Market/User's EO needs (following eoTAXONOMY)

MARKET TAXONOMY				
Market	**Description**	**Sector**	**Users**	**"Needs" relevant to "EO services"[1]**
Managed living resources	Users in managed living resources refer to human activities exploiting natural organic resources. Knowledge and information products to forge a viable strategy for the user's operations such as the assessment of the status of the resource due to natural or human activities for effective commercial exploitation and conservation. This includes **agriculture, fishing and forestry** sectors.	**Agriculture**	Agricultural commodities/trading, agricultural production / horticulture, agricultural services, agriculture machinery, agriculture and rural development policy, agri chemicals / plants & fertilizers, animal production / livestock/ Stock traders on commodity price like wheat, coffee. The EO/GI users also include agriculture and rural policy makers and insurers.	• forecast production yield and monitor variability in crop development; • support usual farm management / operations providing highly accurate customized consultation to any farmer and for any kind of crop, from the smallest to the largest scale; • calculate the correct amount (savings) of fertiliser, water or pesticides; • more informed decision-making on crop type and land use, savings on seed through optimising seed density during planting (vegetation-Index Crop-Insurance); • implement a crop production index to build an insurance product; • evaluate farm solvency & trade on commodities stock exchange; • monitor farming deforestation impact and delineate field boundaries; • assess losses based on actual damage extent in the field overall monitor several stages in the value chain to make better-informed decisions in planning, planting and growing the new crops; • …
		Fishing	Fish stock management, fishing fleets, fishery distribution logistics, aquaculture / fish farms, coastal management agencies. Besides, the users include fisheries authorities / policy makers.	• improve fisheries economic activity boosting their income, making the fishing experience easier, safer, and more sustainable, assessing fish shoals, catch optimisation & understanding the impact, overfishing, livestock monitoring/management, etc; • detect patterns of illegal behaviour at sea (illegal fishing, narco-traffic, immigration, maritime pollution, piracy); • …
		Forestry	Forest management, forest services, commodities, logging industry, wood, paper and pulp industry, forest policy, forest machinery. They also include forest policy makers.	• establish historical forest area changes and implement forest monitoring solutions; • verify the impact of and compliance with no-deforestation policies and transform the industry towards sustainable practices (sustainable management of forest); • set-up reducing emissions from deforestation and forest degradation (REDD+ national strategy and support final users in obtaining certificates and carbon credits) (REDD+ MRV (monitoring, reporting and verification));

[1] Needs have been extracted from EARSC services providers activities at EARSC membership (www.earsc.org/members), Copernicus market report 2019 (https://www.copernicus.eu/sites/default/files/2019-02/PwC_Copernicus_Market_Report_2019_PDF_version.pdf)

				• perform cost-effective and accurate forest inventory, at national or local scales; • conservation and enhancement of forest carbon stocks, baseline mapping and stock change; • damage assessment; • …
Energy and mineral resources	Users in energy and mineral resources deal with the harvesting of energy from **renewable resources** and **extractive industries** including **oil and gas and raw materials**. EO information helps them in exploring potential locations to build new mines or power plants, in identifying risks from infrastructure and in managing the environmental impact of their operations. Uses that apply to the extractive industries: a study of landforms, structures, and the subsurface, to understand physical processes creating and modifying the Earth's crust.	**Renewable energy**	Solar energy providers, wind energy providers, tidal energy providers, energy and carbon traders, local and regional planners, and national policy makers.	• successful management of renewable resources as the selection and development of exploration areas; • detection and quantification of renewable energy potentials; • solar radiance data for renewable energy project planning, and nowcasting for extreme weather events; • assess environmental impact assessment for industrial permitting and monitoring purposes; • aspects of energy planning, production, and distribution within bioenergy and thermal power, wind, solar, renewable energy and energy-efficient heating and cooling solutions; • …
		Oil & gas	Offshore and onshore exploration and production, drilling and support services, oil and gas commodities trading, and energy planners.	• assessments and monitoring of environmental impacts related to energy exploration, extraction, transportation and consumption; • establishment of an environmental baseline, or snapshot, for planning and design; • monitoring conditions over time (via change detection, feature mapping or geophysical parameter measurement) to understand environmental impacts and trends; • hazard assessment (risk assessment and post-event analysis, including operational and situational awareness); • oil spill and pollution monitoring; • assess pack ice and icebergs, and internal wave/soliton mapping to help mitigate potential risks posed to offshore activities; • improved representation of the subsurface, optimize field development and achieve more efficient oil and gas production; • …
		Raw materials	Mining and quarrying companies, exploration and survey specialists, commodities traders, exploration and extraction equipment suppliers, drilling, excavation and support services, and regional planners / policy makers.	• challenges focus on lifecycle phases of the mineral extraction: areas of poor coupling, baseline historic mapping of environment and ecosystems, continuous monitoring of changes throughout the lifecycle, engineering geological evaluation, facility siting, pipeline routing and roads, identification of adverse terrain for trafficability, infrastructure monitoring, land motion relating to fault lines or other causes, lithological discrimination, mapping geological features, monitoring of assets, natural hazard risk analysis, reservoir management, risk assessment, structural interpretation, support to

