ACCELERATING THE USE OF SPACE IN PORTUGAL AND EUROPE

ESA COUNCIL MEETING AT MINISTERIAL LEVEL – CM22

Strategic Framework and Portuguese Subscription

Paris, 22 and 23 November 2022

1. EXECUTIVE SUMMARY

1.1. SPACE IN EUROPE IN THE NEW GLOBAL GEOPOLITICAL CONTEXT AND ESA'S ROLE IN THE NEW ERA OF SPACE

In recent years, the evolution of the global space sector has been marked by the growth in the number of players and the intensification of the global dispute for new space markets. The space sector in Europe has sought to assert itself in this new commercial paradigm. While the North American investment culture continues to dominate, the new paradigm increases its presence in different geographies - such as China, India, Japan and Israel, among others - that seek to capture the potential for innovation and new business models. These models are less anchored in public policies, as had been traditional in the former European model.

In addition to pushing global economic competitiveness, the conflict in Ukraine has accentuated the European space sector dependence on third parties, such as Russia, in terms of technology and raw materials. The conflict situation has highlighted the gaps in Europe's strategic autonomy in space.

In this context of global competition, and adverse economic conditions worldwide, the European Space Agency (ESA) and its Member States reinforced Europe's role as a competitive actor in this strategic field, capable of boosting the benefits of space activities for European citizens. This position takes on particular importance because ESA is among the entities responsible for the components of the European Union's Space Programme, alongside Copernicus, Galileo, SSA, EGNOS and GOVSATCOM, under the terms of the ESA-EU Framework Partnership Agreement, and its role and contribution to the Secure Connectivity initiative is also being defined.

1.2. ESA Council Meeting at Ministerial Level (CM22) and the New Space Programs for the Decade

The ESA Council Meeting at Ministerial Level took place on 22 and 23 November 2022. Every three years, the ESA Member States meet to discuss, define and approve a common strategy for the near future, to affirm Europe in the space sector. For two days, participants evaluated the ongoing programs, discussed new objectives, and approved the respective level of funding, through the Member States' subscriptions to each program.

The Ministerial meeting also represented **an opportunity for Portugal**, as a Member State, **to define and implement its own scientific, technological and industrial policy in the space area**, not only by participating in defining the European agenda, but also by giving national companies the opportunity to actively participate in implementing each of the programmes, namely through the figure of geographic return and ESA's service contracting policy. As the decision about the programmes subscribed by Portugal was crucial for the future development of the national space community, the companies and research institutions were extensively consulted in the months previous to the ministerial, its positions were heard, and its participation will be translated in tangible business opportunities in the future.

1.3. ESA and the Development of the Sector in Portugal

ESA is one of the fundamental international organizations for the effective development of scientific and technological capabilities in Portugal. This activity is translated not only into high levels of scientific production and significant participation in European R&D projects in space, but also into the growth of the business community, with the continued creation of new companies and innovative projects. For example, one of the main indicators for evaluating national participation in ESA is the geographical return on investment, and in Portugal's case it has shown values in excess of 100% in recent years. This number is particularly relevant because it shows the ability of the national community to compete successfully in ESA tenders and ensure a return on investment. **Since 2015, this relationship has brought contracts worth more than 115M€ to Portuguese entities**. Currently, there are 400 Portuguese entities registered in ESA's procurement platform, which is also demonstrative of the interest and deployment that ESA has produced at national level.

1.4. The Strategic Axes of the Portuguese Space Agency for the Decade

One of the main functions of the Portuguese Space Agency is to monitor national participation in ESA and articulate national interests through the national space strategy, with the space community and

policy makers. Preparing for the Ministerial Council, the Agency pursued multiple contacts within the ecosystem to define a plan of action mapping the interests and priorities of Portuguese entities for the presentation of the new European programs, culminating in a strategic dossier that supported the decision-making process at government level.

