

**2020-2022 GEO Work Programme**  
**Implementation Plan for GEO Initiative**  
**GEO-CRADLE: GEO Capacity Building in North Africa, Middle East, Balkans, Black Sea**

**1. Executive Summary**

- **Full title of the Initiative:** GEO Capacity Building in North Africa, Middle East, Balkans, Black Sea
- **Short title or acronym:** GEO-CRADLE
- **Existing or proposed category:** GEO-CRADLE started as an EC H2020 project and was recently upgraded to a GEO Initiative.

- **Overview:**

The establishment of the new GEO Initiative for GEO capacity building in North Africa, Middle East, and Balkans (NAMEBA) with a potential to expand to Black Sea (namely the Region of Interest or RoI), sustains the key outputs of GEO-CRADLE and scales-up their reach in terms of geographic coverage and operational maturity. The scope of the new Initiative is strongly motivated by the need to capitalise, sustain and scale up the results mainly achieved during the implementation of the 34-month H2020 [GEO-CRADLE](#) project (02/2016-11/2018), also promoting, where is relevant, key outcomes of other EU Flagship projects and Initiatives (e.g. EuroGEOSS, AfriGEOSS, NextGEOSS, ERAPLANET, GEOGLAM, GEO-VENER, EO4SDG, EO4SD). In that regard, the details of the GEO-CRADLE Initiative are strongly informed by the lessons learned during that period, and by the outcomes of various exchanges between the project and key stakeholders (most prominently GEO Secretariat, EC DG RTD and DG GROW, ESA and several regional, national and local actors in the countries within the RoI).

From its very conception and throughout its implementation, GEO-CRADLE has been in accordance with and driven by the strategic priorities laid out in the [GEO Strategic Plan 2016-2025](#) regarding the implementation of GEOSS and with the [Copernicus Regulation](#) defining the actions towards Copernicus uptake. Following the 34 months of its activities, it is now possible to demonstrate its value and underline its contribution to the achievement of GEO/GEOSS and EuroGEOSS goals in the region, as well as to argue for the need to maintain the existing GEO-CRADLE coordination and networking mechanism alive and further scaled up for the benefit of EU GEO supported initiatives and Copernicus.

Moreover, the GEO-CRADLE Initiative will provide further impetus on the GEO-CRADLE pilots and offer an opportunity to extend the relevant GEO-CRADLE services, as well as, where relevant, the services from other projects and Initiatives, beyond the geographic and thematic coverage initially considered by GEO-CRADLE, in support of the three GEOSS priorities, namely Climate Change, Disaster Risk Reduction and Sustainable Development Goals.

The 4 major planned outputs of the Initiative are summarized here:

**O1:** Promote the **coordination of EO activities at regional level** through the sustained operation of the [GEO-CRADLE networking platform](#) (currently with 268 actors from 29 countries), the organisation of additional [regional workshops](#), and the interfacing with key initiatives (including regional GEOSS' like [EuroGEOSS](#) and [AfriGEOSS](#) as well as collaborative efforts such as [PRIMA](#) and [ESA EO4SD](#)).

**O2:** **Assess the maturity of EO activities** at national level, towards informing targeted capacity building, applying the [novel methodology](#) which was pioneered by GEO-CRADLE and covered already 11 countries from the NAMEBA region, using an extensive set of 32 maturity indicators across three main fields: Capacities, Cooperation and National Uptake and Awareness.

**O3:** Foster the **progressive operationalisation of EO-based services**, building on the results of

the [four GEO-CRADLE pilots](#) (Adaptation to Climate Change, Improved Food Security – Water Extremes Management, Access to Raw Materials, and Access to Solar Energy), linking to the GEO priorities and the national needs for achievement of SDGs and involving the private sector.

**O4:** Further promote the **effective implementation of data sharing principles** in the region and the registration of national datasets to GEOSS Platform, through the [GEO-CRADLE Regional Data Hub](#), which is set up with free and open access, serving as a gateway that facilitates the access of the regional actors and EU partners to useful datasets and portals from the regions that use open standards (more than 25 million datasets are now available by accessing through the RDH to GEOSS and regional / local portals, including the data available through the GEO-CRADLE project pilots).

The **expected outcomes, impacts and beneficiaries** are presented below:

**Short to medium term**

I1: Enhanced participation of the complete EO ecosystem in capacity building, R&D&I collaboration and awareness raising, with focus on continuous engagement of users.

I2: Progressive increase of EO maturity in the region through the assessment of gaps and challenges, the design and implementation of tailored pilot activities and their subsequent operationalisation.

I3: Improved “dialogue” between demand and supply side by fostering co-design approaches (maintaining the GEO-CRADLE user requirements registry) and involving private sector to provide operational services.

I4: Increased number of regional datasets linked to GEOSS Platform.

**Medium to long term**

I5: Sustained uptake of GEO/GEOSS and Copernicus in the region, and better leveraging of existing and future investments.

I6: Matching top-down (i.e. at programme level whether this is GEO or Copernicus) with the bottom-up (i.e. national and sector-specific) perspectives. This is further informed by the GEO-CRADLE Roadmap which promotes multi-actor, cross-border and interdisciplinary collaboration among EO stakeholders in the RoI for the delivery of EO-based benefits to society and economy.

I7: Improved uptake of EO-derived benefits (incl. from EuroGEOSS outputs) in a region with strong interest for Europe and solid foundations for cooperation (see PRIMA, EO4SD, IPA, ENI).

Overall, the GEO-CRADLE Initiative will achieve great scientific, societal and economic impact in the RoI through the networking and exchange of EO methodologies, know-how, datasets and services. The provision of EO value-adding services will be beneficial for the local societies and the EO market uptake towards sustainable development.

- **Planned Activities:**

**WP1: Regional Coordination and Liaison**, led by NOA, M1-M24:

- T1.1 Regional Coordination
- T1.2 Liaison with Copernicus, EuroGEOSS, AfriGEOSS, ESA, GEO, UN initiatives and NSOs.

**WP2: Continued animation of Networking Activity and Capacity Building Actions**, led by NOA, M1-M24:

- T2.1 Maintenance of Networking Platform
- T2.2 Organisation of selected workshops promoting EuroGEOSS, and Copernicus

**WP3: Indicators and priorities**, led by Evenflow, M1-M24:

- T3.1 Expansion and update of Maturity Indicators
- T3.2 Update of priorities in relation to regional challenges

**WP4: Operationalisation of Pilots**, led by NOA, M1-M24:

- T4.1 Support upscale and exploitation of Pilots Services promoted through key initiatives and projects e.g. EuroGEOSS, NextGEOSS, GEO-CRADLE, etc

- T4.2 Mapping of Pilots' contribution to indicators and targets of the SDG frame
- T4.3 Engagement with the private sector

**WP5: Enhancement of the Regional Data Hub**, led by NOA, M1-M24:

- T5.1 Maintenance of the Regional Data Hub
- T5.2 Linkage of regional datasets to GEOSS Platform

**WP6: Impact Maximisation**, led by NOA, M1-M24:

- T6.1 Communication and Dissemination
- T6.2 Impact Assessment

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## 2. Purpose

The establishment of the new GEO Initiative for GEO capacity building in North Africa, Middle East, and Balkans (NAMEBA) with a potential to expand to Black Sea (namely the Region of Interest or RoI), sustains the key outputs of GEO-CRADLE and scales-up their reach in terms of geographic coverage and operational maturity. The scope of the new Initiative is strongly motivated by the need to capitalise, sustain and scale up the results mainly achieved during the implementation of the 34-month H2020 [GEO-CRADLE](#) project (02/2016-11/2018), also promoting, where is relevant, key outcomes of other EU Flagship projects and Initiatives (e.g. EuroGEOSS, AfriGEOSS, NextGEOSS, ERAPLANET, GEOGLAM, GEO-VENER, EO4SDG, EO4SD). In that regard, the details of the GEO-CRADLE Initiative are strongly informed by the lessons learned during that period, and by the outcomes of various exchanges between the project and key stakeholders (most prominently GEO Secretariat, EC DG RTD and DG GROW, ESA and several regional, national and local actors in the countries within the RoI).

From its very conception and throughout its implementation, GEO-CRADLE has been in accordance with and driven by the strategic priorities laid out in the [GEO Strategic Plan 2016-2025](#) regarding the implementation of GEOSS and with the [Copernicus Regulation](#) defining the actions towards Copernicus uptake. Following the 34 months of its activities, it is now possible to demonstrate its value and underline its contribution to the achievement of GEO/GEOSS and EuroGEOSS goals in the region, as well as to argue for the need to maintain the existing GEO-CRADLE coordination and networking mechanism alive and further scaled up for the benefit of EU GEO supported initiatives and Copernicus.

Moreover, the GEO-CRADLE Initiative will provide further impetus on the GEO-CRADLE pilots and offer an opportunity to extend the relevant GEO-CRADLE services, as well as, where relevant, the services from other projects and Initiatives, beyond the geographic and thematic coverage initially considered by GEO-CRADLE, in support of the three GEOSS priorities, namely Climate Change, Disaster Risk Reduction and Sustainable Development Goals.

### **The 4 major planned outputs of the Initiative in more detail:**

**O1:** Promote the **coordination of EO activities at regional level** through the sustained operation of the [GEO-CRADLE networking platform](#) and the interfacing with key initiatives (including regional GEOSS' like EuroGEOSS and AfriGEOSS).

GEO-CRADLE has significantly supported the establishment of a vibrant ecosystem of EO stakeholders across the NAMEBA region. This has been achieved through the organisation of [multiple regional workshops](#), and the setup and operation of a dedicated [networking platform](#) with currently 268 actors from 29 countries. These networking activities triggered several regional collaborations either on R&D

activities or on operational services but also helped to raise awareness on who does what, where and on what resources. Therefore, through the “upgrading” of GEO-CRADLE to a GEO Initiative, an even larger community will be attracted, helping to build a more integrated ecosystem of EO stakeholders. To that end, the National Observatory of Athens commits to maintain the platform and will seek to integrate it in the EuroGEOSS. At the same time, the GEO-CRADLE project partners will continue operations towards intensifying stakeholder engagement and liaison activities, also in alignment with the SDGs’ frame, to maintain good traction with the national EO communities and seek to exploit the most of new vehicles such as the Copernicus FPA and the Copernicus User Uptake “infrastructure”, i.e. Copernicus Relays and Academies where the leading partner NOA is actively involved. This could potentially translate into joint Action Plans supporting not only the intra-regional collaboration but also facilitating links with EU industry in these regions. It is thus foreseen that in line with planned activities by national partners but also fuelled by the funding expected in collaborative efforts such as [PRIMA](#) or [ESA EO4SD](#), the partners of the proposed Initiative will organise or attend regional workshops and sustain their operation.

