disaster & geohazards”. Concerning the land domain, we have incorporated a shift in the meaning of the concepts such as “measure land use statistics” in the sector, replacing “land accounting” or minor details such as replacement of “water level” with “surface water dynamics”.

Executive Summary

The Figure below represents the upgraded taxonomy with the Thematic (Supplier) perspective.



Executive Summary

These elements of the taxonomy fit together showing the hierarchy of the terminology used and how the EO services form the bridge between the market and thematic views on the taxonomy – both views (market/thematic) ultimately describe this same range of services.

EARS TAXONOMY								
MARKET (User) perspective				EO SERVICES (3 rd level)	THEMATIC (Provider) perspective			
Customer and User (view) 					Technician and Expert (view) 			
-Structures the market from the customer point of view -Based on customer segmentation -Identify the type of organisation that fits into each one -Helps associate types of users with their requirements					-Structure of the EO domain from a technical approach -Based on an expertise view -Seek to gather EO services into groups -Add meaning & insight to each service			
1st level		2nd level		2nd level		1st level		
MARKET	Responds to the highest rank in the market perspective, describes a part of the economic activity, it is a group or groups of customers who require the products and services provided by industry. Understand the major markets in which EO services are doing business. These major markets structure prove sufficiently robust to accommodate future sector segments. We can cite as an example the market super-category “managed living resources”.	SECTOR	It provides some granularity introducing a group of business activities (industry activities) that have similar characteristics. For example (agriculture, forestry and fisheries) all in the primary sector and helping to define the type of customers.	AREA	It is the set of EO services (greater detail of objects) with similar characteristics and associated patterns. There corresponds to thematic segments in each of the domain. For example, objects to be monitored in built environment such as urban areas, infrastructure, transport, or waste. It may be also named as a segment.	DOMAIN	Responds to the highest rank in the thematic perspective, categorises by type of activity for which the observations are being made i.e., risk assessment, forecasting, responding, monitoring, detecting etc. for a particular domain. We propose 6 domains (atmosphere & climate, build environment, disasters & geohazards, land, marine, security & safety). It may be also named as thematic.	
<p>The special nature of EO services is their composing ability. The EO services gather the information and data for a particular object. This characteristic allows the composition of service chains that tackle the necessity of solving complex business procedures supported by technological platforms. The EO services propose an action or a sequence of actions, specific events appropriate in a given situation geographically or temporal (an application) for example, “assess the environmental impact of farming in the region of Murcia”. For example, it unifies major entities such as environment, agriculture or deeper on granularity such crops. The description of the EO services include the products which make up a service but also key words representing the parameters or essential variables.</p>								