The strategic elements of this document are based on the three main axes of action of the Portuguese Space Agency in this decade. These are: a) continuing the **scientific and technological capacity building** process; b) **pursuing the programmatic challenges launched by the Agency**; c) expanding the role of space in the **promotion of scientific education and culture** among younger generations.

1.5. The Programmatic Areas of ESA and the Strategic Alignment

ESA presented **twelve programmatic areas for subscription** at the Ministerial meeting. Each one contains several programmes that implement ESA's strategic objectives, which also **contribute to the strategic objectives of the Portuguese Space Agency**, as shown in the matrix below.

	Scientific and Technological Training	Programmatic Challenges:			Space for Scientific Education
		Space Agenda	Valorization of the Atlantic Position	Sustainability of Space Operations	
Scientific Programme (Mandatory)					
Basic Activities (Mandatory)					
CSG (Mandatory)					
Prodex (Optional)					
Technology (Optional)					
Human and Robotic Exploration (Optional)					
Space Safety (Optional)					
Earth Observation (Optional)					
Telecommunications (Optional)					
Navigation (Optional)					
Space Transportation (Optional)					
Commercialisation (Optional)					

Figure 1 – Programmatic objectives by programmatic subscription area

1.6. Maximizing the Potential of the Sector by Articulating Funds to Support Innovation

The Portuguese Space Agency defined strategic axes and programmatic challenges that respond to the major challenges facing the country to which space can contribute, delineating the support of different sources of funding for innovation. Among these are ESA programs, the Recovery and Resilience Plan,

structural funds, European Union programs such as Horizon Europe, national funds, and also funds available through venture capital firms. Within the scope of its interaction with the different actors, the Portuguese Space Agency seeks to **maximize the articulation of funds so that the financing of the sector's complex technological programs is carried out efficiently**. The specificities of each source of funding are always considered, with a view to minimizing or even avoiding any interruptions in the support for innovation, which sometimes results from programmatic complexity and delays.

1.7. Public and Private Financing

The funding of the Portuguese space sector is still predominantly public, although private funding and commercial contracts not dependent on public funding are assuming an increasingly significant role. In terms of national public funding, we can distinguish four major typologies:

- **Funding from international organizations**: accounts for about 50% of the total. ESA accounted for about 35% of the total funding in 2021.
- **Funding from EU centrally managed programs**: represents about 33% of the total and corresponds mainly to the Copernicus, Galileo / EGNOS and Horizon 2020 / Horizon Europe programs.
- **Financing of EU decentralized management programs**: represents about 4% of the national investment and, for the most part, corresponds to PT2020, PT2030 and PRR, among others.
- **Funding from national entities via FCT and other sources**: represents about 14% of the total.

In the 2014-2021 period, public investment in the sector doubled in absolute terms. In 2021, it reached around €80 million, while Portugal's funding for the ESA in the same year was €27 million. It is worth noting, however, the very significant investment that Portugal makes in the European Union Space Programme (and its Copernicus, Galileo / EGNOS, SSA and GOVSATCOM components), in the R&I Framework Programme (H2020 and Horizon Europe) and in structural funds, among other programmes, through its contribution to the European Union budget.

In terms of national funding, it is important to mention the distinction between the investment made by the country in an institution or program and the return that Portugal receives in terms of industrial contracts or research activities. Each program and entity has its own particularities, but in the case of ESA, the geographic rate of return on individual contracts is generally 100%, although the direct economic return to Portugal is around 70% of the national investment (subtracting ESA overheads, operating costs and other expenses allocated in other countries).

In the case of European Union programs, the situation is very different: for Copernicus, the rate of return in industrial contracts in Portugal is around 25%, while for Galileo/EGNOS, the figure is 3%. On the other hand, for the space component of Horizon 2020/Horizon Europe the rate of return exceeds 100%. Due to the very nature of the programs, the rate of return for structural funds is much higher and, in recent years, funding through the PT2020 program has assumed an increasingly relevant role in the space sector. In 2021, the execution of structural-fund projects in the space sector was around 11M€ of public funding, corresponding mostly to mobilizing projects and international partnerships.