**O2: Assess the maturity of EO activities** at national level, towards informing targeted capacity building. GEO-CRADLE has pioneered the establishment of a novel methodology to assess the state and progress of different aspects of EO activities at national level. The “maturity indicators” methodology has been tested over a period of 15 months, through the mobilisation of the GEO-CRADLE country partners, covering 11 countries from the NAMEBA region. An extensive set of 32 maturity indicators has been defined, measured and validated across three main fields “Capacities”, “Cooperation” and “National Uptake and Awareness”, and maturity cards have been produced to allow for a standardised visualisation of the results. The results of the implementation of the methodology in this first phase have been highly appreciated by the GEO Secretariat and by country representatives. The maturity cards have proven to be a powerful tool to highlight strengths and weaknesses, communicate on identified gaps, understand the level of uptake of key initiatives such as Copernicus and GEO, and guide future EO activities at the national level. Given the keen interest of these key stakeholders, the methodology will be further implemented, tested and improved in these countries, but also beyond, and a mechanism for periodic update will be established, as part of the GEO-CRADLE Initiative. To that effect, the EuroGEOSS will provide a unique opportunity to extend the geographic coverage of this activity; and also hopefully AfriGEOSS countries and other constituents of GEO will give support and involvement.

**O3: Foster the progressive operationalisation of EO-based services**, building on the results of GEO-CRADLE pilots, linking to the GEO priorities and the national needs for achievement of SDGs and involving the private sector.

GEO-CRADLE has carried out pilot activities in 4 thematic areas which have been identified as key priorities in the region: Adaptation to Climate Change, Improved Food Security & Water Extremes Management, better Access to Raw Materials and Access to Solar Energy. These activities have built on existing capabilities of EO stakeholders in the NAMEBA region and have yielded significant results:

- The **Adaptation to Climate Change** pilot supported the sustainability of regional EO infrastructures. It focused on the holistic monitoring and forecasting of region-specific atmospheric components, ECVs and hazards, in line with the standards and vision of GEOSS & Copernicus. It provided services related to desert dust, climate change, and air quality, benefiting key end users, and engaging aviation authorities, environmental and civil protection institutions and state agencies, as well as public/private sectors e.g. tourism, agriculture, natural hazards and water management.
- The **Improved Food Security – Water Extremes Management** pilot transferred state-of-the-art know-how between the involved countries on soil spectroscopy, and built for the first time a standardized regional [Soil Spectral Library](#) (the 2<sup>nd</sup> largest after the LUCAS database), as a complement to the EU Soil Sample Data Base, serving the food security and agriculture sectors. It

provided detailed thematic soil maps by analysing the soil spectra with Sentinel-2 image acquisitions. Moreover, in support to the agriculture production and flood/drought mitigation, the pilot adapted and launched a region specific version of the myDEWETRA web platform. The delivered services have strong potential to support EU agricultural policy and initiatives (e.g. SDGs, [PRIMA](#)).

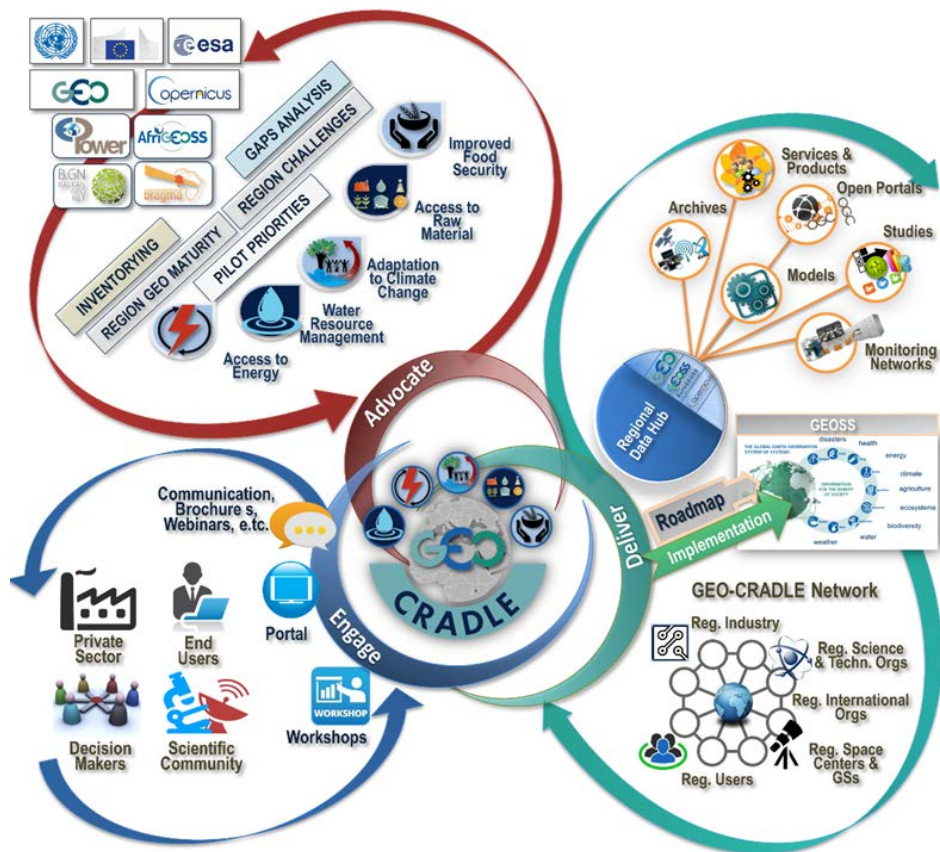
- The **Access to Raw Materials** pilot focused on EO based solutions to support the management of mining and post-mining sites and the mitigation of their environmental impact on the surrounding areas. The pilot engaged key private and public/state organisations from the mining and environmental sectors.
- The **Access to Solar Energy (SENSE)** pilot took advantage of the free access to Copernicus data and Core services, innovative modelling and state-of-the-art real-time solar energy calculating systems, and delivered reliable and high resolution solar Atlases and broader climatology studies. It engraved strategic methods to integrate a solar energy nowcasting system into a wider GEOSS driven system at global scale. It stimulated the interest of key energy stakeholders and decision makers from the private and public/state sector in various countries, e.g. Egypt where it was acknowledged by the Ministry of Electricity and Renewable Energy and is currently integrated in its official website, serving the needs of potential solar investors.

Beyond these immediate results, the pilots have attracted significant interest by companies willing to support the operationalisation of their outcomes, and users willing to adopt them in their own context. In addition, it has given GEO-CRADLE partners significant momentum to contribute to efforts related to the monitoring and reporting of SDGs. As an example, in Egypt, a collaboration with CAPMAS and line ministries is being established. The GEO-CRADLE Initiative will provide further impetus on these activities and offer an opportunity to extend beyond their geographic and thematic coverage (in support of the three GEOSS priorities, namely CC, DRR and SDGs).

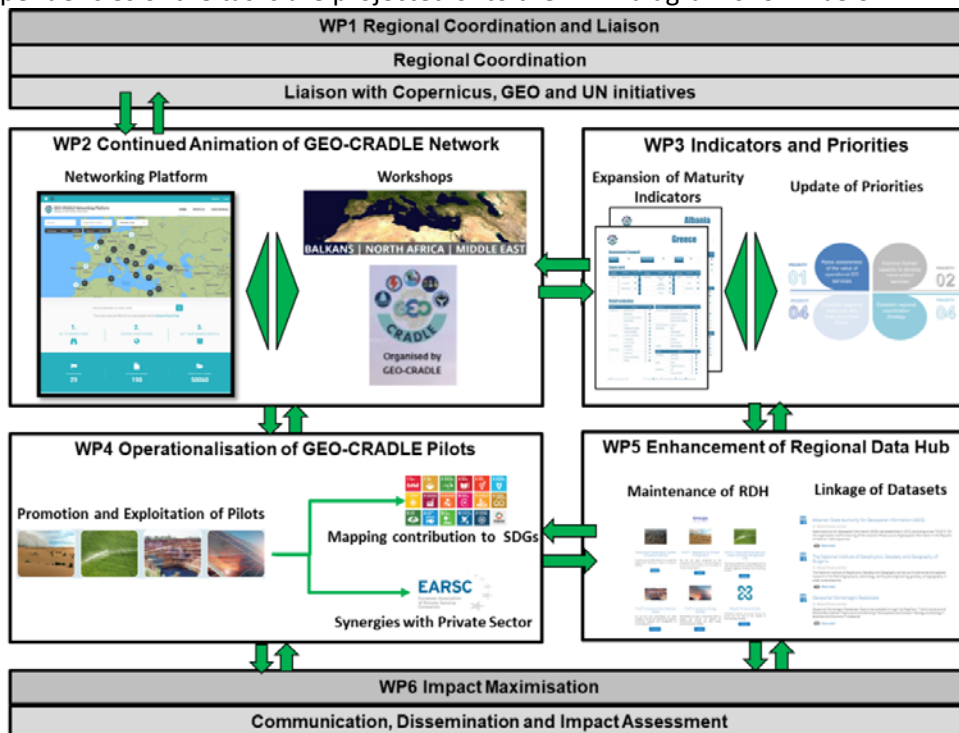
**O4:** Further promote the **effective implementation of data sharing principles** in the region and the registration of national datasets to GEOSS Platform.

