ENSURING THE SHORT AND LONG-TERM FINANCIAL SUSTAINABILITY OF COPERNICUS

THE URGENT CALL OF THE EUROPEAN SPACE SECTOR TO SUSTAIN AND IMPROVE EUROPE'S GLOBAL ROLE IN CLIMATE CHANGE MITIGATION AND ENVIRONMENTAL MONITORING

Preamble

Copernicus[1], one of the most prestigious European Space Programme, is today the unfailing ally to the European Union's ambitions to be the first climate-neutral continent by 2050.

Universally recognised on the international scene[2] as an unrivalled space system, Copernicus continuously delivers an enormous quantity of data responding to the needs of a vast ensemble of users worldwide (from private companies and citizens, to universities and public administrations) who utilise Copernicus services with full confidence in their quality and durability. As an example, Copernicus is essential for:

- Farmers, in shortage precipitation regions, to optimise the total amount of water requirements as well benefit from specific irrigation requirements depending on crop types;
- Ship captains, in Arctic regions, to significantly improve navigation safety with key information on sea ice parameters;
- Local coastal municipalities to rely on the monitoring of jelly fish populations or detection of harmful algal blooms to prevent potential negative impacts on activities linked to tourism;
- Public health authorities to share air quality and UV forecasts to citizens for them to adjust their behaviour according to their personal situation.

Yet, today, **a funding gap of 721M€ substantially jeopardises the enhanced continuity of the Programme and by extension its capability to fully and timely support the EU Green Deal**[3].

With this paper, **Eurospace**[4] (the trade association of the European space industry) **SME4SPACE**[5] (the voice of SMEs in the European space sector) **EARSC**[6] (the European Association of Remote Sensing Companies) and **NEREUS**[7] (the network of European Regions using space technologies) would like to share some **proposals to help ensure that the European Union achieve its core strategic objectives and in particular the ones related to the EU Green Deal for reaching climate neutrality by 2050 and international commitments such as COP21**, while sustaining the **competitiveness of the European space industry**.

Copernicus: a constantly evolving world-class European programme

Copernicus is one of the most prestigious European programmes. This public services Earth Observation (EO) system is considered as a **world-class reference** for climate change and environmental monitoring. It therefore directly contributes to addressing and finding solutions to some of the major challenges of the coming decades for all European Union citizens, and to **supporting Europe's role on the world stage**.

Copernicus continuously delivers an **enormous quantity of data and information products** responding to the needs of a hundred of thousands of worldwide Copernicus users. The excellence of the Copernicus services is directly linked to the very **high-quality set of Copernicus observations and measures** that can only be provided by the state-of-the art of this space system. As a result, Copernicus has become the **globally-accepted standard for science-grade imagery and EO data quality as well as state-of-the-art earth observation and change monitoring**.

[1] https://www.copernicus.eu/
[2] *As an example among many, climate services products have been identified as a reference and are now regularly relayed by CNN, and Europe can be rightly proud of it.*
[3] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[4] https://eurospace.org/
[5] https://www.sme4space.org/
[6] https://earsc.org/
[7] https://www.nereus-regions.eu/

The excellence and unique benefits of six Copernicus Expansion missions at risk:

The EU Green Deal, as a centrepiece of European policies, holds the potential for wide-reaching impacts for European economy and society over the next decades to come. However, its ambitions call for sharper tools, **beyond the capabilities provided by the first generation of Copernicus Sentinel satellites**.

To match the new ambitions of the EU Green Deal, the European Space Agency (ESA), in partnership with the European Commission (EC), proposed six new innovative Earth observation satellite missions - the **Sentinel Expansion Missions**.

The six Sentinels Expansion have been designed to answer essential societal and economic challenges such as greenhouse impact monitoring, agriculture management, survey of the heavy impact of anthropic activities in particular on coasts, biodiversity, and water cycle (ice and snow) monitoring. One important issue-area and priority is the Arctic, owing to its increasing role and relevance in trade and security for Europe in the future.

Each of the six Sentinel Expansion missions will significantly raise the level of Copernicus' available applications and its services portfolio, and will fill in the gaps currently present in the Copernicus Programme, provided that they are adequately supported financially.

A structuring programme for the competitiveness of the European space sector

From an industrial perspective, **Copernicus is a structuring programme for the European space sector** as it enables it to master world-class technologies for operational and reliable remote sensing.

More precisely, on the one hand, it allows equipment suppliers to develop and maintain performant and reliable products, featuring technological innovation and recurring models with mini-series, **contributing to ensure a "critical mass" of activities to space satellites manufacturers, and providing continuity to the EO manufacturing industry**; this in turn positively impacts industry's product policies. On the other hand, Copernicus data act as enabler and enormous accelerator for all kinds of **value-added EO products and services based on latest AI developments, cloud computing and mass data processing**, for-real time monitoring of the earth system and all its constituents.

Copernicus is also a **driver for established European downstream companies** and a **catalyst for SMEs and start-ups** to develop added value services and products, develop business in Europe and abroad. With the long-term approach, companies can invest in the upstream developing complementary capabilities or in the downstream in the processing of data and the delivery of services or products creating jobs and expand internationally.

Indeed, the cutting-edge technologies and products developed in the frame of the Copernicus programme can then **be used for future commercial and export customers** as state-of-the-art and "ESA proven" branded products, making a qualitative differentiator. It is probably not a coincidence that, today, Europe is the world leader of EO systems and EO-based services and products on the export market.

