



e-shape Immersed

accelerating Earth Observation solutions



EuroGEO
Showcases:
Applications
Powered
by Europe

e-shape is the flagship European project bringing together key European actors to ensure the optimal implementation of EuroGEO and, eventually, the delivery of EO-based benefits to a wide range of stakeholders in key societal areas.





e-shape coordinates multiple actors and activities with the ultimate aim to border Copernicus and GEO for the benefit of users.

e-shape showcase Agriculture

“The possibilities for Copernicus data in Agriculture are enormous and very diverse, supporting the institutional market, Common Agricultural Policy, insurance, agro industry and many more domains, as demonstrated in the different agricultural pilots.”



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> Pilot: GEOGLAM

Within our GEOGLAM service, new capabilities and supporting tools to monitor crop calendars at a global scale are developed. These include an app to easily collect reference data by non-expert users (CropObserve), a centralized database for the curation of agricultural in-situ data (Agrostac), all of which are supporting the newly started GEOGLAM in situ data working group. Next to this we also provided supporting documents and lessons learned on how to use the European EO-infrastructures to provide a global on-demand agricultural monitoring service.

> Pilot: EU-CAP Support

Delivering targeted services to cotton farmers and agro-insurers through the agrowth platform, such as optimal sowing date recommendations and yield predictions months before the harvest. It also aims at bringing together different actors in the cotton value chain in Greece.

> Pilot: Vegetation-Index Crop-Insurance in Ethiopia

An index-based single-peril drought insurance scheme provides support to smallholder farmers in Ethiopia. The EO-based monitoring system is also expanded to other areas in Africa to provide information on drought, drought progression and impact at the regional level, with the aim to mitigate the risk of climate change for farmers across Africa.

> Pilot: Agro industry

Through the WatchItGrow platform, EO-based services are provided to a wide number of agro-food actors, such as the processing industry, seed breeders and multipliers, insurances and machinery companies, enabling a one-stop shop where farmers can access the data from and interact with all these different actors.



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➤ **Pilot: Linking EO and Farm IoT for Automated Decision Support**

Support automated farm management with EO-information. The focus of this pilot is on vineyards and orchards, to optimize fruit cultivation, by assisting farm management software developers to integrate EO data in their systems, focusing on the complementarity with Internet of Things (IoT) sensors and Decision Support Systems (DSS's).

➤ **Pilot: Service for SDG 2.4.1 and 15.3.1 indicators**

Demonstration of how you can go from a small piloting area to a national mapping effort through the upscaling in the cloud. In this pilot, several SDG indicators will be calculated for all of Ukraine*, focusing on land productivity and land cover dynamics.

* The pilot is located in Ukraine, and is currently being partially redirected!

➤ **Pilot: DynaCrop- unlocking EO intelligence across the food value chain**

Instead of building another solution for farmers, Pilot 7 pursues a synergy with companies that are already established in the food value chain, and helps them to integrate EO-based information through a white-label ecosystem. This allows an easier integration of EO-data into existing data systems, and provide clients with state-of-the art service and consulting at low costs.

e-shape showcase Health

“
Demonstrates the value
of Earth Observation,
engagement of communities
and delivering data and
information in support of
Public Health Surveillance
by yielding insight into the
threat of vector-borne and
environmentally-linked
diseases.”



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> Pilot: EO-based surveillance of mercury pollution

The Knowledge Hub developed under the GEO Flagship Global Observation System for Mercury (GOS4M) provides tools for mercury pollution monitoring, data sharing, scenario analysis to enable decisions of Parties of the Minamata Convention on Mercury and its effectiveness evaluation.

> Pilot: EO-based surveillance of POPs pollution

Delivering critical data on Persistent Organic Pollutants to decision-makers, thus enabling adoption of targeted policies that protect the environment and human health. Through harmonization of metadata production, archiving and sharing it is possible to anticipate changes in the global environment and act accordingly.

> Pilot: EO-based pollution-health risks profiling in the urban environment

The Teaser Platform of the Health Surveillance Air Quality Pilot collects and visualizes city-tailored, health-relevant air quality information, utilizing a variety of existing Earth Observations in support of stakeholders from the environmental and health sectors of selected cities in the globe.