Through the establishment of the [GEO-CRADLE Regional Data Hub \(RDH\)](#), GEO-CRADLE has actively advocated the Data Sharing Principles and effectively implemented them. The RDH is set up with free and open access, serving as a gateway that facilitates the access of the regional actors and EU partners to useful datasets and portals from the regions that use open standards. It is an open-source data web management tool / portal that provides access to region-related datasets and services, directly fed from GCI, and at the same time being the focal node for regional data providers to contribute easily and timely their data to GEOSS. This plays a unique regional role in the promotion of the Data Sharing towards GEOSS and Copernicus implementation, as well as in the direction of the implementation of the SDGs. The RDH is a stable service with full interoperability with GCI based on the GEO DAB APIs and DKAN. More than 25 million datasets are now available by accessing through the RDH to GEOSS and regional / local portals, including the data available through the GEO-CRADLE project pilots. As part of the GEO-CRADLE Initiative, the lead partner NOA will maintain the operation of the Regional Data Hub further seeking to discover and effectively link key regional datasets to the GEOSS Platform. Synergies with NextGEOSS platform, EuroGEOSS initiative and other ongoing initiatives and projects will help in that direction. Indicatively, in the case of NextGEOSS, the platform, the services and the datasets which will be developed in the framework of NextGEOSS will be also shared and become visible through the [GEO-CRADLE Regional Network of stakeholders](#) and the [GEO-CRADLE Regional Data Hub](#).

The overall logic of the GEO-CRADLE Initiative, directly driven by the planned outputs presented above, is shown in the figure below.



The work will be split in work packages, each including several tasks, as presented in Table C. The interdependencies of the tasks are projected onto the PERT diagram shown below.



### **WP1 Regional Coordination and Liaison**

The objectives of this WP are **(1) ensuring the smooth coordination** between initiative members and across activities, taking into account the multi-regional character of the initiative; **(2) coordinating the high-level engagement of the relevant stakeholders**, i.e. EC-Copernicus, EuroGEOSS, AfriGEOSS, ESA, GEO, UN initiatives, NSOs and other national authorities, etc., across all activities of the project.

The **coordination** (T1.1) of the Initiative will be undertaken by NOA. It will be facilitated by the established **Regional Coordination Network** supervised by IBEC and CEDARE. These two organisations will act as focal points, assuming the responsibility of regional coordination within the Balkan (incl. Israel and Cyprus) and Black Sea region, and MENA region respectively, building on linguistic commonalities (i.e. Arab and non-Arab speaking countries). The **liaison activities** (T1.2) will be led by NOA and in particular the Greek GEO Office.

The primary objective is to closely engage with high-level stakeholders from the EC (e.g. DG GROW Copernicus Units, DG RTD), GEO Secretariat, relevant Participating Organisations (POs) regional initiatives/flagships, GEO relevant projects – in particular EUROGEOSS, AfriGEOSS, ESA (e.g. EO4SD), UN Organisations, Programmes and Initiatives (e.g. WMO, UNEP, UN-GGIM, GSDI) and national authorities (Ministries, Space Agencies, etc.) in order to:

- Enable exchange of know-how and best practices.
- Establish and maintain an effective liaison network in the broader community involved.
- Ensure that the activities and outcomes are in line with EC and GEO priorities (e.g. through participation in relevant plenary meetings and fora).
- Liaise with the members of the Advisory Board, ensuring their timely involvement at key points.
- Promote maximal traction and mutually beneficial synergy with ongoing activities of ESA, EU-funded projects, GEO initiatives (e.g. EuroGEOSS, AfriGEOSS), UN agencies and national entities.
- Explore the possibility to compile Joint Action Plans in the context of Copernicus FPA and in conjunction with Copernicus UU Infrastructures (Relays, Academies).
- Foster the involvement of the private sector including the startup ecosystem in synergy with FabSpace 2.0, KATANA and other projects.
- Exploit multiplier and key enabler effects for the implementation of the proposed capacity building methodology.

### **WP2 Continued animation of Networking Activity and Capacity Building Actions**

The objective of this work package is to support the continuous animation of the existing NAMEBA network, expanding also to the Black Sea region. This will be achieved through **T2.1 the maintenance of the Networking Platform**, which practically involves the enrichment of the database of regional actors with additional profiles, the continued monitoring and presentation of funding opportunities allowing new R&D collaborations on EO-related projects and the presentation of any region-relevant news and developments on the portal. The latter will include the **organisation of regional workshops (T2.2)** by the Initiative in line with the successful approach tested over 34 months with 19 regional workshops across several countries in the GEO-CRADLE project. The workshops will be carefully planned to coincide with major national or international events (whereby dedicated sessions will be organised). It must be noted that synergies with other ongoing activities such as EuroGEOSS, AfriGEOSS, NextGEOSS, ERAPLANET, GEOGLAM, GEO-VENER, EO4SDG, EO4SD or national activities will be sought to ensure optimal use of resources.

### **WP3 Indicators and priorities**

In this work package, the objectives are to expand the **maturity indicators methodology (T3.1)** in terms of its geographic coverage, collecting all the necessary information to update the national maturity

cards; and to refine the **priorities related to regional challenges (T3.2)** using the outputs of the GEO-CRADLE Roadmap and devising an action plan to tackle them (with the involvement of additional stakeholders incl. private sector).

It should be noted that for T3.1, the methodological expansion of the maturity indicators has been planned for the EuroGEOSS. Similarly, T3.2 will capitalise on other ongoing work by key participants in the Initiative, namely in relation to PRIMA and ESA EO4SD actions.

#### **WP4 Operationalisation of Pilots**

The GEO-CRADLE Initiative will carry on the successful work done under the 4 thematic pilot areas showcased in the NAMEBA through GEO-CRADLE. It will pursue their **upscale among users** (through involvement of additional partners and resources from other ongoing projects) and support their overall **exploitation** and eventually **operationalisation (T4.1)**. Each pilot has a different technical implementation plan and exploitation perspective fleshed out in the specific sustainability plan. This will be taken into account and any opportunities will be exploited. To further support this, a dedicated **mapping of Pilots' contribution to SDGs (T4.2)** will be undertaken. This will highlight in concrete terms how the services provided through the pilots can support monitoring and reporting on SDGs. The Initiative will leverage its strong connection with national actors (Statistics Offices and line ministries in that regard), utilising resources and seeking the expert advice of other ongoing actions (e.g. EuroGEOSS, AfriGEOSS, NextGEOSS, ERAPLANET, GEOGLAM, GEO-VENER, EO4SDG, EO4SD). Additional **synergies towards operationalisation will be built with the engagement of the private sector (T4.3)** under the leadership of EARSC and the vision for [sustainable market uptake of \(G\)EO enabled services](#) in NAMEBA showcased in the various GEO Data Providers Workshops and [presented at the GEO Symposiums](#). This will be done in close synergy with EuroGEOSS and the [H2020 calls on commercial activities related to GEO](#).

#### **WP5 Enhancement of the Regional Data Hub**

The objective of this work package is to support the enhancement of the existing GEO-CRADLE Regional Data Hub. This entails: **maintaining the Regional Data Hub (T5.1)**, namely ensuring the operational functionality of this tool in a user-friendly way, providing technical support, upgrading the system, checking, updating and adding/enriching the available information, and **linking regional datasets to the GEOSS Platform (T5.2)** in consistency with supported standards for searching services and/or products based on several search filters (e.g. thematic area (e.g. climate), data type (e.g. space-born/in-situ/airborne), AoI (e.g. Greece), etc, accessing also relative metadata.

#### **WP6 Impact Maximisation**

This WP will entail all the activities helping the realisation of the impacts of the Initiative. This includes **communication and dissemination activities (T6.1)** both on-site and on-line using the well accepted branding of GEO-CRADLE as developed during the H2020 project. This will have as a main gateway the [GEO-CRADLE portal](#) and as a guiding document the GEO-CRADLE communication strategy. Finally, **the impact assessment activity (T6.2)** will allow to measure the progress of the impacts of the Initiative at all levels (national, sector-specific, GEO WP).

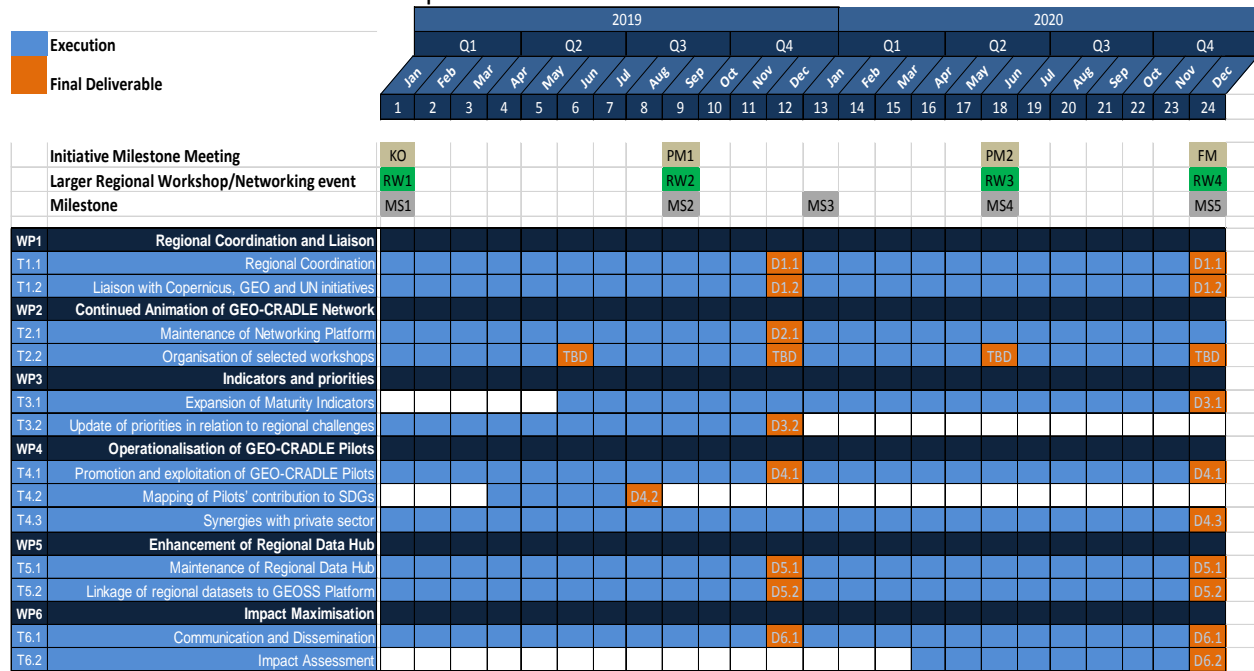
#### **Implementation plan**

The implementation of the activities will be pursued as described in the task descriptions above and in line with the lessons learned from the execution of GEO-CRADLE project. Thereby all the information associated with the different activities is publicly accessible through the CORDIS portal.