				surveying crews for planning surveys and H&S, terrain evaluation and geo-morphology characterisation; • on-site field data and calibration information; • change detection and time series analysis; • risk management and environmental impact analysis; • geological mapping, mining management; • selection and development of exploration areas, detection and mapping of illegal mining activities, or monitoring assets; • …
Infrastructure & transport	Users in transport and infrastructure apply to all manufacturing and physical supply in **land** but also **marine** domains including **transport & logistics, utilities, construction, communication & connectivity**, and **tourism.** They oversee assets, monitor competition, build competitive advantage and source ground-truthing data.	**Construction**	Construction companies, civil engineering consultancies, architect and design companies, planning authorities, and national land agencies dealing with structures, tunnels, etc.	• assessments of key infrastructure changes and construction developments; • continuous mapping and monitoring of critical infrastructures across multi-site projects; • continuous monitoring to detect encroachment events, including intentional damage to infrastructure or a threat to staff safety; • engineering development, planning, monitoring and controlling of infrastructure solutions at all levels of scale and complexity to optimize the processes and results; • demand and suitability analysis; • assess the environmental impact of human activities (detect land movement, subsidence, heave, and monitor land-use statistics); • intelligence on the location, extent, magnitude and evolution of deformation; • …
		Utilities & supplies	Operators of utilities such as water, electricity, waste, power stations (including hydroelectric), water plants, landfill and waste, a well as survey companies, regulatory bodies, distribution companies, regional planners / policy makers.	• monitoring electrification planning, renewable energy resource assessment, distributed generation, grid operation and reliability, and disaster risk reduction and recovery efforts; • identify risk hotspots on and around the rights-of-way and mitigate risk by monitoring vegetation around power lines; • improve the safety and reliability of their network; • understand and plan tree trimming cycles and verify vegetation maintenance completion. Reduce the risks of power outages, asset damage, and other economic losses, as well as environmental and safety hazards from storms or wildfires; • improve access to reliable electricity and resilience infrastructure, incorporate renewable energy into the electric sector, and improve energy governance; • dynamic water availability and change monitoring, water demand and usage assessments; • …

		Communications & connectivity	Construction companies, civil engineering consultancies, architect and design companies, planning authorities, and national land agencies.	• support operations of communications networks through information to set up infrastructure settlement networks and coverage; • assessing changes to urban/rural areas, and mapping line of sight visibility; • …
		Transport & logistics	Road transport operators, haulage, road infrastructure operators, tolls, airport operators, rail operators, airlines and airline services, and transport engineers.	• corridor assessments and route / network planning; • reliable maps for transportation management systems to guide decision-making, determine how/where to engage across large supply chains in transport and logistics (rail, roads, highways); • assess and monitor high-risk areas by providing more information on geological hazards along with rail and road networks; • …
		Marine & maritime	Ports & Harbours administration, bulk cargo carriers, cruise liners operators, ferry operators, naval operations, and rescue and safety at sea.	• contribute to more efficient marine operations and further development of the Blue economy[2] comprising all the activities related to oceans, seas and coasts, that cover established sectors (e.g. exploitation and preservation; aquaculture, fisheries, water quality, coastal tourism, maritime transport, etc.) and new ones, e.g. blue bioeconomy and biotechnology, coastal and environmental protection, etc; • weather monitoring for vessel detection and identification; • policy objectives such (bath water quality, integrated coastal marine directive, marine strategy framework directive, UNEP regional seas; • …
		Travel & tourism	Tour operators, leisure service providers, hotels, parks etc., offices of tourism, travel agencies, ski and coastal resorts, surfers & sailors.	• forecast of weather conditions over a particular environment such as coastlines (safety of tourists and holidaymakers through operational weather observations and providing a picture of changing circumstances, natural features and their characteristics; • validate the assessment of resorts, evaluation of conditions for safety for outside activities (biological reserves areas (cannoping), improved mapping for tourists with classification and other advanced automated processing technologies; • cultural heritage, displacement monitoring (detection of slow movements and structural failures of historical buildings and structures and of terrain in the surrounding areas); • assessment of land use change (e.g. pollution in rivers and lakes); • …

