



e-shape

EuroGEO Showcases: Applications Powered by Europe

Shaping EuroGEO

A position paper prepared by the e-shape consortium

November 2022

1. Executive Summary

This position paper is put together by the Executive Board of e-shape on behalf of all partners, the European Flagship project supporting EuroGEO. Its aim is to share the vision of the e-shape partners for the future of EuroGEO. In that regard, we argue that EuroGEO should assume a multifaceted role supporting the **coordination of EU contributions to GEO**, enabling **partnerships between public, academic and private actors**, fostering **increased innovation**, **promoting and disseminating the FAIR and GEO principles**, facilitating **international cooperation** and **contributing** to the **creation and development of a comprehensive innovation pipeline in Europe**. These roles can greatly benefit from the concrete outputs of e-shape and the lessons learned through the implementation of 37 pilots by 68 partners. Moreover, the necessary governance structure for the execution of these roles is discussed in this position paper having fully incorporated reflections to this end from the execution of e-shape.

The position paper is drafted with full awareness of the critical timing in the greater EO ecosystem; it takes into account the significant opportunities and challenges that characterise our sector and shape its future; it also recognises the fact that the post-2025 GEO vision is being presently shaped and that a ministerial is coming up next year.

Finally, the position paper raises a call to action for the launch of appropriate calls with adequate budget to fully exploit the legacy by e-shape and not only maintain its momentum by also help to shape the future for the benefit of all EO actors.

2. Background

2.1. EuroGEO: Current scope and vision

EuroGEO has been launched as Europe's contribution to GEO, with the ultimate aim to promote the role of Earth Observations in support of addressing global challenges. In that context, the main spheres of activities to be conducted by the EuroGEO Initiative are:

- Coordination of GEO-relevant activities undertaken in Europe to ensure a coherent European contribution to the GEO initiatives and priorities;
- Implementing a user-driven research and innovation agenda to maximise uptake and engagement of EO applications that are addressing the GEO priorities, and require further demonstration, incubation, up-scaling, or replication;
- Supporting cooperation among individual European and national programmes and user communities (e.g. Copernicus, ESA, NMHIs, European observing networks and Research infrastructures, etc.);
- Cooperation with other Regional GEOs, in particular with view to sharing data, applications and good practices globally.

The implementation plan of EuroGEO in relation to these activities was revised for the new version of the 2023-2025 GEO work programme endorsed by the GEO community at the last plenary in Accra, Ghana. Thus, the new Implementation plan of the EuroGEO Initiative will focus on the strategic actions based on the 3C approach (Coordinate, Combine and Cooperate).

2.2. e-shape's scope and role in support of EuroGEO

The H2020 e-shape project has been supporting the development of EuroGEO activities in line with the latter's strategic objectives. In this regard, e-shape has been functioning as a sandbox of the EuroGEO initiative whereby methodologies and approaches are tested, best practices are collected, created and shared, and important components with a far-reaching impact and long-lasting perspective are rolled out for the benefit of the EO community at large (academia, industry, users). This includes:

- The **development and testing of a robust co-design methodology** that fits the operational requirements of EO services development, delivery and use, significantly contributing to an impactful adoption of well-adapted co-design processes in the EO sector. This has been applied in the case of 37 pilots and has since been disseminated to other EU-funded projects, the GEO community on the road to post-2025 and major initiatives such as Destination Earth programme (DestinE).
- The development and offering of a **dedicated tool facilitating the implementation of FAIR and GEO principles** for data and services.