The **Deliverables** and the **Milestones** of the GEO-CRADLE Initiative are presented in the Tables D.



The **GANTT chart** of all activities is presented below.



To sum up, the **expected outcomes, impacts and beneficiaries** are presented below:

**Short to medium term**

- I1: Enhanced participation of the complete EO ecosystem in capacity building, R&D&I collaboration and awareness raising, with focus on continuous engagement of users.
- I2: Progressive increase of EO maturity in the region through the assessment of gaps and challenges, the design and implementation of tailored pilot activities and their subsequent operationalisation.
- I3: Improved “dialogue” between demand and supply side by fostering co-design approaches (maintaining the GEO-CRADLE user requirements registry) and involving private sector to provide operational services.
- I4: Increased number of regional datasets linked to GEOSS Platform.

**Medium to long term**

- I5: Sustained uptake of GEO/GEOSS and Copernicus in the region, and better leveraging of existing and future investments.
- I6: Matching top-down (i.e. at programme level whether this is GEO or Copernicus) with the bottom-up (i.e. national and sector-specific) perspectives. This is further informed by the GEO-CRADLE Roadmap which promotes multi-actor, cross-border and interdisciplinary collaboration among EO stakeholders in the RoI for the delivery of EO-based benefits to society and economy.
- I7: Improved uptake of EO-derived benefits (incl. from EuroGEOSS outputs) in a region with strong interest for Europe and solid foundations for cooperation (see PRIMA, EO4SD, IPA, ENI).

Overall, the GEO-CRADLE Initiative will achieve great scientific, societal and economic impact in the RoI through the networking and exchange of EO methodologies, know-how, datasets and services. The provision of EO value-adding services will be beneficial for the local societies and the EO market uptake towards sustainable development.

### 3. Background and Previous Achievements

The GEO-CRADLE Initiative will build in principle on the success of the [GEO-CRADLE H2020 project](#) and carry on with the implementation and extension of its activities, but also key outcomes of other **EU GEO Flagship Projects and Initiatives** (e.g. EuroGEOSS, AfriGEOSS, NextGEOSS, ERAPLANET, GEOGLAM, GEO-VENER, EO4SDG, EO4SD). More specifically, the GEO-CRADLE Initiative will be organised as a complementary capacity building block around the overarching EuroGEOSS Initiative and other EU GEO related projects, and its extension will be realised along the following dimensions:

- **Geographic:** The Initiative will progressively embrace all Balkan countries, with potential to involve new areas (Black Sea) and maintain the involvement of Middle East (where major gaps in GEO memberships are encountered) and North Africa (in connection to AfriGEOSS).
- **Thematic:** On top of food security, solar energy, raw materials and climate change the Initiative will explore the incorporation of additional thematic areas such as disaster management and water resources management, in accordance to GEO priorities. These are areas identified as key priorities in the region and also strongly tied to the SDGs. In this way they can be considered “quick wins”.
- **Operational Maturity:** In support to the efforts being planned under EuroGEOSS, the Initiative will seek stronger involvement of the private sector and a clear orientation towards exploiting and capitalising on the operationalisation of services built in GEO-CRADLE project, EuroGEOSS, Copernicus, etc with the engagement of active users.

The [GEO-CRADLE project](#) was funded by the European Union and ran for 34 months from February 2016 to November 2018. In this timeframe the following key highlights were achieved:

#### 1. **Integration of existing EO capacities**

- a. **Extensive inventorying of the EO capacities:** Space/air-borne, Ground-based/In-situ monitoring, Modelling and computing.
- b. **Detailed collection of user needs** (93 interviews from 14 countries, 19 regional workshops and exchanges in outreach activities), followed by [gaps analysis](#), and [Priorities Action Plan](#).
- c. **4 pilot activities** showcasing advanced EO Services to address regional challenges (e.g. SDGs).
- d. **Regional Data Hub** connected to GCI (**25.534.239 datasets, 45 regional portals and sites**, including the 4 pilots).

#### 2. **Engagement of the EO stakeholder community**

- a. **Networking Platform** (**268 profiles of EO actors from 29 countries**).
- b. **Liaison activities** (GEO, Copernicus-DG GROW, DG RTD and ESA).
- c. **Stakeholder engagement and capacity building events** (including 19 regional workshops) and **dissemination activities** (including **31 scientific papers and articles**).
- d. **Communication materials** (e.g. [website](#), social media).

#### 3. **Uptake of EO services and data**

- a. **Regional Data Hub** providing access to EO services and data.
- b. **4 pilot activities** addressing the daily needs of key stakeholders.
- c. Development of a novel methodology for **EO Maturity Assessment** (32 indicators) and application in 11 countries.

#### 4. **Implementation of GEOSS and Copernicus**

- a. Advocacy on the importance of **data sharing and data opening**, in line with GEOSS data sharing principles, and operation of the [Regional Data Hub](#) in this direction.
- b. **“Exporting” of Copernicus data and core services** through regional workshops and capacity building activities.
- c. Enhancing the **establishment of GEO liaisons** (e.g. Albanian GEO Office established in 11/2018).

- d. Delivery of a [Roadmap](#) with an **Action Plan by 2030** for the implementation of GEOSS & Copernicus.

The GEO-CRADLE project had a **remarkable progress beyond the state of the art**:

- The **novel methodology for EO maturity assessment** provided a common standard for evaluating the countries' involvement in the implementation of GEO and Copernicus for mutual benefit.
- The **Networking Platform** presents an up-to-date status of the regional capacities, and facilitates the networking and synergies among the stakeholders, helping to set region-based consortia.
- The **Regional Data Hub** provides access to millions of regional datasets, and thus fosters further data sharing and EO service development for the benefit of the relevant science and geo-information sector.
- The **Adaptation to Climate Change** pilot supported the sustainability of regional EO infrastructures. It focused on the holistic monitoring and forecasting of region-specific atmospheric components, ECVs and hazards, in line with the standards and vision of GEOSS & Copernicus. It provided services related to desert dust, climate change, and air quality, benefiting key end users, and engaging aviation authorities, environmental and civil protection institutions and state agencies, as well as public/private sectors e.g. tourism, agriculture, natural hazards and water management.
- The **Improved Food Security – Water Extremes Management** pilot transferred state-of-the-art know-how between the involved countries on soil spectroscopy, and built for the first time a standardized regional Soil Spectral Library, as a complement to the EU Soil Sample Data Base, serving the food security and agriculture sectors. It provided detailed thematic soil maps by analysing the soil spectra with Sentinel-2 image acquisitions. Moreover, in support to the agriculture production and flood/drought mitigation, the pilot adapted and launched a region specific version of the myDEWETRA web platform. The delivered services have strong potential to support EU agricultural policy and initiatives (e.g. SDGs, [PRIMA](#)).
- The **Access to Raw Materials** pilot studied mining and post-mining sites, focusing on EO based solutions to support the sites' management and mitigation of their environmental impact on the surrounding areas. All the methodologies were elaborated on the basis of Copernicus data integration and were delivered having a universal character, applicable for other RoIs as well. The pilot engaged key private and public/state organisations from the mining and environmental sectors.
- The **Access to Solar Energy (SENSE)** pilot took advantage of the free access to Copernicus data and Core services, innovative modelling and state-of-the-art real-time solar energy calculating systems, and delivered reliable and high resolution solar Atlases and broader climatology studies. It engraved strategic methods to integrate a solar energy nowcasting system into a wider GEOSS driven system at global scale. It stimulated the interest of key energy stakeholders and decision makers from the private and public/state sector in various countries, e.g. Egypt where it was acknowledged by the Ministry of Electricity and Renewable Energy and is currently integrated in its official website, serving the needs of potential solar investors.
- Finally, the detailed **Roadmap** further promotes multi-actor, cross-border and interdisciplinary collaboration among EO stakeholders in the RoI for the delivery of EO-based benefits to society and economy. The Roadmap concludes with a concrete Action Plan by 2030 for the implementation of GEOSS & Copernicus which is structured so that the different actions fall under five main categories: (i) Infrastructure and data exploitation, (ii) EO in support to policy implementation and decision-making, (iii) Ecosystem Capacity Building, (iv) EO Services Sustainability and (v) Uptake of EO market.

Overall, the GEO-CRADLE project achieved **great scientific, societal and economic impact** through the networking and exchange of EO methodologies, know-how, datasets and services. For the first time in

the RoI the **current state-of-play** was captured and the provision of **EO value-adding services** was beneficial for the local societies and the EO market uptake towards **sustainable development**.

#### **4. Relationship to GEO Engagement Priorities and to other Work Programme Activities**

The GEO-CRADLE Initiative will contribute through the regional coordination to capacity building in support to awareness raising and achievement of the following **SDG** targets and/or the measurement of SDG indicators, indicatively and not exclusively, which relate to the dissemination of the work realised in the framework of the GEO-CRADLE project:

- **Goal 1. End poverty in all its forms everywhere**, target 1.4, linked with the access to raw materials pilot.
- **Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture**, targets 2.1, 2.3 and 2.4, linked with the adaptation to climate change pilot and the improved food security pilot.
- **Goal 3. Ensure healthy lives and promote well-being for all at all ages**, target 3.9, linked with the adaptation to climate change pilot.
- **Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all**, targets 7.1, 7.2, 7.3, 7.A, 7.B, linked with the SENSE pilot on solar energy.
- **Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**, target 9.4, linked with the SENSE pilot on solar energy.
- **Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable**, target 11.6, linked with the adaptation to climate change pilot.
- **Goal 12. Ensure sustainable consumption and production patterns**, targets 12.2, 12.4 and 12.A, linked with the adaptation to climate change pilot and the improved food security pilot.
- **Goal 13. Take urgent action to combat climate change and its impacts**, targets 13.2 and 13.3, linked with the adaptation to climate change pilot.
- **Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**, target 15.3, linked with the improved food security pilot.
- **Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development**, targets 17.6, 17.7, 17.8, 17.9, 17.16, 17.17 and 17.18, linked with the dissemination and exploitation of the results, the capacity building, the networking, and the cooperation.