Finally, it should be noted that from 2022 onwards there will be very significant co-financing in the space sector through the RRP, acting in the areas of sustainability, and most particularly for earth observation, solutions for space traffic, and mitigation of the space debris problem. This public funding will also mobilize significant private funding in the sector.

On the other hand, in recent years there has been a significant increase in private investment in national space sector companies. Although this investment often goes to companies working in sectors other than space, venture capital investment in national space sector companies exceeded 30M€ in 2022.

The following chart shows the evolution of public investment and venture capital fund investment in the space sector in Portugal.

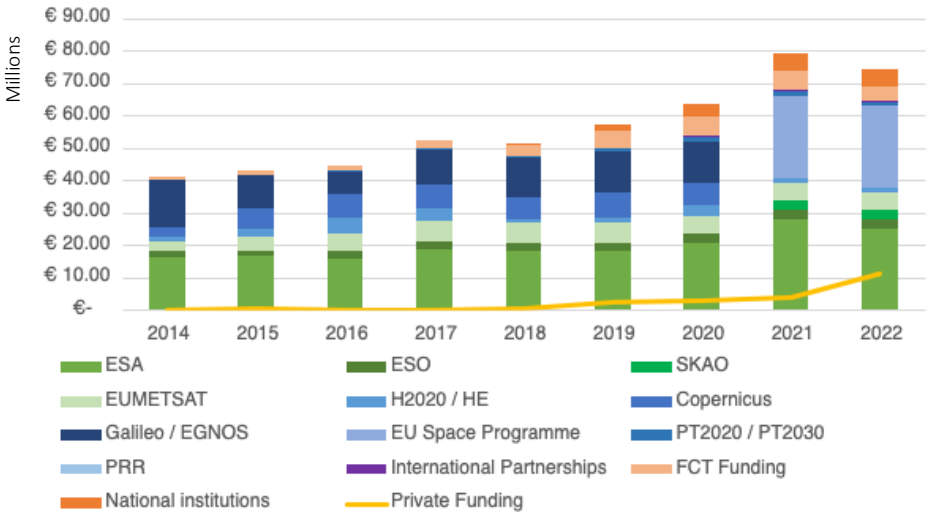

Chart 1 – Evolution of public funding and venture capital funds in the Portuguese space sector. The chart considers confirmed values up to July 2022

1.8. The National Subscription in the ESA Council Meeting at Ministerial Level

The ESA programs proposed for subscription at the ESA CM22 Ministerial meeting, represented an essential element for ensuring the sustainability of the space value chain, ensuring the achievement of the Agency's strategy, and promoting the effective implementation of an operational space program in Portugal that responds to national challenges, defining priority areas and complemented by the need to articulate funds.

The Portuguese subscription at the ESA CM22 Ministerial meeting allows the country to leverage space sector projects, promote their commercial exploitation, and continue the effort to build the capacity of national industry and academia to keep pace with global innovation cycles and their opportunities. The increase of the Portuguese subscription allows the national sector to continue to growth its capabilities and impact in this decade, signaling the priority for innovation to overcome the present global challenges.

The Portuguese Space Agency proposed to the Government to increase the subscription when compared to the previous ministerial and to subscribe to ESA's mandatory and optional programs for 114.94M€, for the next 5 years, which was fully accepted as shown in the following table.

