

## Preparing the Future Downstream Services

### Position paper from the European Earth Observation Services Industry

#### Summary:

The present paper describes the position of the European Earth Observation services industry [represented by European Association of Remote Sensing Companies] on the evolution of the Copernicus Programme in its next phase. This is especially important, if not critical, given the impact anticipated coming from the economic crisis starting to hit the industry.

The main points covered in this paper are the following:

1. *Preparing for the future Copernicus services*
2. *Developing the market*
3. *The industrial role*

#### European Association of Remote Sensing Companies - EARSC:

EARSC represents the Earth Observation geo-information services sector in Europe with today over 120 members coming from 23 countries covering the full EO services value chain including commercial operators of EO satellites, resellers of data, value-adding companies, geospatial information suppliers, consultancies and system/software providers. The sector plays a key role in providing value-added, geospatial information to its customers in Europe and the world. In 2018, the sector revenue in Europe was over €1.2b giving work to over 8000 highly skilled employees; The sector is dominated by SME's with over 95% of the companies having less than 50 and over 60% less than 10 persons employed. This paper reflects the views of the full members of EARSC, which are commercial companies, coming from Member States in the EU or in ESA, providing services (including consultancy) or supplying equipment in the field of remote sensing or using EO data. EARSC observer members are informed and may have commented on the paper but are not necessarily endorsing its conclusions.

For any further information on this position paper, please contact us at: [info@earsc.org](mailto:info@earsc.org).

## Background

The Earth observation (EO) services industry is a key stakeholder in the Copernicus programme as both a supplier and as a user with the goal to develop new business, contributing to economic growth and job creation in Europe. European Association of Remote Sensing Companies (EARSC), as the representative body for the European EO services industry, provides regular position papers setting out the industry views on the Copernicus programme and other key topics. A paper was published in November 2019<sup>1</sup>, which sets out the position of the industry on the evolution of the programme in which the following key points addressed were:

- Support to the Copernicus free, full and open data policy and to complementary actions that would introduce an element of reciprocity vis-à-vis third countries.
- To establish a clearer boundary between the role of public and private actors in the provision of Copernicus services
- To construct a more structured dialogue between industry and the Copernicus Entrusted Entities
- A framework contract model and the possibility of asset federation for the Copernicus Contributing Missions
- A greater industrial involvement in the design and testing of new missions making use of public-private partnership schemes
- Better allocation of resources for downstream market development.

This paper, coming after the European Space Agency (ESA) ministerial<sup>2</sup> through which Member States agreed to prepare to expand the space component of the European Union (EU) Copernicus programme, builds upon our previous paper, and presents some specific industry perspectives regarding the preparation of the next phase of the Copernicus programme – sometimes referred to as Copernicus 2.0.

## The evolution of the Copernicus programme

In 1998, a group of experts signed the Baveno Manifesto, proposing the creation of the European environment monitoring programme known initially as GMES. This vision gave rise to the Copernicus programme, the largest and most ambitious EO programme ever implemented worldwide. After a preparatory phase and a 1<sup>st</sup> operational phase, Copernicus will enter its 3<sup>rd</sup> phase with the launch of the next financial framework of the EU in 2021.

The Copernicus Programme has proven to be highly successful, serving the needs of Europe's policy makers and embracing the important role of the industry. Recognising the opportunities in terms of technological development and industrial growth, the European EO service industry has always supported Copernicus. Whilst Copernicus is first and foremost a public programme serving public information needs, its data and information can be and, in some cases, is complemented by commercial and other data sources and is being used for commercial business purposes.

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<sup>1</sup> EARSC Position paper from the European Earth Observation Services Industry, « Industry view of the future of the Copernicus Programme : key issues to address », November 2019.