The GEO-CRADLE Initiative supports the implementation of the **Paris Agreement on Climate Change** with regards to:

- **Pillar Adaptation**, through the work done under the adaptation to climate change pilot.
- **Pillar Capacity Development / Technology Transfer**, through the dissemination and exploitation of the results, the capacity building, the networking, and the cooperation.
- **Pillar Mitigation**, through the work done under the SENSE pilot on solar energy.

The GEO-CRADLE Initiative supports the achievement of the global targets of the **Sendai Framework for Disaster Risk Reduction** with regards to:

- **Global target F**. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.

The GEO-CRADLE Initiative is highly relevant to the **3 GEO Strategic Objectives (Advocate, Engage, Deliver)**, which are analysed on the [GEO Strategic Plan 2016-2025: Implementing GEOSS](#), as shown in the following Table.

Vision	Means	Activity	<b>GEO-CRADLE contribution towards 2016-2025</b>
<b>Objectives</b>	<b>Areas of action</b>	<b>ADVOCATE</b>	<ul style="list-style-type: none"> <li>• Establish a regional strategy and increase awareness of EuroGEOSS and GEOSS Data Sharing</li> <li>• Collect and organize datasets and archives to support EuroGEOSS, GEOSS, and Copernicus relevant service and scientific domains</li> <li>• Catalyse increased contribution of regional resources directly to GEOSS Data-CORE and EU data portal, NextGEOSS, and likely Copernicus DIAS</li> <li>• Secure free, full and open data access, and know-how dissemination through the sustained operation of the GEO-CRADLE Regional Data Hub</li> <li>• Support improved access to open data, enhanced interoperability, fostered re-use and retrieval of RoI specific and proprietary data to address (via the pilots) key priorities of GEO, EuroGEOSS, and Copernicus</li> <li>• Expand (the produced by GEO-CRADLE) gap analysis of EO capacities (space-/air-borne, and in-situ, skills, scientific know-how, and processing power), in support of the Roadmap for the future implementation of GEOSS and Copernicus</li> <li>• Pursue commitments to sustain and strengthen the concerted operation of different observational platforms/networks in the RoI</li> <li>• Foster the launch of collaborative R&amp;D activities following up on the results of the GEO-CRADLE pilots and the relevant EU GEO related projects (NextGEOSS, EuroGEOSS, relevant H2020 projects)</li> </ul>
		<b>ENGAGE</b>	<ul style="list-style-type: none"> <li>• Develop synergies, encourage cross-fertilization, address common challenges across the RoI and enforce prioritization via flexible regional frameworks</li> <li>• Involve the EO industry, institutions, governmental organisations and international initiatives, towards a sustainable network in the RoI for the benefit of GEOSS, EuroGEOSS, and Copernicus</li> <li>• Identify funding gaps, enhance visibility of opportunities, explore new resources, urge national (or private) commitments, leverage new calls of regional interest</li> <li>• Broaden the GEO, EuroGEOSS, and Copernicus user base through well-targeted dissemination and exploitation actions</li> <li>• Support– through the diffusion of best practices – the greater participation of less developed countries in GEO and the establishment of regional GEO offices</li> <li>• Demonstrate the power of GEOSS, and EuroGEOSS to uncover trends in the regional earth system, and design pathways to reach decision makers and assess progress towards policy goals</li> </ul>
		<b>DELIVER</b>	<ul style="list-style-type: none"> <li>• Deliver a sustainable information system through a dedicated data sharing hub (Regional Data Hub) that links with various sources in the RoI and follows the same principles as the GEOSS and EU data portal</li> <li>• Establish the foundations towards greater regional participation in GEO Initiatives and the initiation of a specific regional GEO Initiative (in connection to pilot activities)</li> <li>• Showcase concrete collaborative schemes (building on the pilots) relying on integration of regional capacities and skills towards addressing specific challenge priorities in the RoI</li> <li>• Support integrated and cross-utilised solutions of space based, airborne, and in-situ monitoring networks in the RoI</li> <li>• Provide the means (maturity indicators) and the methodology (roadmap, impact assessment) for continuous and efficient maturation of participation in and contribution of countries to GEO, GEOSS, EuroGEOSS, and Copernicus</li> </ul>

The GEO-CRADLE Initiative is also highly relevant to the current [2017-2019 GEO Work Programme](#), with potential for (further) engagement / collaboration with several GEO activities, such as:

- the **GEOGLAM** Flagship, through the work done under the improved food security pilot.
- the **AfriGEOSS** Initiative, as an Initiative supporting capacity building in Africa, including North Africa which is part of the GEO-CRADLE RoI.
- the **EuroGEOSS** Initiative, as an Initiative overlooking an adjacent geographical area and driven by the same user-oriented spirit. Moreover, several pilots under the e-SHAPE EuroGEOSS Showcase and Expressions of Intent and the action groups are directly connected to GEO-CRADLE activities.
- the **GEO-VENER** Initiative, through the work done under the SENSE pilot on solar energy.
- the **CAMS** Community Activity, through the work done under the adaptation to climate change pilot.
- the **C3S** Community Activity, through the work done under the adaptation to climate change pilot.
- the **EO4SDGs** through the engagement of EO service providers on one hand and statistics offices/line ministries on the other hand within the GEO-CRADLE network.
- the **GEOSS Platform** through the work done in the GEO-CRADLE Regional Data Hub which is set up with free and open access, serving as a gateway that facilitates the access of the regional actors and EU partners to useful datasets and portals from the regions that use open standards. This plays a unique regional role, amongst others, in the direction of the implementation of the Sustainable Development Goals (SDGs). The RDH integrates advanced IT technology based on the GEO DAB APIs and DKAN for easy access and discovery of regional EO data. Millions of datasets are now available by accessing through the RDH to GEOSS and regional / local portals.

## 5. Stakeholder Engagement and Capacity Building

A **great range of key organizations and stakeholders** has been already engaged in the GEO-CRADLE project from the beginning until the end. They have given valuable input for the inventory of EO capacities and user needs, the gap analysis, the EO maturity indicators and the priorities setting. Moreover, they were actively involved in the decision-making process regarding the design and implementation of the pilot studies, which were selected in order to address regional challenges, such as their own real needs. More specifically, the following end-users were engaged in the context of the four pilots:

- **Adaptation to Climate Change:**

The Algerian Meteorological Office, the Ministry of Electricity and Renewable Energy of Egypt, the Kuwait Institute for Scientific Research, the Department of Meteorology in Cyprus, the Balloonera private company in Serbia, the University of Belgrade Serbia, the Regional Hydrology and Water Resources Sebou Basin Agency (ABHS) of Marocco, the Department of Infrastructure and Rural Development of the School of Rural and Surveying Engineering of the National Technical University of Athens (NTUA), the Centre for the Assessment of Natural Hazards and Proactive Planning (CANaH) of NTUA, and TEMES S.A. in Greece.

- **Improved Food Security and Water Extremes Management:**

The Ministry of Economic Development, Tourism, Trade & Entrepreneurship of Albania, the Ministry of Environment of Albania, GEO's Secretariat, the Agriculture Cooperatives of Nestos (NESPAR), and the Cooperatives of Xanthi, Eleftheroupoli, and Volvi in Greece.

- **Access to Raw Materials:**

The Ministry of Environment and Energy of Greece, the Municipality of Alexandroupolis in Greece, the Ministry of Agriculture, Rural Development and Environment of Cyprus, the Hellenic Copper Mines Ltd in Cyprus, the Minister of Energy, Mining, Water and Environment of the Kingdom of Morocco, the Geological Survey of Algeria, the Association of Geological Researches of Turkey (JADE), and the JeoDijital Bilisim Teknoloji Madencilik in Turkey.

- **Access to Energy:**

The Egyptian Ministry of Electricity and Renewable Energy, the Greek National Independent Power Transmission Operator, the Pre-TECT campaign, the Attica Group with Bluestar and Superfast Ferries, the National and Kapodistrian University of Athens (NKUA), and the Magdi Yacoub Heart Foundation in Egypt.

The GEO-CRADLE Initiative blends seamlessly together capacity building, R&D and outreach/user uptake activities. On the capacity building side this includes direct engagement of stakeholders in the co-development / co-production of the Initiative, continuous monitoring of their requirements and support to integrate the proposed and showcased pilots (from GEO-CRADLE, EuroGEOSS, NextGEOSS, etc) into their workflows and operational realities. It also involves an active advocacy of data sharing principles with tangible results – none other than linking several datasets to GEOSS platform. Similarly, awareness raising is pursued both through the portal and during all events, workshops organised or attended.

The capacity building in order to use the outputs of the Initiative will cover all levels:

- Individual capacity building through workshops, trainings, webinars, etc. (19 regional workshops were organised already during the GEO-CRADLE project);
- Organizational capacity building through the provision of tools, services, or information to enable better decision making (e.g. through the dissemination of the results of the pilots of the GEO-CRADLE project and the Regional Data Hub);
- Institutional capacity building through the facilitation of cooperation and collaboration among domains to enable societal impact (e.g. through the Networking Platform of the GEO-CRADLE project and the provision of updated information on the funding opportunities).