[2] 2018 Annual Economic Report on EU Blue Economy (https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/2018-annual-economic-report-on-blue-economy_en.pdf)

Financial & digital services	Users in financial and digital services cover a broad area of activity that touches on many other market sectors such as **insurance & real estate, retail, news & media and digital interfaces**. They look to better understand risks, accelerate claims, and detect fraud. The categories included are identifiable as a "service" for the tertiary sector which provides advice, access, experience activities and knowledge and there are not part of the physical supply of goods.	**Insurance & real estate**	Primary insurance companies, re-insurance sector, insurance brokers, insurance service suppliers, commercial banks, major projects, and international financial institutions).	• detection and monitoring of hazard-prone locations, including vulnerability assessment; • better management of risk exposure, assessment (capital/risk) to natural disasters such as hurricanes, earthquakes, and floods; • key analytics reports and alerts of risks (such identification of risk); • assess situations for predictive analysis or risks on a property basis; • …
		Retail & geo-marketing	Retail centres and advertising and marketing agencies. They use EO/GI data in the field of navigation and Location Based Services (LBS), shopping chains or logistics.	• leverage geospatial intelligence to take management decisions leading to reduced costs on, e.g. new location selection, practices or processes through e.g. implementing dashboards to integrate and visualize spatial variables & information such as reliable NRT data, stores and localized areas, identification of public segments of interest, location of establishments, billboards and their influence on online advertising, customer dynamics, study of competitors, price strategy design etc; • …
		News & media	Television companies, broadcasting providers, news and information agencies, web service providers, and entertainment software providers.	• bringing together images, videos, and visualisations from the Earth onto known platforms (digital, print, radio, television) to inform society on the ecosystems, environments, emergency, risk and safety of people or socioeconomical impact; • …
		ICT, knowledge & digital interfaces	Fixed and mobile telecommunications providers.	• assist with data processing and enhancements, and provide a range of specialist analysis ready data solutions to help final users maximize intelligence from imagery; • basemap data for radio network analysis; • …
Urban development	Users in urban development and users involved in the development of rural settlements perform tasks at local and regional scales (to the scale of nations) on mapping land use and monitoring urbanization. These users benefit from EO information to manage the use of land & its impacts. Users include experts in e.g. urban planners, architects, spatial planning offices, urban policy makers in public/private sectors in **smart cities** or **generic urban** local/regional **planning** belong to this category.	**Smart cities**	Urban planners, architects, spatial planning offices, urban policy makers.	• baseline inventories for site suitability studies, city infrastructure monitoring, information on green urban areas and peri-urban ecosystems; • estimate distribution of the population, economic activity, property ownership and valuation, land use/ land cover inventories; • sustainable cities and communities creating places where the environments enhance liveability and quality of life; • classification tools using administrative vector data as reference for supervised image classification; • map and assess urban adaptation to climate change, environmental/socio-economical characterization and map green urban areas in and around cities; • map risk of land change and ground deformation and its temporal evolution;

				• water and sanitation planning to support water related infrastructure projects and waste management; • …
		Local & regional planning	Spatial planning departments of municipalities, spatial planning offices, and spatial planning policy makers	• inventories of informal settlements, integrating different data streams into the map-based products (cadastral maps for land administration and mapping); • mapping of building footprints and building blocks as well as classification of building/infrastructure types; • optimize planned routes for transport and infrastructure, and when combined with mapping solutions, can help mitigate the impact of natural hazards whilst minimizing project costs; • interactive analysis, simulation and visualisation tools for urban policy implementation; • socio-economic and demographic analysis and impact assessment, facility planning; • …
Defence & security	Users in **defence** and **security** work in the field of **military, emergency and social protection** and define, collect, analyse information to provide intelligence & safety (monitor events, improve response and drive resilience). Some examples are activities under **Humanitarian response** such as border control organisations, police and rescue forces, coast guards, civil protection, military services, and intelligence services which can use EO services to detect and monitor high risk areas produced naturally or by humans, monitor border incursions or maritime movements.	**Emergency & social protection**	Coast guards, ambulance services, fire services, police services, civil protection organisations, and rescue services. They benefit from increased efficiencies and effectiveness through monitoring, detecting and assessing natural risks/disasters.	• mapping disaster areas for situation awareness and detecting sensitive risk areas; • economic and social vulnerability assessment to natural hazards and climate change (monitoring, action and adaptation); • assess loss (€/m2) mostly for assets combined with in-situ data; • …
		Security, defence & military	Border control organisations, police and rescue forces, military services, and intelligence services.	• defence mission (naval forces): intelligence, support to troops, manoeuvres, support to aerial operations, interception of suspicions activities (assist with trapping/catching traffickers in the act); • support the detection of illegal or irregular activity and to make land /maritime operations safer and more efficient (situational awareness), overall citizens' security; • …
		Humanitarian operations	Humanitarian aid and support organisations such as; at European level (DG RELEX, DG ECHO, DG ENV/ MIC), at UN level (OCHA, UNHCR, UNDPKO, UNDP, UNOPS, UNITAR, UNICEF, UNESCO, WFP), International (IFRC, WHO, WB, donor organizations), and national level (Civil Protection Agencies, Ministries of Internal Affairs/ Civil Protection Department, Development and Aid agencies).	• improve emergency response and assessing pressures on populations and migration, monitor & tracking displacement population and humanitarian movement and camps; • assessment and support to aid actors dealing with hazard assessment (risk assessment and post-event analysis), including operational and situational awareness as well as those involved in recovery, disaster risk reduction and preparedness activities; • disaster resilience and assessing geo-hazard vulnerability of cities & critical infrastructures; • reach actionable information to send the right people and supplies to the most vulnerable sites;