Amounts in M€, 2022 ec / cec

TOTAL OVERVIEW by DOMAIN	CM22 (M€)
Scientific Programme (Mandatory)	36,00
Basic Activities (Mandatory)	18,26
CSG (Mandatory)	3,38
Prodex (Optional)	4,00
Technology (Optional)	9,80
GSTP Element 1 "Develop"	9,80
Human and Robotic Exploration (Optional)	2,25
European Exploration Envelope Programme	2,25
Space Safety (Optional)	10,40
S2P Envelope Programme	6,80
Cosmic	3,60
Earth Observation (Optional)	10,19
FutureEO-1 Segment 2	5,00
Copernicus Segment 4 Phase 2 (CSC-4)	1,74
Aeolus 2	1,15
Digital Twin Earth	1,30
CLIMATE SPACE	1,00
Telecommunications (Optional)	15,00
Future preparation	0,20
Core Competitiveness	3,00
Business Applications Space Solutions	5,00
Space for 5G/6G and Sustainable Connectivity	0,50
Optical & Quantum Communication - ScyLight	3,00
Moonlight	0,70
Civil Security - Line 1	0,40
Secure Connectivity - Phase 1 and Phase 2	2,20
Navigation (Optional)	1,50
NAVISP Phase 3 E1	0,50
LEO PNT	1,00
Space Transportation (Optional)	2,70
Boost!1	0,80
Boost!2	0,20
Boost!3	0,20
Space Rider 3.1. - CSI Element	1,50
Commercialisation (Optional)	1,50
Scale-Up! Element 1 "INNOVATE"	1,50
TOTAL (M€)	114,98

Table 1 – Detailed subscription

The goal of leveraging the Portuguese Space Agency's strategic defined by the National Space Strategy 2030 is reaffirmed through subscriptions in the various areas of ESA, namely:

- The Scientific Programme (mandatory) and the PRODEX programme contribute to the development of ESA's scientific missions and their instrumentation, allowing the scientific community working in space to maintain high levels of excellence and scientific impact. In particular, the versatility of the PRODEX program is unparalleled in national support mechanisms and is essential to ensure the involvement of the Portuguese ecosystem in solving the major issues of space science in this century.
- The Basic Activities program (mandatory) and the Technology program (GSTP) represent ESA's pillars in supporting the development of technologies in all phases of maturity. These programs also support other transversal activities, such as using space's inspirational capacity to promote education in the areas of science and technology. The GSTP program also contributes to the development of strategic national projects, namely in the development of space access and return infrastructures, or in the modernization of the ground segment infrastructures on the island of Santa Maria, Azores.
- The Human Exploration and Robotics program enables the national community to contribute to the most complex and ambitious European projects of Solar System exploration, as well as the use of research platforms in the space environment for the benefit of other sectors of society.
- The Space Security program contributes to the Portuguese ecosystem to continue leading the development of products, services and technologies for new markets related to the sustainability of space operations, such as in the emerging field of space traffic control.
- The Earth Observation programs promote the involvement of the national scientific community in new Earth exploration missions, and allow the creation of industrial capabilities for the development of new generations of satellites and constellations, including the Copernicus Program. The Earth Observation programs seek to address major challenges of society such as climate change, pollution and sustainability, among others, in order to improve the quality of life of citizens, support decision making and promote a more digital and sustainable society.
- Telecommunications programs support the development of national capabilities in an area that represents the majority of the commercial sector and attracts the majority of private investment. The ecosystem shows strong interest in participating in shared-risk activities (50% co-funded), and more than 12M€ in venture capital was raised during the last cycle; these facts show the strong commercial appeal of the sector. Additionally, Telecommunications programs are essential to support the development of innovative technology in areas such as ultra-secure communications, optical or quantum communications or non-terrestrial 5G/6G networks, which are also key to an increasingly digital society. Finally, the Telecommunications programs play a key role in leveraging national participation in major European initiatives such as Secure Connectivity or EuroQCI - European Quantum Communication Infrastructure.

- Navigation programs are an essential tool for positioning the national ecosystem in the European space sector, ensuring its competitiveness in the purely institutional programs of the European Union Galileo and EGNOS, and supporting the innovation of products, services and applications that use these technologies.
- The Access to Space programs and the European Spaceport in French Guiana (mandatory) contribute to strengthening national capabilities related to micro-launcher development, and enable ESA support for the implementation of an Atlantic Spaceport.
- The Commercialization program supports the network of space incubators in Portugal, thus promoting the creation of new companies that explore the innovation potential of space infrastructures and technologies.