- The **dissemination of the cloud paradigm, interoperability, and standards** informed by the solution development activities of the 37 pilots.
- The **development and operationalization of 37 EO applications in seven key thematic areas** (Agriculture, Health, Energy, Ecosystem, Water, Disasters and Climate), helping to strengthen the portfolio of EO applications offered by European service providers and resulting on true **European success stories** towards the EO market and GEO
- The provision of a wide range of **capacity building tools and materials** addressing both the supply and demand side.
- The design of **user uptake activities** in collaboration with key stakeholders and with the aim of creating or enlarging the markets for EO solutions.
- The launch of the **sustainability booster** which offers comprehensive support to the 37 pilots (and the wider EO community) in relation to business planning, market entry strategies, IP and legal aspects, investment readiness and more.
- A thorough assessment of **applicable governance models for EuroGEO**, informing the evolution of the initiative.
- A wide range of **awareness raising and dissemination activities** in close collaboration with European Institutions (DG RTD, DG DEFIS, EUSPA, Entrusted Entities, ESA), Member State Representatives and GEO structures.

All this forms part of the deeper impact and legacy of e-shape. In view of the stated aims of EuroGEO (summarised previously) and the overall state-of-play and future outlook (discussed below) we consider this impact and legacy to form indispensable building blocks for future EuroGEO activities.

3. State-of-Play and Future Outlook

3.1. A thriving European EO sector

Copernicus - Europe's *de facto* contribution to GEO - and the European Earth Observation (EO) community built around it can gaze into the future with confidence and optimism but also with a sense of responsibility. Europe has built world-class EO capabilities, underpinned by the establishment of 6 Copernicus services supplying data and products to respective sectors and the development and operation of a unique constellation of satellites (the Sentinels), which together with contributing missions and in-situ networks, offer a wealth of Earth Observation data.

These underlying capabilities help solutions developers from academia and research, from established companies but also increasingly from start-ups and SMEs, to develop a host of innovative products and services, thus bringing a wide range of benefits to the various users. This vibrant and innovative downstream sector has been formed in large part through collaborations within and with the support of EU funded R&D projects. In fact, European R&D&I activities have been in many ways the engine for the development of cutting-edge solutions in support of societal challenges and in full alignment with the EU's strategic goals for the twin transition to a more sustainable and digital future. The importance of the contributions of the EU EO sector in this regard, can be seen in the continuously increasing recognition of EO in policy making but also its adoption in a wide range of business processes.

This dynamic can be expected to continue and grow thanks to a number of key market drivers:

- **Increased incorporation of EO in support of key EU policies:** In recent years several key EU policies are incorporating the use of EO solutions in their implementation and monitoring. With CAP and emergency management being the most prominent examples several other policy domains such as forest management, carbon removals, water quality monitoring, renewable energy and raw materials, to name a few, are now looking more intently into this aspect.
- **Geopolitical pressures:** The increased importance of EO in policy or strategic domains has received additional impetus following recent geopolitical developments (i.e. Russia's invasion in Ukraine, the pandemic of COVID-19, etc.).
- **Market Developments:** Whether due to more favourable legislation/regulations or simply because of perceived market opportunities, market actors in several application areas and sectors are seeking to further incorporate EO in their operational workflows. This is reflected in the increased private investment in EO startups but also in the roll-out of new business models.
- **Technological Developments:** From enhanced observational capabilities to improved data access and storage, and from novel data processing and visualisation approaches to advanced information products generation, key developments are helping EO solution providers to innovate and better meet users' needs.

All of this together underlines the transformative power of European EO capabilities - spearheaded by Copernicus, and the importance of maintaining Europe's leadership in this regard. Yet, for this to be realised, a number of challenges need to be addressed.

3.2. Important challenges to overcome

For the EO sector to grow and further thrive, important challenges faced by both the demand and supply side need to be overcome.