> Pilot: EYWA - Early Warning System for Mosquito-Borne Diseases

EYWA - Early Warning System for Mosquito-Borne Diseases (MBD), is a niche state-of-the-art tool that distils Earth Observation data combined with advanced epidemiological and entomological modelling to provide early warning for both mosquito populations and MBD risk.



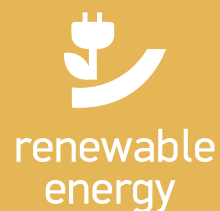
Winner of the first "EIC Horizon Prize on Early Warning for Epidemics"

e-shape showcase Renewable Energy

“Contributes notably to the clean energy transition of the European Green Deal, the UN Sustainable Development Goal 7 (SDG7), and to the initiative GEO VENER, engaging collaborations between research centers, data providers, DIAS, and end-users from industries, decision-makers and citizens to provide from different Copernicus and other European EO sources, innovative and technology mature products and services for renewable energy development and management.”



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> Pilot: nextSENSE - Solar energy nowcasting @ short-term forecasting system

Provides continuous monitoring and short-term forecasting of solar energy in real-time for Europe and North Africa.

> Pilot: High photovoltaic penetration at urban scale

Focuses on high photovoltaic penetration at urban scale and provides services for historical and forecasted time series of power output of fleets of distributed PV at urban scale and integration to FlexiGIS, the open-source GIS-based platform for modelling energy systems and flexibility options in urban areas.

> Pilot: Merging offshore wind products

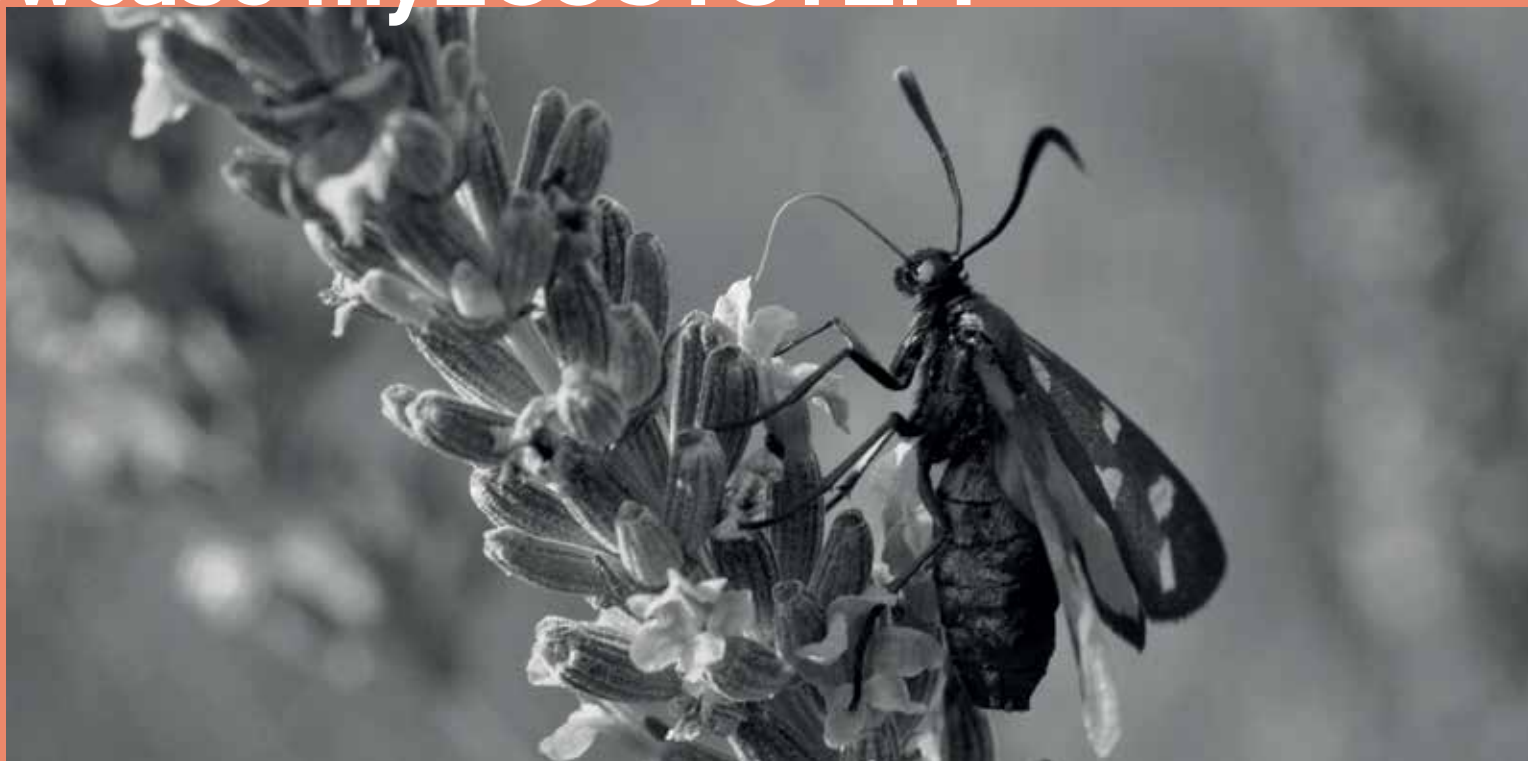
Is dedicated to offshore wind energy and provides high-resolution wind maps in near-real-time and resource maps combining images from the heritage of European SAR and scatterometer missions.