## 6. Governance

The GEO-CRADLE Initiative will be governed by key organisations having held leading roles in the implementation of the GEO-CRADLE project, NextGEOSS, ERAPLANET, and the e-SHAPE EuroGEOSS Showcase project. These organisations will be supported by a vibrant GEO-CRADLE Network covering several countries across the NAMEBA region, expanded to Black Sea. The key roles are:

- The **National Observatory of Athens (NOA)** will act as the **Coordinator of the GEO-CRADLE Initiative**, carrying on its role as Coordinator of the GEO-CRADLE project.
- The **InterBalkan Environment Center (IBEC)** and the **Centre for Environment and Development for the Arab Region and Europe (CEDARE)**, both participating in GEO, will act as **Regional Coordinators** overlooking the Balkan/Black Sea on one hand and the Middle East/North Africa on the other.
- The **European Association of Remote Sensing Companies (EARSC)** – also a participating organisation in GEO – will act as the main **interface with the private sector**.
- **Evenflow SPRL** – an SME based in Belgium with extensive involvement in Copernicus and GEO activities – will support **exploitation** activities and lead the **Maturity Indicators** work.
- Several other key regional partners will act as focal points in their countries liaising with the local

ecosystem. This includes organisations involved as partners in the GEO-CRADLE project such as the Space Technologies Research Institute (TUBITAK UZAY) in Turkey, the Research and Studies Telecommunications Centre (CERT) in Tunisia, the Royal Centre for Remote Sensing (CRTS) in Morocco, EURISY in the EU, the Space Research and Technology Institute (SRTI) in Bulgaria, INOSENS in Serbia, Institute for Nature Conservation in Albania (INCA), the Physical Meteorological Observatory in Davos / World Radiation Centre (PMOD/WRC) in Switzerland, the Tel Aviv University (TAU) in Israel, the Cyprus University of Technology (CUT) in Cyprus. Moreover, multiple other companies, users and governmental stakeholders, which are already extensively engaged in the [GEO-CRADLE Network](#), will continue to actively contribute to the Initiative.

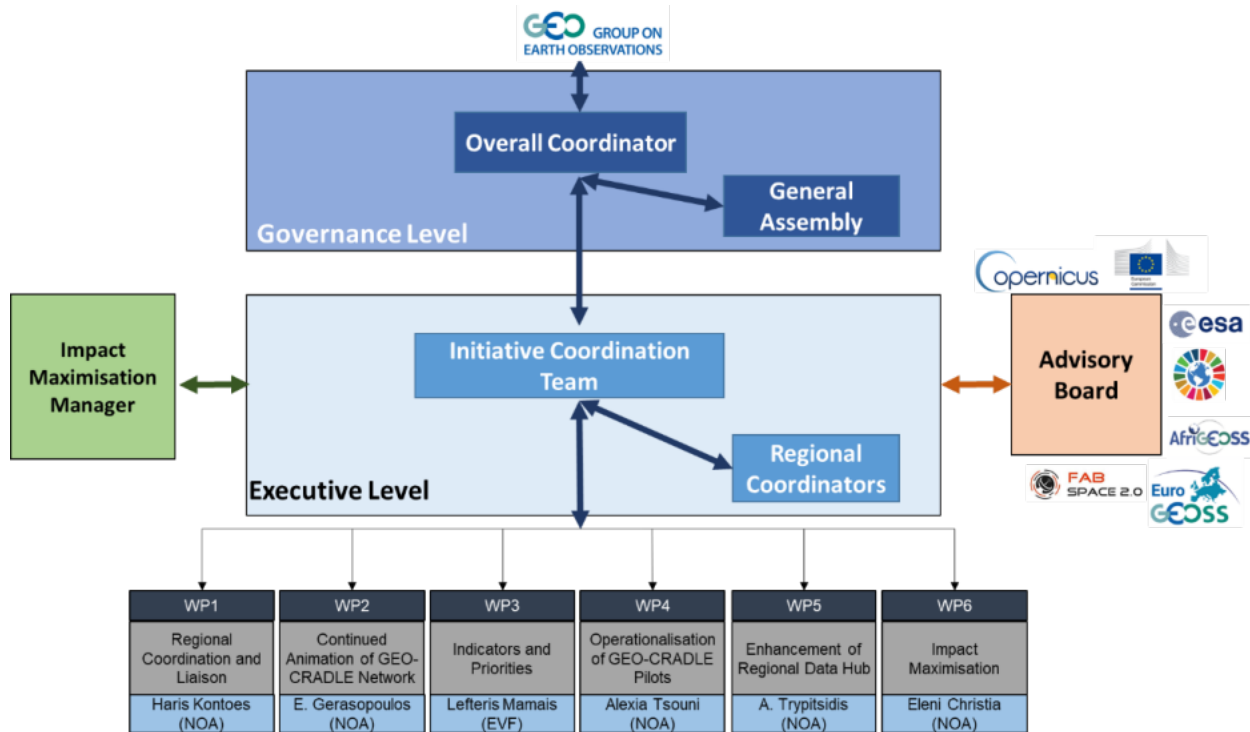
The **organisational structure** will be a more agile version of the one tested and successfully applied in the GEO-CRADLE project. Thus:

- The **governance level** deals with strategic issues and includes the Overall Coordinator (OC) and the General Assembly (GA). The OC will ensure a single line of command and reporting and a single point of contact to the GEO Secretariat. The OC is responsible for the implementation of specific activities: (i) ensure the overall project coordination and official representation, (ii) collecting feedback by participants and reporting to GEO Secretariat; (iii) coordinating the annual reports; (iv) internal reporting and reviewing procedures; (v) resolving conflicts. The role of the **GA** is to make decisions concerning any important top-level management or strategy issues. The **GA** is chaired by the **OC** and composed of **representatives from each partner**. It is envisaged that the **GA** will convene - at minimum - next to all periodic meetings (Kick-off and Review Meetings), supporting the coordination by defining for the next period: (i) A comprehensive and attainable strategy for the completion of the objectives, with appropriate levels of control, (ii) The overall macro management issues which affect the running of the project, including financial, technical, planning, control and exploitation matters, and review of project risks, (iii) The control procedures for ensuring the appropriate resources utilisation with respect to the work plan, (iv) The appropriate corrective actions to be taken in the case of progress problems or conflicts.
- The **executive level** has been described previously. It is worth highlighting the importance of obtaining active advice from key experts comprising the **Advisory Board (AB)**. The experts already involved during the 3-years of the GEO-CRADLE project will be further engaged whilst others that have in the meantime become more active (e.g. from FabSpace 2.0 or from EO4SDGs will be also strongly engaged). Moreover, the **Impact Maximisation Manager** will oversee the activities of WP6 and drive the overall communication and exploitation of the Initiative.

#### **Advisory Board**

<b>Name</b>	<b>Organisation</b>
Peter Zeil (AT)	Spatial Services GmbH, formerly at European Commission (DG GROW – Copernicus)
Marcello Maranesi (IT)	FabSpace 2.0, formerly CEO of e-GEOS
Argie Kavvada (GR)	PoC for EO4SDGs
TBD	EuroGEOSS Initiative Representative
TBD	Geo Secretariat
Luca Montanarella (IT)	EC / JRC - Chair of the Intergovernmental Technical Panel on Soils (ITPS)
Ayman Mahmood (EG)	NARSS (Coordinator of AfriGEOSS for North Africa)
Elena Xoplaki (GR)	Justus-Liebig-Un. Giessen (Ass. Prof. Climatology, Climate Change)





### **Communication with participants and stakeholders**

Similarly to the GEO-CRADLE project, the Initiative will also define an internal communication strategy in order to ensure a constant and effective exchange and sharing of information among the partners and the participants; as well as an efficient and shared management of the knowledge generated throughout the Initiative's activities. Therefore, the communication strategy and action plan will cover both internal and external communication purposes, towards maximizing the impact of the Initiative. The communication tools (website, newsletter, social media, and communication material) which have already been developed in the framework of the GEO-CRADLE project will be further tailored on the basis of the different needs of the stakeholders targeted by the Initiative. Moreover, appropriate communication activities and mechanisms (both online and offline) will be developed for a smooth, organised and effective communication exchange. This is even more crucial and challenging given that the Initiative brings together several organisations from a broad and highly diversified region: Balkans, Middle East, North Africa and Black Sea.

### **Monitoring and evaluation approach, including feedback from participants/partners and reporting to participants and to GEO community**

Following the successful implementation of technical quality control and overall evaluation of activities carried out in GEO-CRADLE project, the Initiative will be driven by the same fundamental processes. Thus, at **executive level** the Initiative Coordination Team (ICT) – comprising of the Overall Coordinator (OC) and the two Regional Coordinators (RCs) – will be responsible for the daily organisational and programmatic steering of the activities with respect to targeted objectives, team organisation, planning and milestones as described by the Work Breakdown Structure. The key role of the ICT is to ensure continuous monitoring of the progress of WP activities and for implementing potential corrective actions to ensure timely delivery, including, (i) Overall maintenance of work progress schedules and achievement of the objectives, (ii) Inter-regional and cross-regional coordination, (iii) Decision making, assisted by the reports and suggestions of task leaders and involved partners, (iv) Control of the quality

of task outputs and deliverables, (v) Management and mitigation of risks and contingencies.

**A concrete channel of continuous communication with GEO PB/Secretariat will be established through the Liaison activities undertaken under Task 1.2.** This will be led by the Overall Coordinator and will rely on the excellent relationships established already during the implementation of the GEO-CRADLE project. Any major findings (including opportunities, obstacles or “ground truth” from the region) will be reported at regular intervals and during key GEO events. Similarly, participants will be informed through the tools developed during the project and primarily through the existing GEO-CRADLE portal. This is directly tied to the activities of WP2.

**Risk management** procedures will be following the successful approach implemented during the GEO-CRADLE project. In that regard, the management and mitigation of risks and contingencies is entrusted to the Initiative Coordination Team as discussed previously. Potential risks which could hinder the smooth implementation of the Initiative have been identified, and are described in the table below along with the proposed contingency/mitigation measures.