<sup>2</sup> [http://www.esa.int/About\\_Us/Corporate\\_news/ESA\\_ministers\\_commit\\_to\\_biggest\\_ever\\_budget](http://www.esa.int/About_Us/Corporate_news/ESA_ministers_commit_to_biggest_ever_budget)

This is highlighted by the Space Regulation<sup>3</sup>, which states in its explanatory memorandum that the objective of this legislative effort is to “*maximise the socio-economic benefits, including by promoting the widest possible use of data, information and services provided by the Programme’s components*”. This statement is also in line with European policy initiatives such as the European Green Deal<sup>4</sup>, the industrial strategy<sup>5</sup> and the data strategy<sup>6</sup> with the common objective of ensuring growth and competitiveness for the European market.

## The Earth observation sector

The EO industry is very dynamic and for some years has been showing a good and regular growth. Currently, the space-based EO industry represents a market worth around €4 billion globally and €1.2 billion<sup>7</sup> for the European market. The EARSC Survey of the State and Health of the European EO Services industry 2019 shows that in 2018 the industry counted more than 500 companies throughout Europe with 8396 employees. The survey underlines a steady growth in the number of companies (company creation rate of 10 % p.a) and employment (increase of rate 10 % p.a. from 6,920 in 2016 to 8,396 in 2019) and foresees a promising future for the sector.

This growth in the commercial market is driven strongly by the public sector. Even if the creativity and search for profit is a commercial imperative, the space sector and especially EO services are governed by an interaction between the private and public sectors. Even if formal public-private partnerships do exist, they are not common. Informal arrangements are prevalent throughout the sector given the importance of global surveillance to most governments.

According to the Copernicus 2019 market report<sup>8</sup>, the public sector has been driving the demand for EO services and is likely to continue doing so, representing about half of the demand when combining civil and defence applications. It should be clearly recognised that in the case of EO services, the large majority (> 80 %) of the public money is used as a customer to procure the required services and not to sponsor the industry. In this respect, the governments are legitimate and valued customers for services and not sponsors of the sector.

The EARSC 2019 Industry Survey evaluation estimates that the direct business with the public sector accounts for 55 % of the market and that the percentage share coming from public sector sources has increased slightly compared to previous surveys from 62 % to 66 %<sup>9</sup>. Nevertheless, there are still issues preventing more take up from the public sector such as a lack of awareness regarding the benefits of the EO data and services – and where this can underpin policies - or the lack of trust in new technologies, which limit its introduction into legislation.

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<sup>3</sup> Regulation of the European Parliament and of the Council establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU), N° 912/2010, (EU) N° 1285/2013, (EU) N° 377/2014, and Decision 541/2014/EU

<sup>4</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)

<sup>5</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en)

<sup>6</sup> <https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy>

<sup>7</sup> Figure from the EARSC Survey into the State and Health of the European EO Services Industry 2019, p 2.

<sup>8</sup> [https://www.copernicus.eu/sites/default/files/201902/PwC\\_Copernicus\\_Market\\_Report\\_2019\\_PDF\\_version.pdf](https://www.copernicus.eu/sites/default/files/201902/PwC_Copernicus_Market_Report_2019_PDF_version.pdf)

<sup>9</sup> EARSC Survey into the State and Health of the European EO Services Industry 2019, p.9

The potential for growth and market penetration is very high. According to the Geobuiz report of 2019<sup>10</sup>, the whole EO industry<sup>11</sup> is estimated to be worth US\$ 57.5 billion and is expected to grow to US\$ 75.9 billion in 2020, **growing at a CAGR<sup>12</sup> of 15.0%**. The report also states that the demand for EO **data is set to increase significantly in the next three years** because of three concomitant factors: the smallsat and nanosat revolution that is in full swing, the shift towards a higher spatial resolution and near-real-time data offering and the expansion of value-added services. Complemented by some amazing developments in digital processing, fuelled by increased digital services and the use of artificial intelligence, industry is confident that the market for space data and derived products and services will continue to grow rapidly.

In this context, Copernicus is a **key enabler for European remote sensing companies to remain competitive in a global market**. EARSC, on behalf of the EO services industry has fully supported Copernicus' transformation potential for the industry and has supported the actions taken and the many successes achieved by Member States and the EU. In particular, the free, full and open data policy plays a significant role as a business enabler at different levels across the value chain<sup>13</sup>. From the perspective of the value-adding service providers, the data policy represents a valuable cost advantage for the development of their businesses. For the EO data providers, it helps fostering awareness about the benefits of EO, exposure of a larger audience to EO capabilities and provokes an increasing demand for additional high and very high spatial resolution data.