> Pilot: WindSight - First class input data for wind energy models

Provides EO-based first class data for on-shore wind to ensure optimal wind resource estimations from the combination of Copernicus Sentinel 1 and 2.

e-shape showcase myECOSYSTEM

“
Serves focal user groups such as research, environmental assessment, reporting and management by offering seamless access to consistently scaled environmental information from various sources (in-situ, Earth Observation, Modelling) at benchmark sites.”



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> Pilot: mySPACE

Provision and access to standardized and value-added products through the integration of in-situ and Earth Observation data, with a special focus on ecosystems/biodiversity for several research sites across Europe.

> Pilot: mySITE

Enable access to standardized and harmonized in-situ data from research sites across Europe for the integration with Earth Observation data and Essential Biodiversity Variables workflows.

> Pilot: myVARIABLE

Provide access to and link discoverable and harmonized Essential Biodiversity Variables (EBV) datasets from one unique location, specifically fostering accessibility to EBV datasets of several research sites across Europe.

e-shape showcase

Water Resources Management

“Reflects the multidisciplinary of this field by presenting seven pilot applications that focus on different elements, from inland waters to coastal areas and the ocean, providing a link to different European Directives and Policies - Water and the Marine Strategy Framework Directives, the Floods, the Integrated Coastal Management Directives and the Common Fisheries Policy - and SDGs - Clean Water and Sanitation, Life Below Water and Climate Action.”



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> Pilot: Improved historical water availability & quality information service

SMHI has developed and setup the Hydrological Predictions for the Environment (HYPE) operational model to address a number of user needs for water quantity and quality monitoring at different temporal and spatial scales (i.e. hydropower, water authorities, emergency response management centers, general public). With the effort developed in e-shape, the HYPE team is able to compare model results with EO based observations to better understand model setup limitations.

> Pilot: Satellite Earth Observation-derived water bodies & floodwater record over Europe

The HASARD flood mapping algorithm developed by LIST enables systematic, automatic and reliable spaceborne SAR mapping of terrestrial water bodies. The pilot

is currently focusing on upscaling and operationalizing the HASARD service so that a water bodies and floodwater record is generated at large scale and over a long period to support flooding-related disaster risk reduction in Europe.

> Pilot: Dive - Diver Information on Visibility in Europe

PML is currently releasing the Dive mobile app to provide Near-Real-Time EO based visibility information to diver communities in Europe, which are estimated to include around 3.2 million active divers in Europe, making this crucial commercial service for many coastal economic areas.

> Pilot: Sargassum detection for seasonal planning

Unprecedented massive landings of sargassum have been observed since 2011 along the shorelines of a huge area encompassing the Gulf of Mexico and the Caribbean Sea, affecting local communities, marine environment and industry, in particular, the tourism



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and fishing sectors. CLS is developing an EO based application to detect sargassum landings at an early stage, monitor and predict, with months in advance, their impact during sargassum season in the Caribbean Islands.