Description of Risks	Proposed mitigation measures
Difficulties in coordination and tasks delivery due to cultural diversity	GEO-CRADLE has taken full consideration of cultural differences in its management approach; the Regional Coordinators have strong relevant experience and ties with the participating entities; the Project Coordination Team of NOA also has extensive experience of managing diverse consortia. The rich experience from the implementation of the project will be strongly leveraged in that regard.
Lack of motivation to contribute due to lack of associated funding	The core team of the Initiative has built strong partnerships through the 3 years of project implementation and has successfully managed to secure funding in other activities (e.g. Copernicus FPA, EO4SD, PRIMA, EuroGEOSS, etc.). Thus, beyond the firm commitment of all partners to pursue the realistic objectives set out herein, the partners will seek to leverage their involvement in these other programmes of great direct relevance to the Initiative.
Inadequate participation of regional stakeholders (scientists, EO service providers, decision makers)	The GEO-CRADLE network is already a vibrant and dynamic community of actors across the spectrum of EO activities. Nonetheless, through WP2 strong focus will be placed to continuously animate this community, expand its reach and multiply its impact. The participation of organisations such as EARSC, NOA, IBEC and CEDARE further ensures representation of service providers, end-users and decision-makers across their rich combined network. Liaison activities targeted at key organisation will also secure their active involvement building on their keen interest and prior engagement.
Difficulty to measure concrete impacts during and beyond the lifetime of the Initiative	The commitment to building sustainable solutions and to measuring the impact of its activities has been already showcased during the 3 years of running activities. The GEO-CRADLE project has been considered a success story on many occasions and has been committed to maintain the momentum towards further uptake of GEO, GEOSS and Copernicus in the region. Several of the key exploitable assets (Regional Data Hub, Regional Network, Pilots, EO Maturity Indicators) are at the epicentre of this Initiative and will be pursued through additional venues too.

These and potential new risks will be monitored permanently during the Initiative, primarily through WP1.

## 7. Resources

The Initiative will leverage the involvement of its partners in **key ongoing or planned activities** of very high relevance to the objectives set out here. This includes: the [ESA EO4SD](#) – Climate Resilience Project; [PRIMA](#) – several projects; Copernicus FPA in Greece (NOA is a central player) and potentially Romania, Bulgaria and Cyprus; e-SHAPE EuroGEOSS Showcase; [EXCELSIOR](#); ERA-PLANET (primarily [SMURBS](#)); [NextGEOSS](#) – several pilot activities therein.

The Initiative will operate on **in-kind contributions** and will leverage **budget** associated with the abovementioned activities to the extent that the tasks performed in these projects directly impact the achievement of objectives herein. The country partners have shown strong commitment to mobilise their own resources within their operational context in the organisation/attendance of workshops and contribution to the reports produced under the Initiative. Specific budgetary overview will be provided once the “mix” of resources presented above is consolidated – note that some of these actions are pending (e.g. PRIMA) whilst others have already secured some budget for regional workshops (e.g. Copernicus FPA).

## 8. Technical Synopsis

The GEO-CRADLE project has been collecting and inventorying a large number of data, i.e. capacities and profiles of Earth Observation stakeholders in the Region of Interest (Balkans, Middle East and North Africa). Moreover, in the framework of its four feasibility studies, the project integrated regional EO capacities in response to given regional challenges, for which a number of datasets were integrated and produced. These, together with other existing datasets made available by regional stakeholders, are now openly and freely accessible through the [GEO-CRADLE Regional Data Hub](#). The key datasets collected or created by the activity are the following:

- In the work done under “**Pilots towards regional challenges**”:
  - 1) In “**Adaptation to Climate Change**”:  
Atmospheric aerosol measurements, mass concentrations and chemical components; MSG-SEVIRI input (Spinning Enhanced Visible and Infrared Imager); NMM-DREAM satellite assimilation fields; NOAA – FireHub; FLEXPART-WRF biomass smoke dispersion; RegCM4-dust; CORDEX regional climate data; EMEP air quality data; AirBase air quality data; ECA dataset of daily meteorological observations; CAMS input; GAW stations input.
  - 2) In “**Improved Food Security – Water Extremes Management**”:  
Regional Soil Spectral Library; Thematic maps; Global Assessment Report 2015 Flood Hazard maps; FloodPROOFS model output.
  - 3) In “**Access to Raw Materials**”:  
Space borne radar and optical images; Air borne hyperspectral images; Air borne joint existing multi - hyperspectral campaigns under EUFAR TA for soil/mineral spectra collection; Airborne LIDAR (Light Detection and Ranging) scanning; In-situ measurements.
  - 4) In “**Access to Energy**”:  
MSG input; CAMS input; GHI (spectrally solar energy); DNI (spectrally solar energy); Solar Atlas of GHI; Solar Atlas of DNI.

- In the work done under “**Regional contribution to GEOSS & Copernicus**”:
  - 5) **Datasets of the [Regional Data Hub](#)** (RDH). Apart from being a service that allows its users to search for (discovery), view (access) and download (request) datasets, portals and services related with the region of Balkans, Middle East and North Africa, the RDH is also currently utilized as a gateway / interface for registering data GEOSS, and has been highly considered by GEO Secretariat as a significant pilot operation of a Regional GEOSS Portal. The RDH is a stable service with full interoperability with the GEOSS Common Infrastructure (GCI) resources and GEO DAB APIs, and serves as well as a repository of the data which became available through the project pilots. The RDH facilitates access to downloadable files of space-borne data from real-time EO satellite missions’ acquisitions; data from airborne campaigns performed in the region; in-situ data; and model results such as in the domains of Atmosphere and Climate.
  - 6) **Dataset of Stakeholders of the [Networking Platform](#)**. This includes all key stakeholders in the RoI (Balkans, Middle East and North Africa) along the value-added chain: raw data providers, intermediate users/service providers, end-users from the Industry, Academic and Public Sector. It consists of the following sections: Description, Details, Activity Focus, Capacities, National Activities, Engagement in GEO-CRADLE, and Location. The profiles of all stakeholders who have filled in the GEO-CRADLE survey are validated and uploaded on the Networking Platform, in a fully functional mode with user-friendly filtering / searching mechanisms, following open access principles. The profiles include exclusive and specific information collected via the GEO-CRADLE Survey. After their registration, the stakeholders can login anytime and edit their profiles providing updated information. Therefore, this unique GEO-CRADLE Networking Platform publishes comprehensive profiles of stakeholders, incorporates a rich inventory of regional capacities, provides a first assessment of countries EO maturity, and facilitates potential partnerships between various stakeholders.

## 9. Data Policy

The GEO-CRADLE Initiative, alike the GEO-CRADLE project, adheres and promotes the GEOSS Data Sharing Principles as well as the GEOSS Data Management Principles. All the data that have been produced, collected, used and integrated are publicly available online on the GEO-CRADLE portal (<http://geocradle.eu>) and the datasets are further registered to the GEOSS Platform.

More specifically:

- the inventory of the EO capacities and profiles of stakeholders in the RoI is available online on the GEO-CRADLE Networking Platform: <http://geocradle.eu/platform>
- the datasets that were integrated and produced in the framework of the four GEO-CRADLE feasibility studies, together with other existing datasets made available by regional stakeholders, are available online on the GEO-CRADLE Regional Data Hub: <http://datahub.geocradle.eu>

The management of all the different datasets is in line with the relevant H2020 Guidelines on FAIR Data Management. The longer-term preservation of the data and information will be achieved both through in-kind contributions and involvement in key ongoing or planned activities of very high relevance to the objectives of the GEO-CRADLE Initiative.

## **TABLES (attached spreadsheet)**

- A. Individual Participants
- B. Confirmed Contributions
- C. Task / Work Package Structure
- D. Deliverables / Milestones

## **ANNEXES**

### **I. Acronyms and abbreviations**

AB:	Advisory Board
API:	Application Programming Interface
CAMS:	Copernicus Atmosphere Monitoring Service
CC:	Climate Change
C3S:	Copernicus Climate Change Service
CEDARE:	Centre for Environment and Development for the Arab Region and Europe
CEO:	Chief executive Officer
CERT:	Research and Studies Telecommunications Centre
CLMS:	Copernicus Land Monitoring Service
CMEMS:	Copernicus Marine Environment Monitoring Service
CORDIS:	Community Research and Development Information Service
CRTS:	Royal Centre for Remote Sensing
CUT:	Cyprus University of Technology
DG GROW:	Directorate-General for Growth
DG RTD:	Directorate-General for Research and Innovation
DRR:	Disaster Risk Reduction
EARSC:	European Association of Remote Sensing Companies
EC:	European Commission
EO:	Earth Observation
EO4SD:	Earth Observation for Sustainable Development
ESA:	European Space Agency
EU:	European Union
EVF:	Evenflow
FPA:	Framework Partnership Agreement
GA:	General Assembly
GCI:	GEOSS Common Infrastructure
GEO:	Group on Earth Observations
GEO-CRADLE:	Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East, and Balkans and Developing Links with GEO related initiatives towards GEOSS
GEOSS:	Global Earth Observation System of Systems
GI:	Geodynamics Institute
H2020:	Horizon 2020

IAASARS:	Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing
IBEC:	InterBalkan Environment Center
ICT:	Initiative Coordination Team
IERSD:	Institute for Environmental Research and Sustainable Development
INCA:	Institute for Nature Conservation in Albania
ITPS:	Intergovernmental Technical Panel on Soils
JRC:	Joint Research Center
LIDAR:	Light Detection and Ranging
MENA:	Middle East and North Africa
NAMEBA:	North Africa, Middle East, and Balkans
NARSS:	National Authority for Remote Sensing and Space Sciences
NOA:	National Observatory of Athens
NSOs:	National Statistics Offices
OC:	Overall Coordinator
PB:	Programme Board
PERT:	Program Evaluation Review Technique
PMOD/WRC:	Physical Meteorological Observatory in Davos / World Radiation Centre
PoC:	Person of Contact
POs:	Participating Organisations
RC:	Regional Coordinator
RCM:	Regional Climate Model
RDH:	Regional Data Hub
Rol:	Region of Interest
R&D:	Research & Development
R&D&I:	Research & Development & Innovation
SD:	Sustainable Development
SDGs:	Sustainable Development Goals
SME:	Small to Medium Enterprise
SMURBS:	SMart URBan Solutions for air quality, disasters and city growth
SRTI:	Space Research and Technology Institute
TAU:	Tel Aviv University
TUBITAK UZAY:	Space Technologies Research Institute of Turkey
UN:	United Nations
UU:	User Uptake
WP:	Work Package

## II. List of key scientific references describing the basis for the work of the Initiative

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### III. Brief CV of Project Leaders