On the **demand side**, challenges such as **lack of awareness** on the solutions enabled by EO but also, very importantly, **lack of capacity to effectively integrate such solutions in operational workflows** are still widely reported. To address such issues, it is necessary to **involve the users, in co-design practices** ensuring in this way that their requirements inform the development of solutions from the get-go and that any operational specificities are reflected in the final offering of EO-based solutions. In the same vein, users are often **lacking the capacity to procure the necessary solutions**, an area which requires increased attention in view of the many policies which are progressively calling for EO solutions to be used by public administrations. Zooming out to the broader picture, there still is a need for a **comprehensive user uptake strategy** that will be first and foremost **user-driven**. This should seek to put in place **market pull mechanisms** that enable wide uptake of EO solutions by users in various domains. Taking a long-term perspective, these mechanisms should also aim at progressively **building up the capacity of users** to further understand the possibilities and limits associated with EO-based services. This would help the increased uptake of such EO-based services as a key resource to transform their practices and design new ones, in their efforts to tackle contemporary socio-environmental challenges.

On the **supply side** many of the ongoing challenges are related to **struggles in upscaling**. Thus, many EO solution providers find it **difficult to translate their R&D results into operational solutions** rolled out in the market. Closely connected to that, EO solution providers are often finding it hard to internationalise and enter new markets in an effective way. Growing – or even upscaling – their business, means developing and **implementing solid business plans** underpinned by smart and realistic business models and a continuous effort to **hone their value proposition by incorporating user input** through the product development lifecycle. This might also involve inventing thought-through forms of partnerships between public research organisations and commercial companies to ensure the engineering and operationalisation of solutions.

Technical barriers related to data access, storage, and manipulation are still prevalent albeit to a much lesser extent than in recent years. Nonetheless, the need to **disseminate best practices in data management, exploitation of cloud capabilities or adoption of cutting-edge AI/ML techniques** is well documented, as is the need for new observational capabilities (e.g. new satellite constellations). Here too, a look at the broader picture indicates that comprehensive **market development efforts** are required as well as concerted work to **increase the available capital** (public and private) for EO solution providers. In that regard, **investment readiness** remains a challenge for many EO solution providers especially in early stages of their business.

The EO applications developed within e-shape represent true European success stories that contribute to addressing these challenges.

4. Shaping EuroGEO as an engine for growth for the EO sector

4.1. A multifaceted role

To fulfill its stated mission in this dynamically evolving environment and not only coordinate the European contribution but also act as an engine for growth for the EO sector, EuroGEO needs to assume a multifaceted role.

Firstly, it should **build on the legacy of EU investments in GEO activities** and set in motion all the necessary means to ensure **dissemination and replication of best practices introduced in EU-funded projects**. In that regard, the example of e-shape acts as a lighthouse, as it has produced a wide range of outputs that should be “exported” within the broader GEO community to showcase European scientific and innovation excellence. To that end, EuroGEO - as already planned - shall act as the key node for **coordination of EU contributions to GEO** leveraging relevant mechanisms at European and national levels but also strengthening them. To support this, proven practices for the assessment of the maturity level of EO activities at country level, and the identification of gaps or opportunities (significantly supported by e-shape), should be widely adopted with the help of EuroGEO.

Secondly, EuroGEO can play a central role in **supporting increased innovation**. By **fostering collaboration among all actors in the EO value chain** (academia, industry, governmental organisations, users), EuroGEO can **drive the development of applications** that make the most of enabling technological paradigms (cloud computing, AI/ML techniques, datacubes, etc.), and - crucially - involve users throughout the development lifecycle. In that regard, the breakthrough achieved by e-shape in **co-design approaches** designed for and tested in the EO sector should be fully exploited in future R&D&I projects connected to EuroGEO, and, more broadly, to EO solutions development. The experimentation of these EO-specific co-design approaches has led to a clear lesson: a) these methods make a true impact in terms of designing EO solutions that are fit-for-purpose and resilient to the on-going transformations of EO and the sectors it supports, especially in the face of socio-environmental challenges; b) these methods require well-trained managers or co-design experts. EuroGEO has definitively a strong role to play in the development, diffusion and improvements of these methods.