Both the evolution of current Sentinel missions and the preparation of the new missions represent an important opportunity for the EO sector, the society at large and the European economy. These missions will provide valuable data and information serving societal, environmental and commercial needs.

This paper provides the views of the European EO services industry sector, represented by EARSC, **on what steps can be taken to prepare for the new opportunities coming as a result of Copernicus 2.0**.

## Copernicus 2.0

The recent ESA ministerial concentrated quite naturally on the evolution of the space component. The first priority lies in the continuation and improvement of the current six Sentinel families (Sentinel 1-6) and their operation. The new, improved sensors embarked on Sentinels 1-6 will offer some possibility for new services but essentially represent continuity of the existing Copernicus services.

The programme approved by the ESA ministers also includes the development of Next Generation Sentinels<sup>14</sup>. This underpins work by the EC and ESA to establish an extended portfolio of mission requirements for the **Copernicus Framework from 2025 onwards** to address more Copernicus user's needs. In this respect, the EC **has identified priority policy domains which will require new Sentinel**

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<sup>10</sup> <https://issuu.com/geospatialworld/docs/20190329-geobuiz-report-2019-freeve>, page 22.

<sup>11</sup> Remote sensing activities including «Earth observation data through sensor-systems on space, aerial, terrain, sub-surface and underwater platforms ».

<sup>12</sup> *Compound annual growth rate*

<sup>13</sup> EARSC Survey into the State and Health of the European EO Services Industry 2019 shows that many companies have been created based on the free and open Sentinel data as it is fundamental to their business models.

<sup>14</sup> Joint Line-to-Take prepared by DG GROW and ESA, status 8 March 2019.

**missions.** Six missions were proposed by ESA<sup>15</sup>, “the *High Priority Candidate Missions*” which will help tackle challenges such as “urbanisation, food security, rising sea levels, diminishing polar ice, natural disasters and climate change”<sup>16</sup>.

The data from Sentinel missions will serve public information needs and provide vital support to policy makers. In the context of the European Green Deal, the European Digital Strategy and the 2030 Agenda for Sustainable Development<sup>17</sup>, there is no doubt that leveraging the data coming from Sentinel missions will be key to foster growth for the European market.

The evolution of Copernicus programme and the deployment of new missions constitute an opportunity for the EO industry to benefit from these new services. Indeed, as these new missions will bring additional data and expand market capacities, we consider that the evolution of Copernicus will be a chance to enable the industry to play a more significant role.

## Preparing future downstream services

We suggest that a new programme “Preparing the future downstream services” could rest on 3 pillars:

### 1. Preparing for the new Copernicus Services

With new data coming from the enhanced Sentinels and the new missions, preparation is essential to deliver maximum return for European investments. Preparation for the existing Copernicus services started with the launch of the GMES Service Element (GSE) programme by ESA in 2006, 8 years before the first Sentinel was launched; hence it is time to start preparing now for the new missions.

Firstly, directed R&D is necessary to review theoretical concepts and establish the algorithms and processing routines for services based on new data sources. Since these data streams do not yet exist, simulations should be made to construct representative datasets, which can be used by researchers in their work. These datasets may be simulated based around existing missions or other data sources or representative sensors should be flown using aircraft or drone platforms.

New algorithms and processing routines as well as IT infrastructure should be explored and optimised to be capable of delivering the new services. In-situ data necessary to generate these new services should be identified, specified and made available in real or artificial form for researchers. Preparations should be made to ensure that the in-situ data is routinely available once the new missions are to be launched. Research activities should be encouraged between academics, laboratories, agencies and industrial players to bring the best science to business and sustainable operations.

The programme must be timely, taking into account a probable period of initial operations, as was the case with Copernicus 1.0 in its initial operations phase. Some early studies could be embarked to define a strategic road map and implementation plan.