> **Pilot: Monitoring fishing activity**

IPMA and Deimos are developing a pilot application to strengthen the knowledge on the fish supply chain by developing an operational EO service that monitors the dynamics of vessels operating in the Northeast Atlantic waters, focusing on two fleets involved in pelagic fisheries of highly migratory oceanic species: the pole and line and the drifting longline fisheries targeting tuna and swordfish respectively.

> **Pilot: EO based phytoplankton biomass for WFD reporting**

WaterInsight has developed an application that provides Water Framework Directive ecological

status products of phytoplankton biomass for management of selected water bodies, based on Chlorophyll-a concentrations derived from EO data, able to adjust to local water types and WFD threshold differences. With this application they aim to generate further support to the use of EO based products in the scope of the WFD at political, administrative and management levels.

> **Pilot: Rheticus® AquaculturePlus**

Planetek Italia is improving their Rheticus® aquaculture support service that uses satellite data and derived measurements of water parameters and a model for shellfish growth to estimate mussels' growth rates and provide them to their users in the Mediterranean region via weekly bulletins. They are focused on extending their service portfolio to oysters aquacultures, bringing their service closer to operational (TRL-9) and implementing additional pilots.

e-shape showcase

Disasters Resilience

Builds on Earth Observation and develops state-of-the-art products and services in support of disasters resilience for the protection of citizens, economies and ecosystems.



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disasters

> Pilot: E04D_ASH - EO Data for Detection, Discrimination & Distribution (4D) of Volcanic ash

Prototypes a system for the detection, discrimination and distribution of volcanic ash, which integrates multi-source data and provides the aviation community with tailored information in a unique visualization platform.

> Pilot: GEOSS for Disasters in Urban Environment

Integrates and brings in an operational end-to-end hydro-meteorological forecasting chain to predict the weather evolution and the corresponding hydrological and hydraulic impacts in the urban environment, in support of the Italian Civil Protection.

> Pilot: Assessing Geo-hazard vulnerability of Cities & Critical Infrastructures

Assesses geo-hazard vulnerability of cities and critical infrastructures and increases urban resilience against geo-hazards with the use of multi-mission Earth Observation derived products and the delivery of services.

> Pilot: ReSAgri - Resilient & Sustainable ecosystems including Agriculture & food

Supports resilient and sustainable ecosystems including agriculture and food, providing four services in support of farmers and the insurance sector: Adverse Selection, Damage Assessment, High Level Monitoring, and Early Warning.

> Pilot: FRIEND

Provides both citizens and experts with a Flood Risk and Impact Assessment tool based on indicators, time-series charts, and forecast maps through automatic change detection of S-1+S-2 satellite images and climate data from observations and numerical models.

> Pilot: MountaiNow

Provides an interactive live-map of mountain hazards for Europe and the world offering a unique set of actionable information by combining real-time crowdsourcing, Copernicus and GNSS data exploited through Big Data analytics techniques.

e-shape showcase Climate

“Climate adaptation is on our doorsteps, but the routines to include climate change information into human activity planning is not yet developed. As different seasons need different actions the new seasonal forecasts from the Copernicus Climate Change C3S service is a way to have every month something new to include in planning activities. Useful seasonal forecasts are always combined with local climate information and together they help to assess what changes could be likely in the next season in your own backyard.”



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climate

> Pilot: Global Carbon and Greenhouse Gas Emissions

The Global Carbon Project is trying to measure the pulse of our planet in respect to climate change. It is a very complex task, and the Carbon cycle pilot is helping GPC to improve both ocean and land surface flux modeling. A satellite data comparison will help to validate the modeling.

> Pilot: Urban resilience to extreme weather - climate service

Urban resilience to climate change is more and more becoming a routine activity for European cities. Three different services are helping German, Austrian and Finnish cities by combining weather forecasts, seasonal and climate predictions for particular challenges in the pilot cities.

> Pilot: Forestry conditions - climate service

Harvesterseasons is a climate service that helps forestry understand local conditions and seasonal outlooks. Climate change is very clearly affecting winter time harvesting and forces the industry to transition into summer time operations more and more. The FMI service is predicting longtime probabilities for good conditions both in upcoming winter and summer times. This helps forestry to choose where to act in the coming months, leaving easier patches for summer and planning challenging patches with longer time horizon ahead.