Thirdly, EuroGEO should hold a key role in **promoting and disseminating the FAIR and GEO principles**, in relation to data sharing and data management, **for all types of data including in-situ**. In addition, EuroGEO can contribute to **reinforcing the data ecosystem in Europe**, effectively linking cutting-edge research developments to operational progress of data platforms and associated tools and methodologies. Here too, the lessons learned, and best practices developed by e-shape in the course of conducting 37 pilots with different operational constraints can be a significant resource from which to build on.

Next, in its role as regional GEO for Europe, EuroGEO should **foster international cooperation** and help **stimulate user uptake and market development both in and outside Europe**.

Finally, EuroGEO can have a unique contribution to the **creation and development of a comprehensive innovation pipeline in Europe**. By nurturing cutting edge R&D and then supporting solutions that are in

pre-commercialisation stage to make the next step towards sustainable market uptake and upscaling, EuroGEO can be an important actor in Europe, linking with other initiatives (e.g. CASSINI or ScaleUp) managed by other institutions. In this regard, the sustainability booster established by e-shape can be an invaluable asset as it has already supported 37 pilots through which it developed a complete value proposition for commercialisation support.

For all these roles to be incorporated effectively in EuroGEO's work plan, it is essential that an appropriate governance structure is established, as discussed next.

4.2. **A fit-for-purpose governance structure**

From this close to four-year experience and the evolution of the EO sector and institutional landscape (creation of EUSPA, Cassini Programme, Knowledge Centre for EO, evolution of Copernicus, DestinE, etc...), there is a strong need for a coordination structure dedicated to the daily operation of EuroGEO and its guidance towards better research, more innovation, more effective collaboration and integration of the different actors and capacity building through a series of support services across the entire value chain leveraging the expertise of EU funded projects and GEO working groups and initiatives.

The so-called EuroGEO secretariat will need to be not only this coordination body but also a lighthouse allowing the exploration of new concepts, new paradigms and new thematic areas.

The EuroGEO secretariat role will be to coordinate with all actors involved in GEO and in the EO domain (HLWG, countries, GEO, Regional GEO, JRC KCEO, EUSPA, Cassini, Copernicus, Entrusted Entities, DestinE and the R&I community, industry, ministries, NGOs, ...) and to ensure their cooperation to support research and innovation pipeline towards success. For this to be effective, such coordination role must be embraced in all relevant spheres: decision-makers, operational solution developers, researchers and academia, end users (public and private). In that regard, the experience gained in e-shape should not be lost and must guide the EO community from inception of ideas to expansion of the applications and services.

Considering these observations, we argue that the EuroGEO secretariat should combine the coordination aspects with practical aspects and realizations to avoid disconnection between services and applications development and the end-users. The thematic approach proposed within e-shape is echoing the Action Groups approach developed at the inception of EuroGEO. It is a tested approach with proven value that included - crucially - the onboarding mechanism. This served the purpose of inclusiveness and greatly helped to bring top of the class EO solutions within EuroGEO. Combined with the many other key outputs discussed earlier (e.g. co-design, sustainability booster with its on-demand services), the approach of e-shape supported the effective implementation of 37 pilots and fortified their sustainability perspectives.

Thus, this approach should inform the structure of the EuroGEO secretariat. To reflect this, figure 1 presents the different elements composing a potential EuroGEO secretariat, taking into account the demand side, the supply size and all the technical, organizational and market barriers and proposing solutions to effectively connect the EO actors. This approach would ensure the provision of a wide range of services to help the EO community based on the e-shape experience.

The options for running this secretariat are multiple: a rotating EuroGEO secretariat between European countries, an institute-based EuroGEO Secretariat or an externalized EuroGEO Secretariat, supported by a secondment at the GEO Secretariat specifically aimed at supporting coordination with the EuroGEO secretariat. The choice of the ad-hoc governance structure will depend on the ambition of the EuroGEO initiative and its willingness to propose an integrated EuroGEO secretariat, opening discussions on political and funding issues.