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<sup>15</sup> *CHIME*, Copernicus Hyperspectral Imaging Mission, *CIMR* Copernicus Imaging Microwave Radiometer, *CO2M* Copernicus Anthropogenic Carbon Dioxide Monitoring, *CRISTAL* Copernicus Polar Ice and Snow Topography Altimeter, *LSTM* Copernicus Land Surface Temperature Monitoring, *ROSE-L*, L-band Synthetic Aperture Radar.

<sup>16</sup> [https://www.esa.int/Applications/Observing\\_the\\_Earth/Copernicus/Copernicus\\_High\\_Priority\\_Candidates](https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Copernicus_High_Priority_Candidates)

<sup>17</sup> There is a large potential for Earth Observation data to help reporting on Sustainable Development Goals (SDGs) indicators and provide relevant information to monitor the progress towards meeting the SDGs.

Focused on applications, the GSE could be a good model to be replicated for the preparation of the new Copernicus 2.0 Programme. With a better understanding of the High Priority Candidate Missions, the industry believes that it is now time to organize and plan **projects within the framework of a GSE-similar initiative**.

## 2. Developing the Market

As described earlier, the market for EO services is split 55 % towards the public sector and 45 % toward commercial end users. Measures to prepare and develop the new market should reflect this split.

For the public market, the value of EO services coming from Copernicus in support of policy implementation is being led by the European CAP. The new legislation is designed in full confidence that information coming from the use of Copernicus can help enforce new agriculture legislation. Note that this is not to prescribe the use of Copernicus but to recognise that appropriate EO services exist and can be “guaranteed” which will underpin policy implementation and execution.

This is not just applied to agriculture, other policies can and should follow a similar approach including those for climate change, environment and biodiversity, emergency services and resilience, land use and forestry<sup>18</sup>, urban development and air quality, water quality and marine services as well as border control, humanitarian aid and international development. A programme to demonstrate how this can be achieved should be established with each of the appropriate stakeholders. Once technically proven, legislation could include text to prescribe the use of EO services.

This should be reinforced by conducting in-depth analyses of the economic impacts of the space sector on the society and the lifecycle of space companies. Case studies, based upon the use of Copernicus services, should be developed to demonstrate the value of public investments through the creation of new businesses and jobs as well as the overall benefits to society coming from the use of space data.

The procurement of services remains a difficulty for public sector players. Most public procurement practices are not well adapted to encourage SME’s and start-ups due to the heavy procurement processes. This applies especially to the procurement of services where, in the commercial sector, this is becoming an on-line, one-click process. This contrasts with public rules requiring framework contracts, references, and limited flexibility.

The industry would like to see increased use of the pre-commercial procurement (PCP) mechanism. PCP allows innovative ideas to be developed into a commercial product or service, in partnership with the public sector. Its use has so far been limited in the space sector, but we consider it has a strong place in helping to develop the public sector as customers of EO services.

The industry would also like to highlight the necessity to procure commercial data (as-a-service) in order to deliver top quality Copernicus services. The services largely depend on commercial data and the importance of the Contributing Missions to Copernicus should not be downplayed.

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<sup>18</sup> The Land use and forestry Regulation for 2021-2030 (LULUCF) is a good example demonstrating that earth observation data can be a very useful tool to successfully underpin policy implementation.

### 3. The Industrial Role

In the context of potential new markets, industry is ready to play a strong role in supporting the exploitation of the Sentinel data and Copernicus services. We envisage a partnership approach aimed at maximising the public and private sector interests.

The diversity of companies within the EO industry does not allow us to say if the new Copernicus missions will open totally new markets or complement already existing markets. However, the industry stresses the fact that it will bring new sources of information for existing services and thus **expand the market capacities**.

We are still concerned by the positioning of the boundary between public and private interests. There remain many examples where services can be made by the industry which, for historical reasons, remain in the public sector. This stifles investment and restricts the business possibilities as growth in jobs should be a priority for commercial business.

As new services are introduced, we ask that the “industry first” test should be applied. In other words, if industry can supply the services being sought, then industry should be the supplier. This is the case for two new services being introduced into the current portfolio: land deformation and coastal monitoring. Industry welcomes and supports the creation of these services on the basis that they shall follow market procurement rules applied by the Entrusted Entities. We should add that, to avoid being locked into a single supplier for these services, dedicated R&D should be envisaged to ensure that competition can be maintained.