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> **Pilot: Hydropower in snow reservoir – climate service**

Kemijoki Oy is the biggest hydro power operator in Finland. The uncertainty in snow water reserves has a big impact on their business and to be able to project this uncertainty into business decision, weather and seasonal forecasts need to be turned into probabilities of river flow on the 20 or so dams with power production.

> **Pilot: Seasonal preparedness**

Seasonal preparedness is on one hand needed for tourists' decisions planning their holidays and Finnish car tire companies preparing for winter tire sales. Again seasonal or sub seasonal predictions are needed to extend weather forecasts into the future.

> **Pilot: Super resolution air quality monitoring service**

This pilot is new trying to downscale and predict air quality and carbon emissions on urban scales. It is just being developed, so it will be exciting to see how it can help to make urban life more sustainable.



The **e-shape**
project of the
EuroGEO is poised
for success.

Changing lives
& bridging
EO Communities

e-shape works with and for users to maximize Earth Observation enabled benefits

Co-Design

In e-shape, a co-design model considering EO specificities is progressively designed and tested with e-shape pilots, through a dedicated work-package (WP2). A first analytical framework has been built, especially highlighting that a co-design model adapted to EO context should involve two distinct phases: (1) a critical “diagnosis process” to identify the co-design needs, classified in four main types of co-design, (2) the implementation of co-design actions to address these co-design needs.

Highlight #1: A diagnosis process to help the pilots to better structure their co-design strategy identifying relevant forms of co-design actions at different time horizons.

Based on the analysis of e-shape pilots, a certain variety of co-design needs could be identified, leading us to define four main types of co-design.

Highlight #2: Rigorous protocols to conduct co-design actions ensuring the growth of the EO ecosystem in a resilient perspective.

Co-design should be considered as a way of growing an ecosystem of efficient EO-based service designers. It is based on a continuous process involving four types of actions aiming at unlocking blocking points occurring in the development of the services.

Highlight #3: Sharing our methodology with the Earth Observation community WP2 aims at sharing its latest achievements and discoveries beyond e-shape, with the wider EO community.

Highlight #4: Advancing academic research in design and innovation management

The development of the co-design method in e-shape also brings significant contributions to research in design and innovation management, especially investigating the specificities of a data-based regime of design, that would ensure the growth of a data-based ecosystem supporting multiple actors of various sectors in tackling grand challenges.

Building on European Earth Observation infrastructure assets

Implementation

The huge amount of open access Copernicus data, the recent European infrastructures offering Cloud services for Earth Observation developed by public and private companies and new technologies enable tremendous benefits for research and business development, expanding the market of Earth Observation-derived information. But these resources continue to be complex to use, and the rapidly evolving

landscape adds complexity for new players. The e-shape implementation work package takes a user-centric approach to identify the challenges and the lessons learned out of the implementation of 37 pilots from 7 thematic domains to build a shared vision and understanding of the Resources landscape, collect proven best practices for cross domains innovation, and to mainstream their usage.

> The 68 e-shape partners implement 37 pilots over 7 thematic domains. The Implementation work package monitors, supports, and collects the lessons learned and knowledge to foster cross domains fertilization and innovation. These lessons learned will contribute

to the final e-shape development guide.

> The implementation work package identifies the most common issues expressed by the pilots’ development teams to gather information and build knowledge that can be used to raise awareness, contribute to capacity building resources, build common understanding and vision that will foster further progress and cooperation within and across domains.

> Some topics of work are the European platforms landscape and evolution, Challenges for the EO community to adopt Cloud technologies, In situ data challenges and trends, GEO Data Management and other principles, data value and needs, licenses for Earth Observation etc.

e-shape has been developing an unprecedented suite of services in support of the exploitation of EO solutions

Our commitment to economic sustainability & upscaling

e-shape aims to support the long-term economic sustainability and – where applicable – the commercialisation of each pilot. A comprehensive support package offering the tools required to develop robust business plans or long-term economic sustainability strategies has been developed and made available to the pilot partners. Several of these tools will also help the greater EO solution providers community.

Sustainability Booster

The Sustainability Booster, a novel facility developed under WP5 in e-shape, provides insights on market and technology trends, expert advice on innovation and intellectual property, and access to sources of investment and funding. This helps EO product and service providers to get their solution off the ground and grow their business.