In addition to being a key asset for Europe to position itself as a world leader in environmental monitoring, **Copernicus is also an excellent showcase for the European space sector on the open markets**, as well as for supporting political recognition of space in Europe.

According to the 2016 study of the European Commission "Study to examine the socioeconomic impact of Copernicus in the EU", *"the EUR 1.4 B invested in Copernicus over 2008-13 is estimated to have increased employment by around 15,580 person-years",* giving the results that each 10 K€ spent in EO activities generates

0,11 person-years in highly skilled workers. **Using this equation, the 721M€ shortage means a loss of almost 8000 skilled workers.**

According to the 2019 study of the European Commission "Copernicus market report", the impact factor for each euro invested in Copernicus is >2. **Using this equation, the 721M€ shortage means a negative impact of 1.4 to 1.8B€ on Member States' economies.**

Concretely, 721M€ is the amount needed to:

- Procure and launch a third satellite of the Copernicus Copernicus Carbon Dioxide Monitoring (CO2M) mission required to fulfil the mission objectives, aiming at anthropogenic CO2 emission monitoring and verification capacity of the EU and global greenhouse gas concentrations and fluxes. A third CO2M satellite would allow identifying twice as many emitting point sources;
- Maintain adequate capacity levels in response to the needs of civil protection agencies in Europe dealing with disaster management and operational security, as well as support to EU external actions and border control (especially with regards to procurement of very high resolution optical and radar data);
- Maintain top levels of Copernicus space data accessibility and availability, even throughout ever-increasing data volumes.

From an industrial perspective, the Copernicus funding gap will **prevent the continuity of the current Sentinels and the nominal execution of the Sentinels Expansions missions**, resulting in a stop of activities at system level that will have several dramatic impacts both for the upstream and the downstream European space sector.

Not exhaustive expected impacts could include:

- A dramatic **drop of workload** for industry putting at risk the job of hundreds of employees for activities planned until 2029, with **loss of associated skills and competences**;
- In case of a stop of the activities at satellite and payload levels, the relevant teams will be re-assigned to other projects. When the missions will restart, a significant increase of **non-recurring costs** is expected as new teams will need to be set up;
- **Risks of obsolescence** for Protoflight (PFM) and Flight (FM) Models equipment at platform and payload levels is expected following long storage periods;
- **Lack of synergies and continuity** between Sentinels Expansion missions and the planning for the development of Copernicus Sentinels Next Generation; this will increase non-recurring costs and risks of obsolescence;
- **Risks in data/services continuity** if Sentinels Next Generation deployment is delayed, with dramatic impacts on the worldwide Copernicus data user's community (**including reducing the development and opportunities of the European downstream sector**);
- **Risks for the required continuous evolution and expansion of the Copernicus services portfolio,** in order to meet the challenges of progressing climate change and environmental impacts;
- Drop of workload, reduction of revenues (for some companies 70% to 80% of the overall Programme revenues), impacts on series production, increase of non-recurring costs will have **important impacts for the European space industry in terms of investment and competitiveness**;
- **Weakening of European current role and credibility in EO** as Sentinels satellite are currently acting as catalyst a worldwide level for the development of cooperating missions including companion satellites.
- **Loss of contracts for European companies in the commercial export market** due to unreadiness of next generation LEO platforms **and lack of European reference applications and services**.

Ensuring the long-term financial sustainability of Copernicus: way forward

Having the European Union achieve its core strategic objectives, Copernicus users (public and private) have access to essential, independent and reliable EO data and services recognised for their quality, durability and robustness, and the European space sector continue to rely on a structuring programme for its competitiveness, is today being challenged; **the long-term financial sustainability of Copernicus is seriously endangered**.

The European space sector however believes that a swift and collective action is still possible to recover the Copernicus budget gap and secure the enhanced continuity of the Programme.

In this regard, the **Mid-term Review of the Multi-Annual Financial Framework** (MFF) announced in September 2022 by the President of the European Commission Ursula von der Leyen in her letter of intent on the State of Union is **unmissable opportunity** to raise Copernicus as a critical enabler for reaching climate neutrality by 2050 and international commitments such as COP21.

Main vehicle for this ambition, the recently proposed regulation for a **Net-Zero Industry** Act[8] which aims at strengthening the EU's net-zero technology manufacturing capacities as a mean to enable the energy transition allows for the European space sector to be recognised as a strategic sector in the support of the EU's net-zero goals. Giving pride of place to Copernicus and its Expansion missions[9], the proposed regulation, via measures aiming at stimulating investment place the European space sector eligible to **increased financial support** and **quicker accreditation** for its products and components.

In a competitive environment where, for instance, the US grants no less than 3.3 B$ to the National Oceanic and Atmospheric Administration (NOAA) in support to Earth Observation as part of its Inflation Reduction Act, bridging the 721M€ funding gap as part of the Mid-term Review of the MFF is first and foremost **a question of European sovereignty**; do we effectively want to our safeguard our capacity allowing European decision-makers for independent decision-making and action?

For this, the absolute criticality of space as a key asset has increasingly been recognised; Copernicus being one of the most visible catalysts.

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0161

[9] *Recitals (59) : "Space data and services derived from EU Space Programme, and in particular Copernicus, shall be used to the extent possible to provide information on the geology, biology, ecology, socio-economic development, and resource availability for the environmental assessments and authorisations; such data and services and in particular the Copernicus anthropogenic CO2 emission monitoring and verification capacity are most relevant to assess the impact of industry projects and the impact of anthropogenic CO2 sinks on the global greenhouse gas concentrations and fluxes"*