While supporting new actors, existing players and especially SMEs/start-ups shall not be ignored as they are also in preparation for New Space challenges. The life cycle control of those supported projects/successful calls is often neglected, and direct effects on society are not evaluated in the long-term, even though the companies are often richly supported. It would show how even small companies are really competitive (and are bringing jobs and knowledge to the sector) as they are created mostly when they already know the market, and have innovations that have the potential to change the global market.

In that regard, a support system for SME’s could be envisioned to encourage greater participation in the supply of services:

- First of all, small companies would appreciate a **lighter administrative procedure**. Small companies have expressed that the current administrative burden of calls is very costly and is the number one barrier for them to get access to funding.
- The second barrier is the need to put **references to already existing capacities** in calls for proposals. **This practice constitutes a significant barrier for small and young companies** to be successful in winning calls. In addition to this, the lack of references that small companies have makes it difficult to take part in consortiums with larger companies because they view young and small companies more as a risk than an opportunity for being successful at winning calls. Because of this, **more, small and shorter grants would be better for SMEs as they require less teaming and administration**. Small and short grants should be supported by the European Commission to allow ideas to be tested quickly and either allowed to fail or succeed and move onto more conventional funding streams.
- Further, SME’s in particular, depend on Intellectual Property protection for their innovation, and helping to protect them will benefit European strength at large while improving European

technology independence. As SMEs depend on access to a global market, decisions should then consider the best technology available, irrespective of the business model (such as open-source or proprietary) and taking account of reciprocal market access.

Several initiatives have been taken recently to ensure more funds are available for financing. As a new sector, which is growing rapidly, liquidity is of critical importance. Firms seeking loans, equity financing or other funds to develop or secure their business are in strong competition with other sectors. This is likely to become especially acute as the impact of the health crisis wanes and the economic impacts are felt. Competition for funds will become particularly aggressive. As an industry capable of delivering excellent services into a global market, underpinned by substantial public investment into the European space infrastructure represented by Copernicus, it would be regrettable if this is hindered by a lack of working capital in companies or by lack of equity in new businesses and start-ups.

## **Recommendations & Conclusions**

Building upon these developments, EARSC recommends that the following steps are taken:

1. Establish a programme of preparatory research activities between academics, laboratories, agencies and industrial players to prepare the community to take maximum benefit of the new data.
2. Perform in-depth analysis of the economic impacts of the space sector to demonstrate the added value of public investments.
3. Increase use of the pre-commercial procurement mechanism as a means to prepare public sector users to integrate new services into their internal functions and processes.
4. Adopt a partnership approach based around anchor tenancy, to mobilise private investment and maximise the public and private sector interests.
5. Establish public procurement instruments focused on data-as-a-service which include measures to encourage SME's to be a strong part of the ecosystem.
6. Pursue measures which can help ensure the availability of appropriate finance for companies in the sector.

The European EO industry is looking forward to the opportunities offered by the evolution of the Copernicus Programme and wishes to play its role in leveraging the European investments to the maximum. The implementation of the new Copernicus missions could bring a lot of benefits for the downstream service providers as long as there is an appropriate preparation ahead of the upcoming missions. The industry advocates for the development of a new dedicated programme to explore the full potential of new services and encourages a constant dialogue between industrial players, the EC, ESA and Copernicus Entrusted Entities.

Finally, as this paper has been prepared, the Coronavirus pandemic has developed leading to an economic crisis. Companies are very concerned that revenues from commercial sources will fall away significantly over the next 6 to 9 months. In consequence, it is timely to consider the actions described in this document as a means to help companies weather the Covid storm.

We should like to promote the idea that all of these measures could be developed within the framework of an overarching market-led initiative "preparing the future downstream services", so preparing companies to remain in good health and in a position to react quickly and positively once



the crisis starts to ease. We shall welcome the opportunity to explore all these ideas further with stakeholders in the weeks to come.