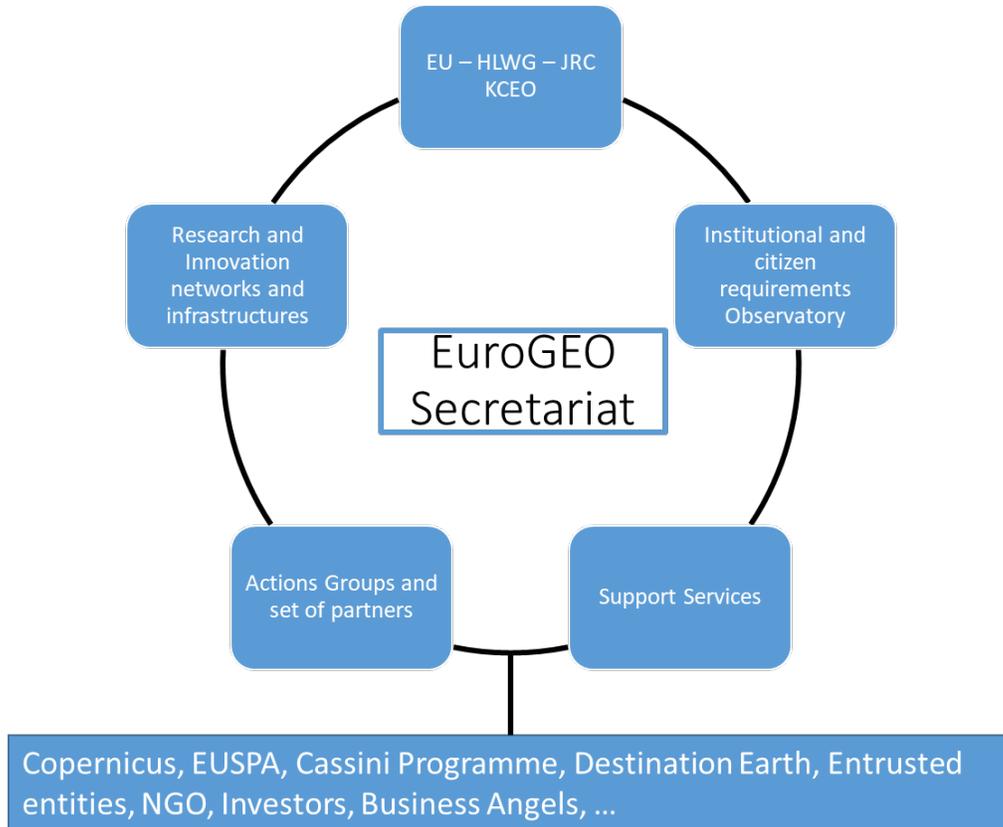


Figure 1: Potential structure of the EuroGEO secretariat

5. Concluding remarks and recommendations

In this position paper we have presented clear arguments on the roles that we consider EuroGEO should assume and the governance structure to support the execution of these roles. In that regard, we consider it essential that a dedicated Secretariat is established, with a clear scope and responsibilities and a steady budget that allows good progress on all dimensions of EuroGEO, from the **coordination of EU contributions to GEO to supporting increased innovation**, and from **promoting and disseminating the FAIR and GEO principles to fostering international cooperation** and all the way to the **creation and development of a comprehensive innovation pipeline in Europe for EO**.

This, however, cannot be supported merely by establishing the EuroGEO secretariat. Instead, a **dedicated R&D&I call (or series thereof) is needed** whereby the outputs of e-shape will be taken up, further honed and put to practice in new or extended operational scenarios (e.g. additional thematic areas). This should have adequate budget (at the order of e-shape at minima) and be launched in the short term so as not to lose the momentum developed by e-shape and the opportunity to contribute to the dynamically changing EO ecosystem.

In that regard, it is also essential that **EuroGEO is not developed in a silo** but, instead, links to the efforts undertaken by other institutional actors and initiatives with the aim to **contribute to a comprehensive user uptake strategy** for the benefit of all actors in the EO value chain (both supply and demand side).