				• …
Environmental, climate & health	Users in the **public administrations** or **private organizations** using EO to increase the **environmental or climate change** impact on policy making decisions which are key to our safety and our economy i.e., assisting in developing monitoring to evaluate and deliver policy goals, provide an assessment of ecosystems, rapid response to major environmental risk events, or those associated with **health security** & care. These users are largely related to international treaties and hence a strong international collaboration.	**Environmental ecosystems & pollution**	Environmental ecosystems & pollution users include coast guards, ambulance services, fire services, police services, civil protection organisations and rescue services.	• assist with the preservation of the natural environment such as reservoirs, inland water monitoring, water management systems (hydrological, hydrogeological maps, water point); • solutions that safeguard the environment such as environmental impact assessment, strategic environmental consultancy, sustainability, waste & resources); • resilient & sustainable ecosystems including continuous monitoring of ecosystems such as wetlands; • …
		Health care	Public administration personnel, civil servants, public health community, etc working on health issues such as air quality, forecasting sunlight exposure, forecasting epidemics, diseases.	• site-specific field conditions as well as import phenological timing events, which helps to make predictions on air quality, which impacts on the health of citizens; • pandemics highlight the need for a comprehensive and integrated approach to human health. Enhancing environmental health through better air quality, water and sanitation, waste management, along with efforts to safeguard biodiversity, will reduce the vulnerability of communities to pandemics and thus improve overall societal well-being and resilience; • …
		Meteo & climate	Meteorologists in a range of downstream sectors.	• disaster resilience and assessing extreme weather; • monitor, understand, evaluate and assess the impact of the climate change; • prediction of conditions of atmosphere reliable weather forecasts; • mitigation actions preventing/reducing the emission of greenhouse gases into the atmosphere; • climate change data modelling (aerosol, biomass, cloud, fire, greenhouse gases (GHG), glaciers, ice-sheets, land cover, land surface temperature, ocean colour, ozone, permafrost, salinity, sea ice, sea level, sea state, soil moisture, snow, sea surface temperature (SST), water vapour); • renewable energy production prediction, all kinds of commodities market trading, inventory management; • …
Citizens & society	Citizens and society in general use and engage with EO services through **mobile devices, social media platforms and apps**. We also categorize in this section	**Consumer solutions**	Mobile devices, social media platforms, apps developers.	• adoption by society of mobile devices, social media platforms, internet connectivity, Internet of Things (IoT), machine learning, portable and low-cost sensors to interact and visualise scientific research for their interest;…

	the users in **education, research and training** providing knowledge and learning outcomes.	**Leisure**	People oriented to basic public understanding on EO services for their leisure activities	• citizen interest on particular environments and ecosystems such as beach area estimation, (understand and check protected areas where sports may be regulated), wind, water depth, water salinity, etc; • information on textures and landscapes for video games, such as flight simulators, augmented reality, 3D; • …
		Education, training & research	Schools and education authorities, universities, research organisations, and professional training organisations	• through environmental research, academics make discoveries that impact on environmental and social outcomes; • enabling the education and research community to find and consume EO services, data access, processing tools, analytics, etc for their research field; • growing the awareness of EO services in researchers in disparate fields leading to new use cases; • promoting the use of EO in schools to foster innovative thinking and ideation of the applications and services of tomorrow; • …

Extracted from EARSC taxonomy https://earsc-portal.eu/display/EOwiki/EO+Taxonomy.
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