PERL

e-shape has developed the pilot Exploitation Readiness Level (PERL), a new robust methodology that incorporates technical, operational and market related parameters in the assessment of the readiness of an EO-based solution. This helps e-shape pilots to better understand where their solutions stand and to support their optimal exploitation in the future.

Socio-economic value analysis of EO solutions

Services and products developed under e-shape have the potential to deliver significant benefits to users and stakeholders in associated value chains. Applying and extending the methodological framework developed within the Sentinel Benefits Study, three reports on socio-economic value of EO in and across different sectors have been produced to support understanding and quantifying such benefits and to stimulate further uptake of EO-based solutions.

Onboarding

Through the onboarding of new pilots, the e-shape consortium is able to complement competences and to include additional needs and the latest developments and trends in EO in its activities. Two open calls attracted a large number of innovative proposals, resulting in the selection and onboarding of 10 Pilots over a period of two years.

EoMall

The EoMall gallery for e-shape offers its pilots the opportunity to showcase their Earth Observation services online to the market. It enables promotion of these services, nurturing a broader access and participation within the community and contributing to an improved uptake amongst new and established audiences.

EO Maturity Indicators

Building on earlier work under the H2020 GEO-GRADLE project (now a GEO initiative), e-shape has extended the EO Maturity Indicators (EOMI) Methodology. EOMI provides a standardised, robust framework for the assessment of the current state of EO activities at country level. In e-shape the methodology has been refined and tested in eight European countries.





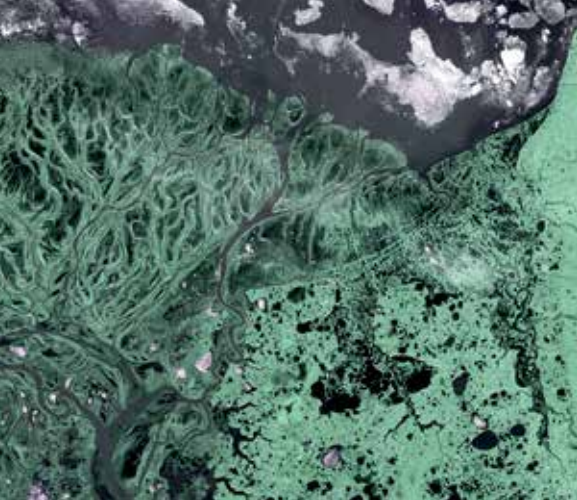
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SDG's

Through the development of our 37 pilots in 7 showcases we aim at contributing to the targets of the Sustainable Development Goals by proposing solutions to combat poverty, inequality, climate change, environmental degradation and to support prosperity, peace and justice.

SENDAI Framework for Disaster Risk Reduction

Disaster risk reduction is the main focus of the e-shape showcase on Disasters. It develops a portfolio of services for evaluating natural and human induced disasters for citizens' protection, economies and ecosystems in line with the priorities and the goals set by the Sendai Framework on Disaster Risk Reduction.

PARIS Agreement on Climate Change

The e-shape showcases "climate" and "renewable energy", as well as other showcases, respond to Climate Change adaptation and mitigation by proposing pilots, tools and sustainable solutions (i.e. reducing GHG emissions).

GEO

GEO aims at developing a future where decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth Observations. Each development within e-shape supports this outstanding goal. The strategic findings of e-shape will be shared with the GEO community.

EuroGEO

e-shape was designed and implemented to support EuroGEO, the European Regional initiative of GEO. It aims at delivering an integrated European contribution to GEO and increase GEO benefits for Europe. EuroGEO acts as an incubator to produce and test EO services and delivers specific EO applications. It promotes, scales up and develops EO applications in association with users.

Copernicus

The Copernicus programme is a major contribution of Europe to the benefits of the world citizens. Through the core services of Copernicus everyone worldwide can access to up-to-date information about the environment and can develop new applications. e-shape leverages this European asset to develop its 37 pilots and to share it with users at a local, national, European or global level.

What inspired us



Starting date → 1.05.2019

Project information → 48 months | 68 partners | EU contribution 14 998 976.27 €

Call (part) identifier → H2020-SC5-2018-2

Coordinator → Professor Thierry Ranchin | MINES Paris - PSL University

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