#### **Dr Charalampos (Haris) Kontoes (male), Coordinator and WP1 Leader**

NOA (GR), Research Director, Remote Sensing,

PhD, [kontoes@noa.gr](mailto:kontoes@noa.gr), [http://www.researchgate.net/profile/Kontoes\\_Charalabos](http://www.researchgate.net/profile/Kontoes_Charalabos)

- Expert in the Remote Sensing of Environment. Solid professional experience in the coordination of 30+ EC, ESA, and national/regional competitive projects funded in the context of framework initiatives e.g. FP6, and FP7, COPERNICUS, GEO, EOEP/ESA, DUE/ESA, Civil Protection Instrument/DG ECHO, GSE/ESA, CAP/DG AGR, etc. Indicative projects include the, (i) GEO-CRADLE H2020 project (<http://geocradle.eu/>), (ii) BEYOND FP7 REGPOT 2012-2013 project ([www.beyond-eocenter.eu](http://www.beyond-eocenter.eu)), (iii) RISK-EOS extension to Greece/ ESA-GSE project, (iv) MASSIVE FP7 DG ECHO project (<http://www.massive.eu-project-sites.com>), (v) EMS Copernicus Risk & Recovery (Deputy Coordinator), (vi) the CLC and CLC-Change 2000 projects in Greece EC EEA, (vii) 5 large scale (nationwide) projects in the context of the Land Parcel Identification System (LPIS/ EC-DG AGR), (viii) 7 projects in the framework of the Greek National Cadastral Program, (ix) 2 LUCAS projects supporting the CAP at EU level EC-DG AGR, (x) SAFER FP7 EC-GMES project (WPs leader and member of the Project Management Board), (xi) LinkER EC-GMES project (WPs leader/member of PMB), (xii) TELEIOS FP7 EC-ICT project ([www.earthobservatory.eu](http://www.earthobservatory.eu)) (WPs leader/member of PMB), (xiii) the LIMES FP6 Security GMES project (WPs leader/member PMB), etc.
- As National Delegate for Space, he has been responsible for leading and coordinating interdisciplinary representations and national delegations in the context of International Organisations' Decision Making Boards and Space Committees (e.g. the ESA PBE0, the EC Space Committees (Fp7, H2020), the GMES Steering Committee, the EC Space Advisory Committee, etc).
- As National Point of Contact (NPC) of ESA's CollGS initiative, coordinated the development and sustained operation of the first Copernicus data dissemination facility in the SE Europe and Balkans (the Hellenic Sentinel Data Hub), and also coordinated the development and operation of large scale GSs facilities for accessing in real time numerous EO satellite missions.
- Chair the organisation of several international research forums, scientific conferences, and dissemination event, including GEO and Copernicus relevant congresses (e.g. the 2nd SE GEO Workshop 2014, the GMES Forum in Athens 2003, the GMES Forum in Liles 2008, the Copernicus Space in Security congress in Athens 2014, etc).
- Author of more than 110 publications in reviewed journals and scientific conferences. Member of the editorial boards and reviewer of highly ranked Scientific Journals (IJPRS, IJRS, SENSORS, IEEE Geoscience and RS). Evaluator of projects submitted to EC in the various framework programs (e.g. FP6, H2020).
- Winner of the Copernicus Masters Best Challenge Service 2014 (The FIREHUB Service) (<http://ocean.space.noa.gr/FireHub>).

#### **Dr Evangelos Gerasopoulos (male), WP2 Leader**

NOA, NOA Research Director, Greek GEO Office Director, Atmospheric Physicist, PhD, [egera@noa.gr](mailto:egera@noa.gr)

Dr. Evangelos Gerasopoulos graduated from the Physics Department of the Aristotle University of Thessaloniki (AUTH), Greece and received his PhD degree from the same department in 2003 in the field of Atmospheric Physics and Dynamics. He has been working as a research fellow at the AUTH, the Max Planck Institute, then the University of Crete in the fields of aerosol science and variability of aerosols

and trace gases at remote-marine environments. He joined IERSD/NOA in 2006, holding the position of Research Director since 2011. Apart from his research activities, he has been a Member of the Sectorial Scientific Council for the Environment and Energy of the National Council for Research and Technology (2014 – 2016), the President of the Scientific Advisory Board of the Institute for Environmental Research and Sustainable Development (2014 – 2016) and the Vice-president of the Scientific Advisory Board of the Institute for Environmental Research and Sustainable Development (2012 – 2014). In addition, he is currently a Member of: EuroGEOSS Coordination Group, the Programme Board of the Intergovernmental Group on Earth Observations (GEO), the Steering Committee of the Navarino Environmental Observatory (Messenia, Greece), the Board of the Hellenic Quality Assurance & Accreditation Agency (HQA), the Head and Quality Assurance Manager of the Laboratory of Atmospheric Chemistry/NOA and the Director of the Greek GEO Office. His full CV, including the complete list of his 200+ publications can be found [here](#).

**Mr Eleftherios Mamais (male), WP3 Leader**

EVF, EVF Co-founder and Director, Physicist, MSc, [lifteris@evenflowconsulting.be](mailto:lifteris@evenflowconsulting.be)

- Co-Founder and Director of Evenflow, with a strong specialisation in developing exploitation and commercialisation strategies for research and innovation projects.
- Lefteris is leading exploitation and business planning activities in multiple projects (APOLLO, GEO-CRADLE, EOMORES, DiscovAIR, ESA Big Data Migration).
- With over 7 years of involvement in multiple EO-related activities, Lefteris has developed an in-depth understanding of strategic and programmatic aspects of Copernicus and GEO/GEOSS, a wide network across the whole EO value chain and an extensive knowledge of downstream EO markets.
- He has solid experience in the management, coordination and technical supervision of large international projects and EC contracts (GEO-CRADLE, GNSS.asia, Copernicus EMS User Guide, European Space Expo).
- He is the lead analyst in several studies undertaken for EU institutions (DG GROW, ESA, GSA) and associations (EARSC).
- He is a frequent speaker (e.g. in 2018 in 3, InDust Action in Barcelona) and moderator at key events, including GEPW 2016 and 2017 (sessions on “Industry contribution to SDGs” and “Capacity development”), Copernicus Industry Workshop with EEEs, April 2017, session on “How can industry and EEEs work better together”,
- M.Sc. in Physics - specialisation in Astrophysics and Cosmology.

**Mr Anestis Trypitsidis (male), WP4 Leader**

NOA, Planning and Regional Development Engineer, MSc, [atrypitsidis@noa.gr](mailto:atrypitsidis@noa.gr)

Mr. Anastasios Trypitsidis, since 2012, is working as a GIS project manager, being responsible of several GIS projects carried out at National & International level 3D-Aerodromes, SEIS, Smart-Islands, ArcFUEL, eENVplus, c-Space, GETIM-EUGAS, RAWFIE, FlySec, SmeSpire, MITA-INSPIRE Gap Analysis & Implementation; SIM4NEXUS; AURORA; SUNSHINE; GeoSmartCity; EMSY; e-Reporting Tool for Industrial Emission; NextGEOSS; Marine-EO; EOPEN. He is having background experience in great amount of software tools, GIS and office tools such as MS Office Project 2010, Redmine, GIS & WebGIS tools (ESRI ArcGIS Desktop 10.x, ArcGIS Server 10.x), RDBMS (MySQL, SQLyog, Postgre/PostGIS), INSPIRE editor s/w tools (INSPIRE metadata editor, GeoNetwork, Publisher), Programming (small experience in Visual Basic), and applies these to urban and regional planning using GIS, spatial data collection and tracking, spatial

databases. Anestis is having a background in engineering, MEng in Urban Planning & Regional Development, and M.Sc. in Applied Geography & Spatial Planning – Stream C: GeoInformatics.

**Ms Alexia Tsouni (female), WP5 Leader**

NOA, Civil Engineer, MSc, [alexiatouni@noa.gr](mailto:alexiatouni@noa.gr)

Ms. Alexia Tsouni is a Flood expert, member of the service provision team as part of the European partnership “NOA - Geoapikonisis SA - Altamira SA - CIMA Foundation” in the framework contract of Risk & Recovery mapping to address needs of the Copernicus Emergency Management Service. Production of thousands of risk & recovery maps for a range of hazards, such as floods and flash floods, forest fires, earthquakes, volcanic eruptions and lava flow, landslides, soil and coastal erosion, tsunamis, as well as toxic gasses concentrations and cloud dispersion due to industrial accidents. Moreover, suggestion of risk-specific mitigation measures for all the above cases of risks, and critical first response spatial analysis to support decision making concerning planning and recovery activities. She is also the coordinator of the FloodHub service in the BEYOND Center of Excellence. Alexia is an author of 6 publications in peer-reviewed journals and international conferences and workshops. Alexia is also a PhD candidate in floods monitoring with remote sensing from the National Technical University of Athens in cooperation with the Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing of the National Observatory of Athens. She has an engineering background as MEng in Civil Engineering, M.Sc. in Water Resources Science and Technology.

**Ms Eleni Christia (female), WP6 Leader**

NOA, Environmentalist-Cartographer, [christia@noa.gr](mailto:christia@noa.gr)

Mrs. Eleni Christia Communication and Dissemination Manager of European Projects. She is the Communication Manager of the GEO-CRADLE project since 2016, with the responsible for the Communication and Dissemination Strategy of the Project. Organising of regional Workshops in Middle East, North Africa and Balkans related to stakeholder’s engagement and end users’ needs. Eleni also organized conferences, workshops and communication activities in collaboration with the European Commission, the GEO Secretariat, the National Observatory of Athens and the Copernicus Academy. She is the dissemination and communication manager of BEYOND Center of Excellence for monitoring Natural Disasters since June 2013. Since 2007, she is the executive Secretary of Greek GEO Office, Eleni was also a member of the writing team of Implementation Plan Working Group of GEOSS and she worked in several EU projects related to GEOSS such as ERA-PLANET, GEOMON, and DARECLIMED. From 2015-june 2018 she was a senior Officer of the Press Office of NOA, responsible for the communication strategy and the communication activities of NOA and member of the Public Relationship and Outreach of NOA.

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Prof George Zalidis (male), IBEC, Scientific Coordinator of IBEC, GEO Principle, [zalidis@i-bec.org](mailto:zalidis@i-bec.org)

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